

Republic of India

Republic of India
Data Collection and Confirmation Study
on Dairy Sector

Final Report

March 2018

Japan International Corporation Agency (JICA)

Kaihatsu Management Consulting, Inc.

Map of the Study Area (India)



Table of Contents

Chapter 1 Outline of the Study	1-1
1.1 Objective of the Study.....	1-1
1.2 Background of the Study.....	1-1
1.3 Study Area.....	1-2
1.4 Study Implementation Plan	1-2
1.5 Limitation of the Study	1-5
Chapter 2 Outline of the Dairy Sector and Related Sectors	2-1
2.1 International Positioning of Indian Dairy Sector and Related Sectors	2-1
2.2 Overview of the Dairy Sector and Related Sectors in India.....	2-5
2.3 Indian Government Policies and Principles in the Dairy Sector and Related Sectors.....	2-13
2.4 Value Chain in Dairy Sector and its Actors.....	2-28
Chapter 3 National Dairy Development Board	3-1
3.1 Organizational Structure	3-1
3.2 Financial Status	3-5
3.3 Scheme for Supporting Cooperatives and Loan Condition	3-8
Chapter 4 Current Status of Dairy Cooperatives and Major Issues	4-1
4.1 Target Milk Unions of the Study and Selection Method.....	4-1
4.2 Basic Descriptions of Dairy Cooperatives	4-3
4.3 Management and Financial Situation of Dairy Cooperatives.....	4-9
4.4 Sales and Marketing of Dairy Products by Cooperatives.....	4-19
4.5 Processing	4-24
4.6 Cold Chain	4-30
4.7 Procurement of Milk	4-33
4.8 Cooperative Services to Members.....	4-38
4.9 Investments and Finances of Dairy Cooperatives	4-41
4.10 Summary	4-45
Chapter 5 Current Status of Dairy Production and Rural Societies	5-1
5.1 Basic Description of Socioeconomic Situation Survey.....	5-1
5.2 Ownership of Cattle and Buffalo and Dairy Production	5-2
5.3 Rearing Management and Productivity	5-6
5.4 Household Incomes and Incomes from Livestock Activities	5-11
5.5 Sales of Milk	5-14
5.6 Reasons for Becoming Dairy Cooperative Member or Not	5-18
5.7 Utilization of Loans and Insurance for Livestock Activities.....	5-19
5.8 Summary	5-20

Chapter 6 Current Food Safety Situation and Issues	6-1
6.1 FSSAI and Regulatory Framework	6-1
6.2 Current Food Safety Management Situation and Issues for Dairy Products	6-3
6.3 Future Prospects	6-10
6.4 Summary	6-11
Chapter 7 Issues and Countermeasures in the Dairy Sector	7-1
7.1 Current Situation of Dairy Sector.....	7-1
7.2 Issues of Dairy Cooperatives.....	7-6
7.3 Countermeasures	7-10
7.4 Consideration of Japanese Technologies and Experience	7-13

List of Tables

Table 1-1 Selected state in each region for the study	1-2
Table 1-2 The study team.....	1-3
Table 1-3 Overview of the field surveys	1-4
Table 1-4 Places and Organizations visited during the field survey	1-4
Table 2-1 Top ten countries for milk production (cow and buffalo milk) in 2016 (Unit: 1,000 tons).....	2-1
Table 2-2 Increase ratio of per capita milk consumption volume	2-2
Table 2-3 Self-sufficiency rate of dairy products.....	2-3
Table 2-4 Production volume, and estimation of share of cow and buffalo milk in 2016.....	2-6
Table 2-5 Monthly per capita milk consumption (L)	2-6
Table 2-6 Distribution of households and average number of cattle/buffalo holdings (2012).....	2-9
Table 2-7 Livestock income by land holding	2-9
Table 2-8 Income sources of farmers by income quintile	2-10
Table 2-9 Annual milk production of top 10 states (2015-16)	2-11
Table 2-10 Milch animals per 100 households by land holding group (rural)	2-13
Table 2-11 Financial outlay and fiscal achievement of the Operation Flood	2-14
Table 2-12 Projection for milk production.....	2-16
Table 2-13 Gap analysis of dairy infrastructure under cooperative and private sectors.....	2-17
Table 2-14 Funding pattern of NPDD	2-18
Table 2-15 Physical targets and achievements of NPDD	2-19
Table 2-16 Outline of National Dairy Plan Phase 1	2-20
Table 2-17 Project development objective indicators of the plan	2-21
Table 2-18 Financial contribution of the DIDF.....	2-23
Table 2-19 Number of projects, project cost, and amount of grant released of the scheme	2-25
Table 2-20 Financial assistance pattern of NCDC schemes.....	2-27
Table 2-21 Organization in charge of breeding in each state	2-30
Table 2-22 Three-tier cooperative structure	2-32
Table 3-1 States covered by headquarters and each regional office.....	3-1
Table 3-2 Board of directors of the NDDB.....	3-2
Table 3-3 Number of officers and staff working for the NDDB as of September 2017.....	3-4
Table 3-4 Groups providing supports to cooperatives and producer companies6.....	3-4
Table 3-5 Net profit after tax of the NDDB from 2010-11 to 2015-16 (in million rupees)	3-6
Table 3-6 Net profit after tax of the NDDB from 2010-11 to 2015-16 (in million rupee).....	3-6
Table 3-7 Net profit after tax of the NDDB from 2010-11 to 2015-16 (in million rupees)	3-6
Table 3-8 Net profit after tax of the NDDB from 2010-11 to 2015-16 (in million rupees)	3-7
Table 3-9 Gross loan portfolio to total assets of the NDDB from 2010-11 to 2015-16 (in million rupees)..	3-7

Table 3-10 Gross loan portfolio to total asset of the NDDB from 2010-11 to 2015-16 (in million rupees) .	3-7
Table 3-11 Gross loan portfolio to total assets of the NDDB from 2010-11 to 2015-16 (in million rupees)	3-8
Table 3-12 Loan disbursements by the NDDB from 2007-08 to 2016-17 (in crore rupees).....	3-8
Table 3-13 Statement of principal and interest repayments during last five years.....	3-9
Table 3-14 Loan terms of short and long term loans provided by the NDDB	3-9
Table 4-1 Target milk unions examined in the study	4-1
Table 4-2 Basic facts on milk production, milk procurement, and sales by state cooperatives (2015-16) ...	4-3
Table 4-3 Historical progress of the number of organized DCS	4-4
Table 4-4 Basic description of MPCs.....	4-5
Table 4-5 Names of state federations for the target states and the brand names of the dairy products produced by dairy cooperatives for each state	4-9
Table 4-6 Composition of the boards of directors of the state federations.....	4-10
Table 4-7 Sales activities, facilities, and size of staff of state federations	4-11
Table 4-8 Profit and loss statement for GCMMF (Gujarat state federation) for 2015-16 (Rs.).....	4-12
Table 4-9 Profit and loss statement for MPCDF (Madhya Pradesh state federation) for 2015-16 (Rs.)....	4-12
Table 4-10 Net profit of PCF (Uttar Pradesh state federation) for each institution (2015-16).....	4-12
Table 4-11 Percentage of milk unions with accumulated deficits and profits by range of milk collection volume (all India) in 2015/16.....	4-15
Table 4-12 Financial indicators for selected milk unions and MPC (2016-2017)	4-16
Table 4-13 Percentages of DCSs at each rank of financial performance	4-17
Table 4-14 Number of registered and functional DCSs for the six states in 2016.....	4-17
Table 4-15 Profit and loss statement of Rahamatenagar DCS for 2015-16	4-18
Table 4-16 Profit and loss statement of Amarpur DCS for 2015-16	4-19
Table 4-17 Sales performance of the dairy cooperatives of the six states.....	4-21
Table 4-18 Major high value-added products procured by each brand of the dairy cooperatives	4-22
Table 4-19 Ways of setting retail prices for products.....	4-23
Table 4-20 Major dairy processing machinery and equipment	4-24
Table 4-21 Major manufacturers of machinery in India's dairy sector	4-25
Table 4-22 Number of installation of major machinery	4-26
Table 4-23 Approximate budget of plants (Rs. crore).....	4-27
Table 4-24 Existing condition of processing infrastructure of milk cooperatives.....	4-28
Table 4-25 Year of installation of machinery	4-29
Table 4-26 Points to be improved by 5S in dairy plants	4-30
Table 4-27 Milk cold chain	4-32
Table 4-28 Costs of cold chain items	4-33
Table 4-29 Volumes of milk procurement by cooperatives and number of functional DCSs and their trends...	4-34
Table 4-30 DCS coverage for selected states	4-36

Table 4-31 Ways of setting milk prices for cooperatives	4-37
Table 4-32 Major member services provided by cooperatives in the five target states.....	4-40
Table 4-33 Examples of services provided by private dairy makers to farmers	4-41
Table 4-34 Descriptions of major investments, their sources of finance, and future demand for credit.....	4-43
Table 4-35 Positive and negative factors affecting the business performance of cooperatives.....	4-48
Table 5-1 Sample size for each category of farmers and state	5-1
Table 5-2 List of target villages in the socioeconomic situation survey	5-2
Table 5-3 Average number of cattle and buffalo holdings per household and distribution of cattle and buffalo reared for each category of rural household.....	5-3
Table 5-4 Average number of bovine (cattle and buffalo) holdings per household for each category of rural household and state	5-3
Table 5-5 Average number of cattle and buffalo per household.....	5-4
Table 5-6 Distribution of rural households in cattle and buffalo holdings.....	5-4
Table 5-7 Average annual milk production volume per household (liter).....	5-5
Table 5-8 Average annual milk sales volume per household (liter)	5-5
Table 5-9 Comparison of livestock holdings and milk production and sales.....	5-6
Table 5-10 Average cow yield per day for major breeds in the target villages	5-6
Table 5-11 Percentages of cows reared by farmers in the target villages by breed.....	5-7
Table 5-12 Percentages of cows by breed for villages with and without DCSs.....	5-7
Table 5-13 Average buffalo yields per day for major breeds in the target villages	5-8
Table 5-14 Percentages of buffalos reared by farmers in the target villages by breed.....	5-8
Table 5-15 Percentages of farmers who use AI services to mate livestock.....	5-8
Table 5-16 Percentages of institution use for AI services	5-9
Table 5-17 Percentages of farmers who provide cattle feed to their livestock every day	5-9
Table 5-18 Percentages of farmers who buy cattle feed at DCS offices	5-10
Table 5-19 Average yields per cow and buffalo per day (liters).....	5-11
Table 5-20 Average household annual income (Rs.).....	5-11
Table 5-21 Average household annual income from agriculture (Rs.).....	5-12
Table 5-22 Average household annual income from livestock activities (Rs.)	5-12
Table 5-23 Percentages of agricultural income against total income	5-13
Table 5-24 Percentages of livestock income against total income	5-13
Table 5-25 Comparison of average household annual incomes	5-14
Table 5-26 Percentages of dairy farmers by type of buyers for DCS members	5-15
Table 5-27 Percentage of dairy farmers by type of buyer for non-members.....	5-15
Table 5-28 Percentages of dairy farmers by type of buyer for villages without DCSs	5-16
Table 5-29 Percentages of favored buyers	5-16
Table 5-30 Reasons why cooperative is the favorite buyer (number of farmers)	5-17

Table 5-31 Reasons why middleman is the favorite buyer (number of farmers)	5-17
Table 5-32 Reasons why private dairy company is the favorite buyer (number of farmers)	5-18
Table 5-33 Reasons for becoming cooperative member	5-18
Table 5-34 Reasons for not being a member of dairy cooperative	5-19
Table 5-35 Percentages of farmers who have used loans to purchase livestock	5-19
Table 5-36 Percentages of insured cows and female adult buffaloes	5-20
Table 6-1 Amendment of milk standard in October 2017	6-1
Table 6-2 FSSAI administration	6-2
Table 6-3 Number of issued licenses and registrations (2015-16), FSSAI staff, and laboratories	6-3
Table 6-4 Results of sample survey in three states.....	6-4
Table 6-5 Quality check of milk by milk unions.....	6-5
Table 6-6 Differences of food safety management of milk between organized and unorganized sector	6-8
Table 6-7 Cleaning practices of farmers	6-9
Table 6-8 Comparison on cleaning practices between village with DCS and without DCS.....	6-10
Table 7-1 Average yield per cow per day, ratio of high-yield breed, AI usage, and cattle feed provision	7-3
Table 7-2 Overall performance and factors of dairy cooperatives in the studied six states.	7-7
Table 7-3 Comparison among India, Japan and other major milk producing countries and areas.....	7-15
Table 7-4 Major manufacturers and importers of dairy sector in Japan.....	7-18

List of Figures

Figure 1-1 Implementation structure of the study.....	1-3
Figure 2-1 Per capita consumption volume of dairy products and global population.....	2-1
Figure 2-2 Per capita milk consumption volume (kg/year).....	2-2
Figure 2-3 Milk production volume in developed countries and developing countries (tons per year).....	2-2
Figure 2-4 Milk production volume in developing countries in each region (tons per year).....	2-2
Figure 2-5 Price change of dairy products	2-3
Figure 2-6 Long-term trend of WMP's international price.....	2-3
Figure 2-7 Structural change of dairy sector in developing countries	2-4
Figure 2-8 Geographical distribution of livestock system	2-5
Figure 2-9 Milk production volume in India.....	2-6
Figure 2-10 Monthly per capita milk consumption in each expenditure criteria (liter)	2-6
Figure 2-11 Estimated daily per capita milk availability, population, and milk demand.....	2-7
Figure 2-12 Utilization pattern for milk and milk products (%).....	2-7
Figure 2-13 Sales of milk and dairy products in 2016 and 2022 (million rupees).....	2-8
Figure 2-14 Import and export of dairy products in India.....	2-8
Figure 2-15 Number of NDP I approved projects.....	2-21
Figure 2-16 NDP I granted amounts (lakh rupees)	2-21
Figure 2-17 Shares of annual milk production volumes in states, NDP I grant amounts,	2-22
Figure 2-18 Outline of value chain in India	2-28
Figure 2-19 Outline of stakeholders in dairy sector in India.....	2-29
Figure 2-20 Average annual turnover and growth rates of nine major private companies.....	2-34
Figure 2-21 Total annual turnover and growth rates of milk unions.....	2-34
Figure 3-1 Organizational chart of the NDDDB as of December 2017	3-3
Figure 4-1 Locations of target unions	4-2
Figure 4-2 Graphical representation of value chain of dairy products.....	4-7
Figure 4-3 Value chain of dairy products in Gujarat.....	4-7
Figure 4-4 Value chain of milk in Assam state.....	4-8
Figure 4-5 Relation between accumulated profit/loss and milk procurement volumes (all unions).....	4-14
Figure 4-6 Relation between accumulated profit/loss and milk procurement volumes (six target states) ..	4-14
Figure 4-7 Typical route of milk collection	4-32
Figure 4-8 Monthly volumes of milk procurement for Patna milk union and Varanasi milk union	4-35
Figure 5-1 Proportion of each source of income to total income for large and medium farmers	5-13
Figure 5-2 Proportion of each source of income to total income for small and marginal farmers.....	5-13
Figure 5-3 Proportion of each source of income to total income for tenants and landless	5-13
Figure 6-1 “Pink Book” Do and don’t buy of milk and milk products	6-2

Figure 6-2 FSSAI's online systems and SNS	6-3
Figure 6-3 Organizational chart of Bhopal milk union	6-6
Figure 6-4 Educational material of the NDDB	6-8
Figure 7-1 Outline of this section	7-1
Figure 7-2 Virtuous cycle at village level	7-4
Figure 7-3 Virtuous cycle at dairy cooperative and village level.....	7-5
Figure 7-4 Vicious cycle at dairy cooperative level	7-8
Figure 7-5 Summary of challenges and countermeasures.....	7-11
Figure 7-6 Number of dairy animals per household and number of dairy farmers in Japan.....	7-14
Figure 7-7 The milk quality test and checks at various stage	7-16

Abbreviation

AI	Artificial Insemination
A to C	Assistance to Cooperatives
AMCU	Automatic Milk Collection Unit
AMUL	Anand Milk Union Ltd./ Gujarat Cooperative Milk Marketing Federation Ltd.
BAMUL	Bangalore Cooperative Milk Union
BIS	Bureau of Indian Standard
BMC	Bulk Milk Cooler
CAMUL	Cachar and Karimganj District Milk Producers Cooperative Society Limited
CEO	Chief Executive Officer
CIP	Cleaning in Process
COMFED	Bihar State Milk Cooperative Federation
DAC	Development Assistance Committee
DCS	Dairy Cooperative Society
DD	Dairy Development
DEDS	Dairy Entrepreneurship Development Scheme
DIDF	Dairy Processing and Infrastructure Development Fund
DoAH	Directorate of Animal Husbandry
DoAHDF	Department of Animal Husbandry, Dairying and Fisheries
DoDD	Directorate of Dairy Development
DPMCU	Data Processor Milk Collection Unit
DPR	Detailed Project Report
DSCR	Debt Service Coverage Ratio
EAMUL	East Assam Milk Producers' Cooperative Union Ltd.
EEC	European Economic Community
EIA	End Implementing Agency
ETP	Effluent Treatment Plant
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FBO	Food Business Operator
FMD	Foot-and-Mouth Disease
FSSAI	Food Safety and Standards Authority of India
FSSC	Food Safety System Certification
GCMF	Gujarat Cooperative Milk Marketing Federation Ltd.
GDP	Gross Domestic Product
GoI	Government of India
HACCP	Hazard Analysis and Critical Control Points
HF	Holstein-Friesian
HTST	High Temperature Short Time
IAS	Indian Administrative Service
ICT	Information and Communication Technology
IDDP	Integrated Dairy Development Program
IDFA	International Dairy Foods Association
IDMC	Indian Dairy Machinery Company
IMARC	International Market Analysis Research & Consulting
INR	Indian Rupee

ISO	International Standard Organization
IT	Information Technology
ITDP	Integrated Tribal Development Project
JICA	Japan International Cooperation Agency
JMF	Jharkhand Milk Federation
KMF	Karnataka Cooperative Milk Producers' Federation
LLPD	Lakh Liter Per Day
MPCDF	Madhya Pradesh State Cooperative Dairy Federation Ltd.
MAITRI	Multi-Purpose AI Technician in Rural India
MoFPI	Ministry of Food Processing Industries
MoSPI	Ministry of Statistics and Programme Implementation
MPC	Milk Producer Company
MPCE	Monthly Per Capita Expenditure
MPI	Milk Producers Institute
MPP	Milk Pooling Point
MT	Metric Ton
MU	Milk Union
NABARD	National Bank for Agriculture and Rural Development
NAP	National Action Plan
NCCD	National Center for Cold Chain Development
NCDC	National Cooperative Development Corporation
NCR	National Capital Region
ND	Non-Descriptive
NDDB	National Dairy Development Board
NDP	National Dairy Plan
NDS	NDDB Dairy Services
NGO	Non-Governmental Organization
NOC	No Objection Certificate
NPBB	National Program for Bovine Breeding
NPCBB	National Project for Cattle and Buffalo Breeding
NPDD	National Program for Dairy Development
NSSO	National Sample Survey Office
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
PCF	Pradeshik Cooperative Dairy Federation Ltd.
PSU	Public Sector Undertaking
RKVV	Rashtriya Krishi Vikas Yojana
ROA	Return on Asset
ROE	Return on Equity
Rs.	Rupees
SC	Scheduled Caste
SHG	Self Help Group
SIQ-CMP	Strengthening Infrastructure for Quality and Clean Milk Production
SMP	Skim Milk Powder
SNF	Solid Non-Fat
SNS	Social Network Service

ST	Scheduled Tribe
TKgPD	Thousand Kilogram Per Day
TLPD	Thousand Liter Per Day
UHT	Ultra High Temperature
WAMUL	West Assam Milk Producers' Cooperative Union Ltd.
WFP	World Food Programme
WHO	World Health Organization
WMP	Whole Milk Powder

INR 1 (Rs. 1) = JPY 1.649040

USD 1 = JPY 106.787

(As of March 2018)

1 lakh = 100,000

1 crore = 10,000,000

Chapter 1 Outline of the Study

1.1 Objective of the Study

The objectives of this study are to analyze the dairy sector in India, from both industrial organization and socioeconomic perspectives by examining the dairy sector's socioeconomic contribution to farmers, its value chain structure, its related actors, and the movement of the private sector, to identify and analyze the problems of the sector, and in turn evaluate the validity of the effectiveness of Japanese support of the dairy sector.

1.2 Background of the Study

The volume of milk production in India has reached 156 million tons, accounting for 18% of total global production. The livestock sector's ratio of value added to India's GDP has been increasing, from 13.9% in 1980 to 25.6% in 2000 to 32.9% in 2014, at which time 70% of value added of the livestock sector is attributed to the dairy sector. Additionally, the ratio of expenditure on milk and dairy products to household's total expenditure between 1977 and 2007 increased from 11.9 % to 14.9% in rural areas and from 15.9% to 18.4% in urban areas. Milk production and processing is a highly important industry in India and, as the Indian economy and urbanization are expected to expand, the demand for dairy products is forecasted to increase. The pressure to increase milk production to satisfy growing demand is, thus, a crucial issue.

In India, Operation Flood, a dairy development project, was implemented with the support of the World Bank and other development agencies between the 1970s and 1996. The institution that implemented the project was the National Dairy Development Board (NDDB), and the project attempted to increase the volume of milk production by extending the model of Anand Milk Union Ltd. (Amul). As the dairy cooperatives that modeled Amul extended to various regions, it led to an increase in milk production and the establishment of value chains extending from the production to the processing and sales of milk. On the other hand, the entries of private companies in the dairy sector have started since the Government of India adopted the economic liberalization policy in 1991. The collection volume of milk by the private companies is thought to exceed that of cooperatives now; the dairy sector in India is at a turning point.

From the aspect of milk production in India, the intensification of production has not progressed; the percentage of farmers who own more than four milking cows/buffaloes is only 8%. Furthermore, 70% of total milk production is by small farmers with fewer than 2 ha of landholdings. Compared to agricultural activities, which are significantly influenced by climate and whose harvest yields and income opportunities are limited, dairy activities, which can be undertaken for ten months in a year, can be a stable source of income. For these small farmers who have limited amounts of assets, livestock can be not only a source of cash income but also an asset which stabilizes their livelihood; thus, the importance of dairy activities is greater for poor farmers.

However, fresh milk easily deteriorates and avoiding the proliferation of bacteria requires

sterilization and disinfection followed by immediate refrigeration after milking. Thus, dairy farmers in remote areas who do not have access to refrigeration facilities have difficulties selling their milk to urban areas with high demand for milk, and the market access to the formal market is a crucial issue for dairy farmers who do not deal with cooperatives and private dairy companies. Under these circumstances, there is a high perceived need for the establishment of dairy products' value chains through the establishment of cold chain facilities and sustaining of dairy products' processing capacity. Additionally, there is also a need to improve productivity for the improvement of livelihoods of farmers through the development of the dairy sector. Based on these situations, the Government of India requested the Japanese government to implement the project "Dairying Through Cooperatives" as an international yen loan project.

1.3 Study Area

One state from each region was selected based on discussions among JICA, the Government of India, and the study team as shown in Table 1-1. In addition to Uttar Pradesh, Karnataka, Bihar, Madhya Pradesh, and Assam, Gujarat state, which has well-developed dairy cooperative system, is also selected as a study area.

Table 1-1 Selected state in each region for the study

Region	State
Norther region	Uttar Pradesh
Southern region	Karnataka
Eastern region	Bihar
Western region	Madhya Pradesh
North Eastern region	Assam

Source: The study team

1.4 Study Implementation Plan

1.4.1 Technical Principles of the Study

The following four points are established as the technical principles of this study.

- (1) The study will analyze the dairy sector from both industrial and socioeconomic aspects.
- (2) There are some regions where the dairy sector is highly developed and, on the other hand, regions that face serious problems in developing the sector. The study includes Gujarat, which has an advanced dairy sector, and compares it with other five target states, which are not as advanced as Gujarat, and then analyzes the applicability, bottleneck and limitations of dairy cooperatives all over India.
- (3) In India, the central and state governments and NDDB, a government institution, play important roles in the dairy sector. Additionally, since 2011-12, the National Dairy Plan (NDP) has been implemented with the support of the World Bank in which the NDDB is an implementing institution. Thus, the study will analyze the current conditions of central and state governments, NDDB, and NDP in order to examine the direction of future support and appropriate support approaches.
- (4) Based on the results of (1), (2), and (3) above, this study will identify and analyze the problems of the dairy sector in India and then, based on the country assistance policy of JICA and applicable

Japanese technology in India, will examine the countermeasures to the problems, as well as the potential, effectiveness, and appropriateness for and effectiveness of the support extended from Japan to this sector.

1.4.2 Study Team

The study team consists of the following four members.

Table 1-2 The study team

Name	Field of responsibility	Contents of task
Fumiko Ikegaya	Team Leader/Value Chain and Marketing	Team management, coordination with JICA, consideration on the direction of JICA's support, consultation with the Indian government concerning study results, value chain survey, collect information from the central government / state government, and NDDB, review of NDP and DPR (Assist the expert in charge of "Dairy/Institutional Analysis")
Yukio Ikeda	Dairy and Institutional Analysis	Survey of actual cooperatives (state level and district level) Socioeconomic situation survey (includes management of subcontractor) (Assist the expert in charge of "Team Leader/Value Chain and Marketing")
Desai Prakash Pralhadarao	Food Processing Equipment and Cold Chain	Survey on status of food processing equipment and cold chain (Assist the expert in charge of "Food Hygiene and Food Processing") Management of field survey (interview request, local logistics and others)
Tomoyuki Tajitsu	Food Hygiene and Food Processing	Survey on status of food hygiene and food processing (Assist the expert in charge of "Food Processing Equipment and Cold Chain")

The implementation structure of the study is described in Figure 1-1.

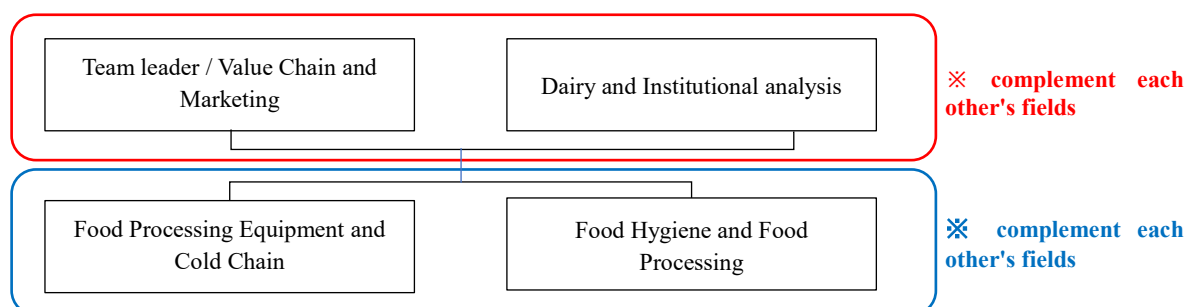


Figure 1-1 Implementation structure of the study

Source: The study team

1.4.3 Methodology

(1) Literature review

Extensive literature review was conducted in Japan before the first field survey as well as throughout the study period. Literatures include papers, reports, books, government documents and statistics in both Japanese and English. Documents provided at the field level were also examined.

(2) Field Survey

1) Schedule

Three field surveys were conducted during the study period as summarized in Table 1-3

Table 1-3 Overview of the field surveys

	The first field survey	The second field survey	The third field survey
Period	September 17 to October 9	November 5 to December 3	February 4 to February 11
States visited	Delhi, Gujarat, Bihar	Assam, Karnataka, Madhya Pradesh, Uttar Pradesh, Delhi	Delhi, Gujarat

Note: A team member extended his stay of the first field survey in India by October 14, and came back on October 29 for the second field survey to prepare the subcontracted survey (the socioeconomic situation survey).

Source: The study team

2) Places and Organizations visited during the field survey

The study team planned to visit government departments and agencies of both the Government of India and state government, dairy cooperatives, private dairy companies, stakeholders of unorganized sector. Places and organizations visited during the field survey in each state are summarized in Table 1-4.

Table 1-4 Places and Organizations visited during the field survey

State	Places and organizations
Delhi	Government: DoAHDF, FSSAI, MoFPI, NCCD Private: Param Dairy Donor: World Bank
Gujarat	Government: DoDD, Gujarat Livestock Development Board, Food Safety Commissioner, NDDB, IDMC Cooperative: GCMF/Amul, Kaira MU, Banaskantha MU, Gandhinagar MU, and their DCS
Bihar	Government: DoAH, Livestock Development Agency, Food Safety Office Cooperative: CONFED, Patna Dairy, Samastipur MU, their DCS Private: Natural Dairy, Anuj Dairy Loose milk market near Patna railway station
Assam	Government: DoAH, DoDD, Food Safety Office, State government owned plant, Town Milk Scheme Cooperative: WAMUL, EAMUL, their DCS, Progress DCS Private: Blueberry Industry, Kamrupa Dairy, their DCS Retail shops, Large scale farmer
Karnataka	Government: DoAH/Karnataka Livestock Development Agency, Food Safety Office, Cooperative: KMF, Bangalore MU, Gulbarga MU, their DCS Private: Workshop with Karnataka Dairy Association's member (7 companies attended), Gokul Dairy, Heritage Retail shops
Madhya Pradesh	Government: DoAH, Livestock Development Agency, Food Safety Office Cooperative: MPCDF, Bhopal MU, Indore MU, Jabarpur MU, and their DCS Private: Shubham, Mahindra, Anik Retail shops/Loose milk shops
Uttar Pradesh	Government: DoAH, Uttar Pradesh Livestock Development Board, DoDD, Food Safety Office Cooperative: PCF, Lucknow MU, Kampur MU, Varanasi MU, Meerut MU, Saahaj PC, and their DCS Private: Gyan, Namaste India, Paras, Ananda Retail shops/State loose milk market

Source: The study team

(3) Sub-contracted Survey

A socioeconomic situation survey was conducted to elucidate the current dairy activities and livelihoods of dairy farmers and the social and economic contributions made by cooperatives to them. The total sample of the survey comprises 1,171 households (75 to 85 households in each village) and the survey was subcontracted to Indian research company.

(4) Stakeholder Workshop

A stakeholder workshop was held during the second field survey in Karnataka as inviting member companies of the Karnataka State Dairy Association to hear opinions of private dairy companies.

1.5 Limitation of the Study

- The study does not cover all states and thus has limitation in terms of geographical comprehensiveness of the finding.
- The study does not cover details of all milk unions in visited states because of time limitation, thus has limitation in terms of coverage of milk unions in each state.
- The study mainly covers milk procurement, processing, and selling of dairy cooperatives and excludes production. Needs and issues identified at production level were not studied in detail due to the framework of the study.

Chapter 2 Outline of the Dairy Sector and Related Sectors

2.1 International Positioning of Indian Dairy Sector and Related Sectors

2.1.1 Milk Production Volume

Milk production (cow and buffalo milk) in India is the world's largest, totaling 155 million tons in 2016 and accounting for more than 19.2% of global production (see Table 2-1). The share of the livestock sector out of India's agricultural GDP was 13.9% in 1980-81, which increased to 25.6% in 2000-01 and 26.9% in 2014-15 at current prices. India's dairy sector accounts for about 70% of its livestock industry, making it an important sector in the country.

2.1.2 Increasing Demand

The global demand for dairy products is rapidly increasing, as both the per capita consumption of dairy products and population increase. Dairy consumption per capita is increasing worldwide, as shown in Figure 2-1. This trend is particularly strong in developing countries, where the consumption of dairy products has increased significantly in the last 30 years. Table 2-2 shows the rate of increase in the per capita consumption of milk between 1985 and 2013. During this period, per capita consumption in developed countries remained almost unchanged, while a 70% increase occurred in developing countries, especially in East and Southeast Asia and South Asia. The consumption of dairy products had been low in these regions; consumption per capita may have increased as income levels improved, and urbanization expanded.

Figure 2-2 depicts the per capita milk consumption trends in developed and developing countries by area. Although the increase in per capita milk consumption volume in developing countries is higher than that in developed countries, the per capita milk consumption volume in developing countries is smaller than that in developed countries. This indicates that the per capita milk consumption volume in developing countries will likely keep increasing.

Table 2-1 Top ten countries for milk production (cow and buffalo milk) in 2016
(Unit: 1,000 tons)

	Country	Milk production	Ratio
1	India	155,416	19.2%
2	U.S.	96,359	11.9%
3	China	40,285	5.0%
4	Pakistan	38,789	4.8%
5	Brazil	32,672	4.0%
6	Germany	30,495	3.8%
7	Russia	30,495	3.8%
8	France	24,482	3.0%
9	New Zealand	21,672	2.7%
10	Turkey	16,842	2.1%
	Total	810,436	100%

Source: FAOSTAT

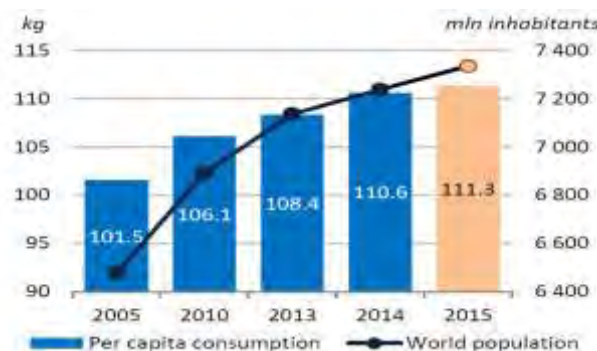


Figure 2-1 Per capita consumption volume of dairy products and global population

Source: International Dairy Foods Association (IDFA) (2016) The world dairy situation 2016

Table 2-2 Increase ratio of per capita milk consumption volume

	1985– 2000	2000– 2013	1985– 2013
All	1%	15%	16%
Developed countries	-1%	2%	1%
Developing countries	25%	36%	70%
East and Southeast Asia	89%	152%	377%
South Asia	27%	31%	66%
Middle East and North Africa	-7%	20%	12%
Sub-Saharan Africa	-22%	30%	2%
Central and South Africa	17%	12%	30%

Source: FAOSTAT

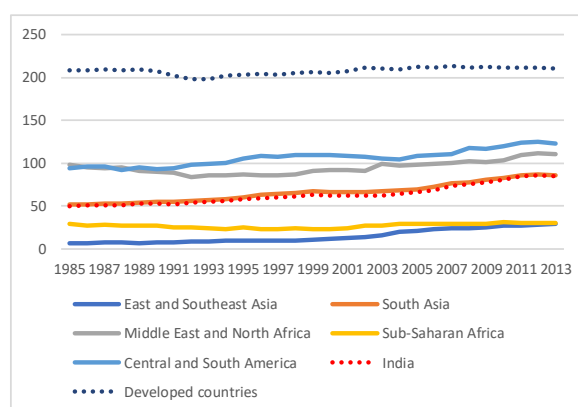


Figure 2-2 Per capita milk consumption volume (kg/year)

Source: FAOSTAT

2.1.3 Milk Production in Developing Countries

Milk production in developing countries, especially in South Asia, has been increasing rapidly since the 1980s (see Figure 2-3). The main engine seems to be India. By 2000, the milk production volume in developing countries exceeded that in developed countries (see Figure 2-4).

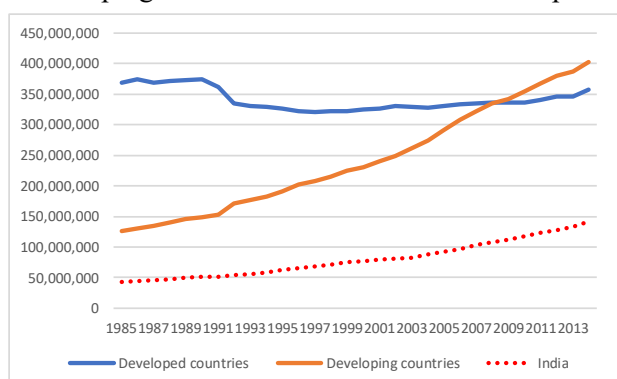


Figure 2-3 Milk production volume in developed countries and developing countries (tons per year)

Source: FAOSTAT

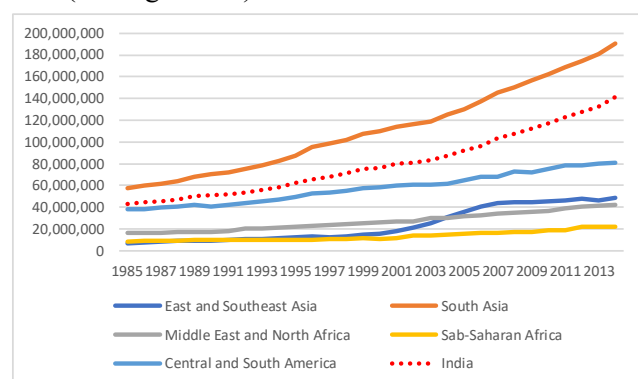


Figure 2-4 Milk production volume in developing countries in each region (tons per year)

Source: FAOSTAT

The increase in milk production is mainly due to two factors: an increase in the number of livestock and an increase in productivity (yield). The increase in milk yield in developing countries is due to the application of advanced technology for breeding and feeding management,¹ but the influence of these technological innovations varies across regions; it is relatively low in Sub-Saharan Africa, and small-

¹Genetic improvements in breeding have been promoted through cross breeding and the use of artificial insemination. Improvements to feeding techniques include balanced feeding, precise feeding, the proper addition of trace nutrients such as amino acids and minerals, the development of improved grass species, and the development of animal feeding systems such as zero grazing.

scale farmers find it more difficult to apply new technologies than large-scale farmers do.²

2.1.4 Self-sufficiency Rate of Dairy Products

Although the rate of production of dairy products has increased remarkably around the world, it does not meet the increasing demand caused by population growth and the increased consumption of dairy products per capita. In Asia, the self-sufficiency rate of dairy products is below 100%, having decreased from 92% to 90% between 2005 and 2015.

Table 2-3 Self-sufficiency rate of dairy products

Region	2005	2015
Asia	92%	90%
Europe	106%	111%
EU	109%	112%
Non-EU	101%	108%
North America	102%	108%
South America	102%	101%
Africa	84%	83%
Central America	75%	78%
Oceania	245%	309%

Source: IDFA (2016) The world dairy situation 2016

2.1.5 Large Price Fluctuations in International Markets

In international markets, dairy product prices fluctuate greatly according to market trends. Figure 2-5 illustrates the changes in the international market prices of cheddar cheese, butter, skim milk, and whole milk powder³ from 2007 to 2016. The prices have drastically fluctuated within a short period of time. Figure 2-6 illustrates the long-term trends in the international prices of whole milk powder. The long-term international market prices⁴ of dairy products show a tendency to rise. Countries that cannot satisfy their domestic demand for dairy products are greatly affected by these changing international prices.

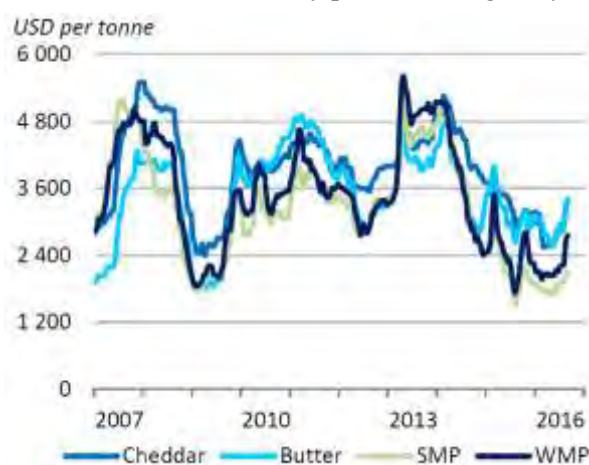


Figure 2-5 Price change of dairy products

Note: SMP stands for skim milk powder while WMP stands for whole milk powder

Source: IDFA (2016) The world dairy situation 2016

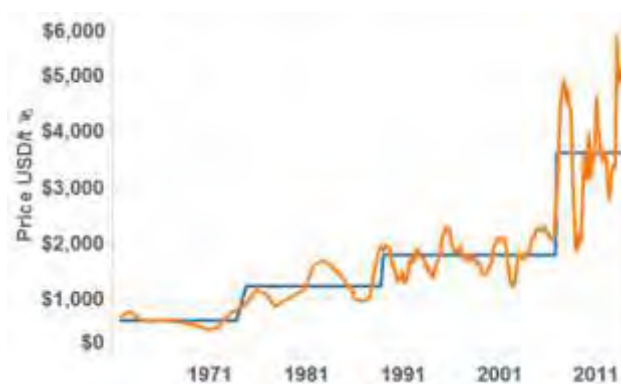


Figure 2-6 Long-term trend of WMP's international price

Source: Fonterra Japan (2014) Presentation for the Cabinet Office, Japan

² FAO (2009) The State of Food and Agriculture

³ Skim milk powder is obtained by removing almost all of the water from skimmed milk to turn it into powder form. It has good preservability because it contains almost no fat. Commercial products are made into granules so that they can be more easily dissolved. If they have less energy, protein and calcium can be taken more easily. Whole milk powder is defined by a Japan regulation as "powder made from milk by removing almost all the moisture." Its milk solids content is 95% or more (of which milk fat accounts for 25%), and the water content is 5% or less. Because the fat content is high, the fat tends to be oxidized during storage, and its storage stability is inferior to that of skim milk powder (HP of the Japan Dairy Association).

⁴ The same trends can be observed for other major dairy products.

2.1.6 Structure of Dairy Sector in Developing Countries

Urbanization and increased incomes in developing countries has resulted in a large demand for processed and packaged dairy products, leading to the emergence of dairy companies with sophisticated processing technology and distribution networks. The market share of top companies in the dairy industry averages 15% for milk and 17% for cheese.⁵ Oligopolies by a small number of dairy companies can be observed in both developed and developing countries. Along with the modernization of distribution, many developing countries have seen large-scale commercial dairy farmers emerging in urban areas.⁶

Thus, the dairy sectors of developing countries have seen a drastic structural change from a combination of small-scale mixed farming systems⁷ and traditional distribution to a combination of large-scale industrial production systems and modern distribution (see Figure 2-7). However, despite the trends described above, small mixed farming and traditional distribution systems continue to play a major role in the dairy sectors of many developing countries.⁸ Figure 2-8 shows the geographical distribution of livestock systems. Some developing countries include areas where landless industrial production systems predominate (red colored areas); in many areas, mixed farming systems (yellow-green colored areas) predominate.⁹

Distribution system	Modern distribution	C	B
	Traditional distribution	A	D
		Small-scale mixed farming system	Large-scale industrial production system
Livestock system			

Figure 2-7 Structural change of dairy sector in developing countries

⁵ Euromonitor International 2015.

⁶ In China, for example, 27% of dairy farms had over 100 animals in 2008, but this increased to 37% in 2012 (Chinese Livestock Yearbook).

⁷ There are several livestock systems. The grazing system is an extensive system with quality grassland that is excluded from crop cultivation. The mixed farming system is a combination of crop cultivation and livestock rearing, mainly involving small and marginal farmers. Industrial farming is a system in which 90% or more of fodder is purchased by others. This is often intensive farming and occurs near large cities.

⁸ According to Steinfeld et al. (2006), 70% of the world's cattle and buffalo are reared in the mixed farming system (this is the average between 2001 and 2003), and 34% of the milk produced in India (excluding self-consumption in rural areas, which accounts for 59.3% of the milk circulating through traditional channels) is distributed through traditional channels.

⁹ The role of dairy for small-scale farmers is not limited to income and food production from livestock; it also serves as an important safety net, such as an asset or collateral for borrowing money, the production of fertilizer, and as a tiller and means of transportation for small-scale farmers engaged in mixed farming (FAO, State of Food and Agriculture 2009).

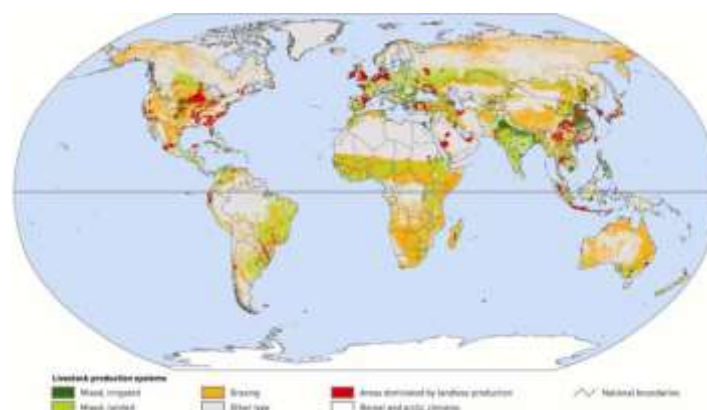


Figure 2-8 Geographical distribution of livestock system
Source: Steinfeld et al. (2006), *Livestock's Long Shadow*.

In the dairy sector of developing countries where small-scale mixed farmers play a major role, rapid changes in the dairy sector have been accompanied by social risks such as the possibility of small farmers being expelled from the market.¹⁰ Therefore, balancing between modernization and the protection of small-scale farmers' socioeconomic welfare is an important issue. The case of a dairy cooperative in Gujarat, India, which will be discussed later, is an example of small-scale farmers helping to meet the demand for urban dairy products (noted as "C" in Figure 2-7) and of balancing the modernization of the dairy sector with the improvement of small-scale holders' livelihoods.

2.2 Overview of the Dairy Sector and Related Sectors in India

2.2.1 Supply and Demand of Milk in India

(1) Milk Production in India

In 2016, milk production in India reached about 155 million tons, consisting of about 78 million tons of buffalo milk and about 77 million tons of cattle milk. The share of buffalo milk is about 50.2% which is slightly greater than cow milk.

In India, the price of milk is usually determined by fat and SNF contents. Patna milk union in Bihar sells "Cow Milk" which has average cow milk fat and SNF contents (3.5% fat and 8.5% SNF) at Rs. 40/L and "Sudha Gold" which has average buffalo milk fat and SNF contents (6.0% fat and 9.0% SNF) at Rs. 48/L. Applying these prices for estimation of value term of cow milk and buffalo milk, the share of cow milk becomes 45.3% while the share of buffalo milk becomes 54.7% in value term as summarized in Table 2-4.

¹⁰ FAO, State of Food and Agriculture 2009.

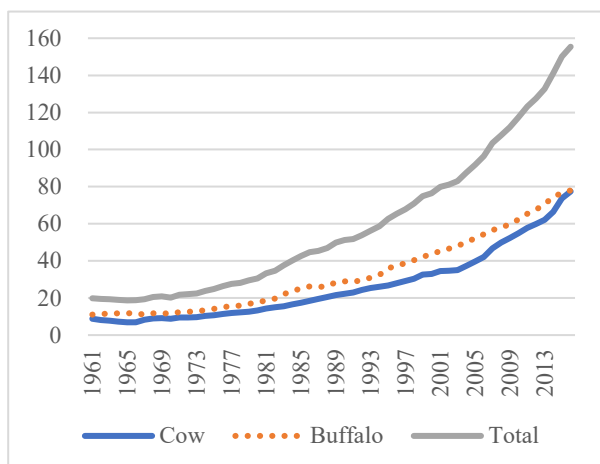


Figure 2-9 Milk production volume in India (1961 -2016) (million ton)

Source: FAOSTAT

Table 2-4 Production volume, and estimation of share of cow and buffalo milk in 2016

	Production volume (mil. tons)	Price (Rs/kg)	Value (Rs. mil.)	% of production volume	% of value
Cow	77.4	40	3,097	49.8%	45.3%
Buffalo	78.0	48	3,744	50.2%	54.7%
Total	155.4		6,841	100.0%	100.0%

Source: FAOSTAT and the study team

(2) Increasing Consumption

As in other developing countries, the consumption of dairy products has increased in India due to factors such as population growth, income growth, and an increased per capita consumption of dairy products due to urbanization. How to satisfy the increased domestic milk demand caused by population increase, urbanization, and income improvement is a crucial issue.

Monthly milk consumption per capita in 2011-12 was 4.333 L in rural areas and 5.422 L in urban areas; milk consumption is higher in urban areas than in rural areas. Monthly milk consumption per capita has been increasing year by year. Monthly milk consumption per capita in 2011-12 increased by 12.1% in rural areas and 6.2% in urban areas over the 2004-05 rates. Milk consumption is expected to increase further in rural areas as incomes increase. Figure 2-10 depicts the relation between monthly household expenditure per capita and milk consumption volume per capita. It shows that people with higher monthly per capita expenditure (MPCE) consume more milk.

Table 2-5 Monthly per capita milk consumption (L)

Year	Rural	Urban
2004-05	3.866	5.107
2009-10	4.117	5.358
2011-12	4.333	5.422

Source: Ministry of Statistics and Programme Implementation (MoSPI) (2011-12) Key Indicators of Household Consumer Expenditure in India

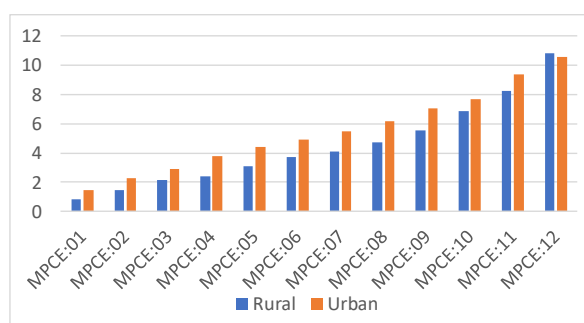


Figure 2-10 Monthly per capita milk consumption in each expenditure criteria (liter)

Source: MoSPI (2011-12) Key Indicators of Household Consumer Expenditure in India

The Government of India has estimated that daily per capita milk availability will increase from 337 g in 2015-16 to 590 g in 2033-34.

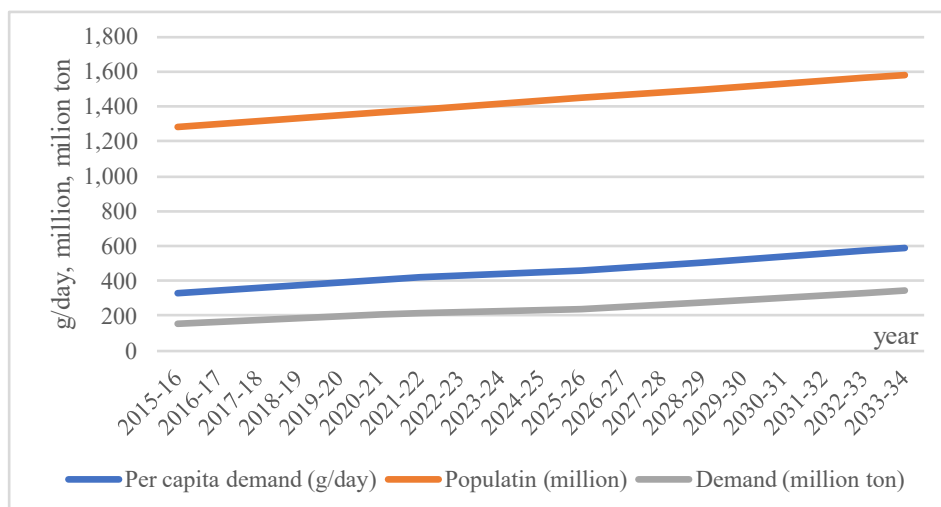


Figure 2-11 Estimated daily per capita milk availability, population, and milk demand
Source: DoAHDF (2017) Vision 2024, National Action Plan for Dairy Development

Figure 2-12 depicts the current utilization pattern for milk and milk products. The figure shows that about 52.10% of milk is used in liquid form, and the rest is processed into dairy products such as ghee, Khoya, and other products.

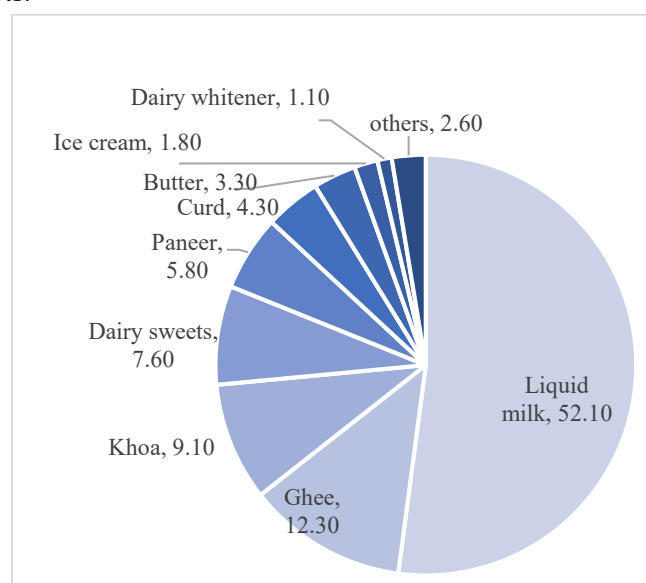


Figure 2-12 Utilization pattern for milk and milk products (%)
Source: IMARC (2017) Dairy Industry in India 2017 edition

Figure 2-13 depicts the current situation of and forecast (2022) for the milk and dairy products market. It shows that sales of both milk and dairy products are expected to more than double by 2022.

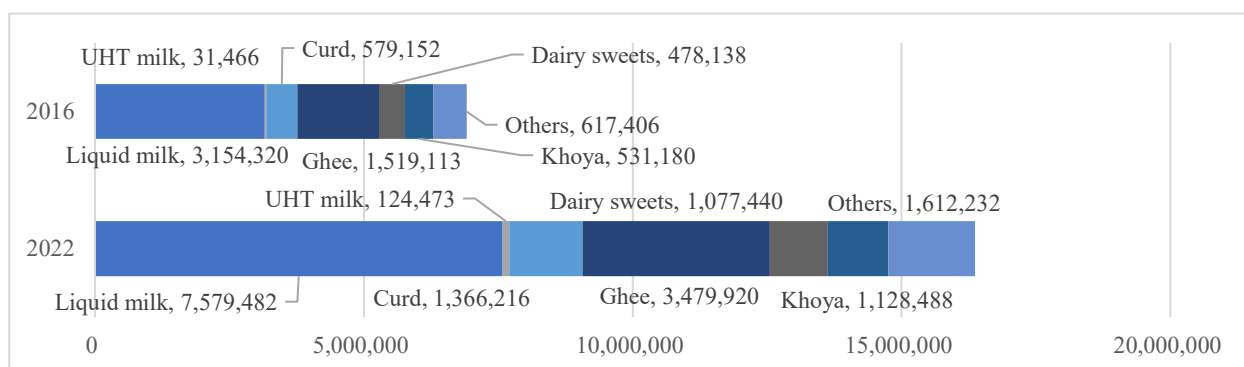


Figure 2-13 Sales of milk and dairy products in 2016 and 2022 (million rupees)

Source: IMARC (2017) Dairy Industry in India 2017 edition

(3) Balance of Supply and Demand

As shown in Figure 2-9, milk production in India has steadily increased. Examining dairy import and export amounts (see Figure 2-14) shows that the export volume of dairy products began to increase and exceeded import volume in the 2000s. The import amount exceeded the export amounts of dairy products in 2009 and 2010. However, this was caused by government intervention to preserve strategically dairy products such as powder milk to manage temporary deficit due to adverse impact of the monsoon. Therefore, it can be said that India has been fulfilling the domestic demand of dairy products since 2000s.

However, as mentioned above, the domestic demand per capita is estimated to increase. The international market may be affected if India temporarily becomes underproduced or oversupplied and then procures or distributes from/to the international market because of the huge size of India's market. When India turns into a milk-importing country, it not only destabilizes the Indian domestic market and the social and economic stability of India's rural society, but it also affects other dairy-importing countries that rely on international markets¹¹. It is thus very important that India satisfies its domestic market consistently.

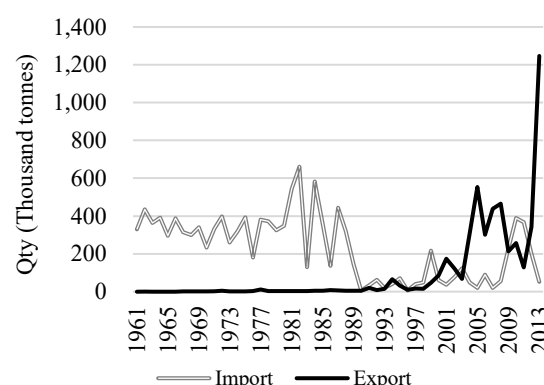


Figure 2-14 Import and export of dairy products in India

Source: FAOSTAT

2.2.2 Milk Producers

The proportion of India's rural households consisting of small farmers (with 2 ha or less of land holding) totals more than 90% and represents the majority of farmers (see Table2-6). The number of cattle and buffalo reared by landless, marginal, and small farmers totals almost 80%. Marginal farmers who hold 0.002 to

¹¹ Japan currently has been fulfilling domestic demand of milk and has been controlling milk production volume not to occur oversupply of milk. Therefore, the change in international market would not directly affect Japanese market much. However, when Japan has surplus or deficit of milk because of weather condition or spread of diseases, it needs to sell or buy milk or dairy products from international market. At the time, the fluctuation of the international market may affect to Japanese market.

1 ha of land rear about 57.67% of the cattle and buffalo, while small farmers who hold 1 to 2 ha of land rear 20.45% of them. In addition, it is estimated that landless, marginal, and small farmers produce nearly 70% of the milk produced in India.¹²

Table 2-6 Distribution of households and average number of cattle/buffalo holdings (2012)

Land holding criteria (Land holding: ha)	Landless (-0.002ha)	Marginal (0.002-1ha)	Small (1-2ha)	Medium (2-10ha)	Large (10ha-)	Total
Household distribution (%)	7.4	75.4	10.0	6.9	0.2	100.0
Average cow/buffalo holding (head)	1.6	1.5	2.6	3.6	4.4	1.8
Livestock holding distribution (%)	0.03	57.67	20.45	20.40	1.46	100.00

Note: "Household distribution" indicates how many percent of households are classified into each criterion and "livestock holding distribution" indicates how many percent of livestock are hold in each criterion.

Source: MoSPI (2013) Livestock Ownership in India, 2013

Table 2-7 below shows the ratio of livestock income to gross income among farmers' households. It shows that livestock income is an important income source, accounting for 12% of household income for all farmers. The smaller the land size, the greater the contribution of livestock income to gross income. The landless household have averagely Rs. 4,561 per month and 26% of income (Rs. 1,186 per month) are generated by livestock. Assuming the average household member is 4.8, their daily income is Rs.31.7 per day per capita which is just above the poverty line of Rs. 27.2 per day per capita. Without income from livestock (Rs. 1,186 per month per household which is estimated to Rs. 8.2 per day per capita), they would fall down under the poverty line. Livestock activities play a particularly important role in the livelihoods of smaller-income households.

Table 2-7 Livestock income by land holding

Percentage out of gross income	Landless	Marginal	Small	Medium	Large	Total
Income from wages/salary out	64%	46%	24%	13%	3%	32%
Cultivation	1%	31%	57%	72%	86%	48%
livestock income	26%	13%	11%	9%	6%	12%
Non-farm business	10%	10%	8%	5%	4%	8%
Monthly income (Rs.)	4,561	4,734	7,348	10,730	21,774	6,426

Source: MoSPI (2013) Income, Expenditure, Productive Assets and Indebtedness of Agricultural Households in India, 2013

In India, land is expensive for small, marginal and landless farmers and the price has been increasing¹³. In the situation where buying land is not easy, dairy animals are important as a property for stabilizing the livelihoods of small-scale farmers, so they have great socio-economic significance.¹⁴

¹² Birthal, Linking Smallholder Livestock Producers to Markets, 2008.

¹³ Interviews at the villages and with dairy cooperatives

¹⁴ According to the National Sample Survey Organization (2002), the disparity in land assets holding among farmers is extremely large, but the disparity in livestock assets holdings is very low (Poverty and asset distribution inequality in rural India, 2009).

2.2.3 Contribution of Dairy Sector to Poverty Alleviation

As mentioned in the above section, majority of milk producers are small, marginal, and landless farmers. Some studies concluded that dairy plays an important poverty alleviation role in India based on the below estimation.

(1) Poverty Line

In 2013, the Planning Commission of the Government of India announced that the number of those below the poverty line in rural areas declined to 25.7% of the population in 2011-12 from 41.8% in 2004-05. However, the rate is still relatively high. The Government of India estimates the poverty ratio based on the “Tendulkar methodology” by assuming that the poverty line is an income of Rs. 816 per month per capita in rural areas, which is Rs. 27.2 per day per capita (Rs. 9,792 per annum per capita).

(2) Income Source of Farmers

Table 2-8 shows that households in income quintiles 1 and 2, which constitute 46% of all farmers, have a per capita daily income of Rs. 22 and Rs. 32 respectively. According to the abovementioned definition of poverty in India, Rs. 27.2 per day per capita in rural areas is the poverty line. This means that all of income quintile 1 and about half of income quintile 2 are below the poverty line. Those people derive 13 to 14% of their income from livestock and dairy activities. It is estimated that the dairy sector represents 70% of the livestock sector in India. Therefore, dairy provides an important additional income to rural farmers.

Table 2-8 Income sources of farmers by income quintile

Income quintile	Per Capita Income (Rs/annum)	Agriculture		Livestock/Dairying		Non-farm business		Wages and salaries		% to total households
		Participati on rate (%)	Share in income (%)	Participati on rate (%)	Share in income (%)	Participati on rate (%)	Share in income (%)	Participati on rate (%)	Share in income (%)	
1	7,992	93%	43%	69%	13%	9%	5%	63%	39%	24%
2	11,592	93%	45%	71%	14%	8%	6%	57%	36%	22%
3	14,700	91%	49%	72%	11%	11%	7%	49%	32%	22%
4	19,344	92%	51%	73%	11%	11%	8%	47%	31%	19%
5	35,904	91%	50%	71%	11%	13%	12%	40%	26%	13%
All (Rs)	16,056	92%	48%	71%	12%	10%	8%	52%	32%	100%

Source: NDDB

(3) Additional Income from Dairy

According to the NDDB, in the cooperative dairy sector across the country, it is estimated that i) dairy farmers realized an average of Rs. 28.18 per liter of milk (4.6% fat and 8.5% SNF) in 2016-17, ii) approximately 2.5 liters of milk per day is sold per dairy farmer, and iii) self-employed labor charges account for 20% of the milk production cost, based on various studies. Based on these estimations, it can be said that the average dairy farmer receives Rs. 14 per day (Rs. 5.6 per liter) for dairy activities, which is significant additional income for those living below the poverty line of Rs. 27.2 per day per capita income.

(4) Reducing Disparity by Increasing Income from Dairy

According to the NDDDB, a study concluded that livestock and dairy incomes decrease income inequality and that a one percent increase in the share of livestock and dairy income out of total income will reduce income inequality by 1.2%. It means that if the share of livestock and dairy income in total income increase from 12% to 13%, the income inequality reduce by 1.2%. On the other hand, the same report concluded that cultivation incomes and nonfarm business incomes increase income inequality and that a one percent increase in the share of those incomes out of total income will increase inequality by 2.7% and 1.6%, respectively. It means that if the share of cultivation income or nonfarm business incomes in total income increase by 1%, for example from 48% to 49% or from 8% to 9%, the inequality will increase by 2.7% or 1.6% respectively. Thus, growth through inclusive dairying does not worsen income disparities; rather, it helps reduce absolute poverty and income inequality among households in India.

2.2.4 Issues for the Dairy Sector in India

Because of the growing demand for dairy products in India, dairy farmers - including landless, marginal, and small farmers - have an opportunity to improve their livelihoods through livestock, but there are several restrictive factors, as described below.

(1) Low Productivity

In India, milk production per dairy animal is at low level. Crossbred cattle can produce 6.78 kg/day, while non-descript and indigenous breeds can produce only 2.75 kg/day.¹⁵ Those productivities are extremely low relative to productivity in developed countries (23.3 kg/day).¹⁶ The milk production volume of buffalo in India totals 5.09 kg/day, which is also low compared to the approximately 8 kg/day of Argentina's commercial farmers.¹⁷

Table 2-9 Annual milk production of top 10 states (2015-16)

	State	Annual milk production (1,000 ton)	% of total production in India	Milk production (kg/head per day)	
				Cow	Buf
1	Uttar Pradesh	26,387	17.0%	3.80	4.34
2	Rajasthan	18,500	11.9%	4.75	5.94
3	Gujarat	12,262	7.9%	5.64	4.93
4	Madhya Pradesh	12,148	7.8%	3.07	4.15
5	Andhra Pradesh	10,817	7.0%	5.24	5.52
6	Punjab	10,774	6.9%	11.11	7.98
7	Maharashtra	10,153	6.5%	5.18	4.78
8	Haryana	8,381	5.4%	7.30	8.21
9	Bihar	8,288	5.3%	4.39	4.27
10	Tamil Nadu	7,244	4.7%	6.14	3.90
	Total	124,954	80.4%	4.72	5.25

Source: DoAHDF (2016) Basic Animal Husbandry and Fisheries Statistics

Milk productivity in India differs greatly from state to state¹⁸. Even in states with large milk production volumes such as Uttar Pradesh and Madhya Pradesh, productivity remains at India's average level.

Indian dairy farmers with annual milk production of 1,000 L (2.74 L/day) or less are the majority. The low production of these dairy farmers is caused mainly by a lack of feed, the low genetic ability of the dairy

¹⁵ DoAHDF (2015) Basic Animal Husbandry and Fisheries Statistics 2015

¹⁶ This is calculated based on 8,511 kg per parous cow (Situation of livestock and dairy in Japan, Ministry of Agriculture, Forestry and Fisheries, Japan (2017))

¹⁷ Agriculture and Livestock Industries Corporation (2006) Outline of buffalo milk production in Argentina.

¹⁸ The reasons of high milk productivity in Punjab can be high ratio of cross breed in total cattle (85.0% in Punjab against 20.8% of India's average) and good access to fodder.

animals, and the spread of animal diseases.¹⁹ While the livestock population is increasing, the gap between the requirement and availability of feed and fodder is increasing primarily due to decreasing area under fodder cultivation and reduced availability of crop residues as fodder. The low genetic ability of dairy animals is caused by insufficient coverage of artificial insemination and non-availability of quality males for breeding. There is a shortage of veterinary and para-veterinary manpower and facilities including mechanisms for diagnosis, treatment, tracking and prevention of the diseases. Adequate infrastructure for ensuring bio-security, proper quarantine systems and services to prevent the ingress of diseases across the states and national borders is not available²⁰.

As mentioned in Section 2.1.6, acquiring appropriate technologies is more difficult for small-scale farmers than for large-scale farmers. How to improve productivity among small-scale farmers, who are important players in milk production, has become a major issue.

(2) Low Production Volume per Farmer

Landless and marginal farmers own an average of about 1.5 heads of dairy animals, while small-scale farmers own an average of about 2.6 heads, as shown in Table 2-6. The ratio of milking bovine in all bovine is estimated about 28.0% in India²¹. It means that landless/marginal and small farmers rear averagely only 0.42 heads and 0.728 heads of milking animals respectively. Considering that average milk productivity of cow and buffalo are 4.72 L/head per day and 5.25 L/head per day respectively as shown in Table 2-9, average milk production of landless, marginal, and small-scale farmers per day can be only 2 to 4 L/day per household. Due to the small number of holdings and low productivity per head, the milk surplus - excluding the household consumption of the small-scale dairy farmers - has become limited.²² Therefore, income improvement through livestock development tends to be limited.

(3) Limited Market Access

Modern collection networks tend to be unprofitable in areas where the market surplus of milk is small. Many areas still do not have access to modern supply chains such as dairy cooperatives and private dairy companies. For example, in Assam state, the milk procurement rate of cooperatives is about 4% of surplus milk, and major private dairy companies don't exist in the area. The milk procurement rate of organized sector in Uttar Pradesh, Madhya Pradesh, and Bihar are estimated relatively low, about 25% to 35%, 25%, and 50% to 60% respectively. Dairy farmers in such areas are limited to sales opportunities other than traditional distribution. Lacking the sales opportunities offered by modern supply chains, farmers risk falling into a vicious circle whereby profits from sales are low and the motivation to invest in order to improve breeding techniques and quality is suppressed.²³

¹⁹ Report of the working group on animal husbandry and dairying 12th Five Year Plan (2012-2017).

²⁰ Livestock Policy 2013

²¹ According to the livestock census in 2012, the number of bovine in milk and all bovine were estimated as 83,982 thousand heads and 299,981 thousand heads respectively.

²² According to an estimation of the Gujarat Co-operative Milk Marketing Federation (GCMMF), average annual income per cattle is about USD 387 <http://www.fwi.co.uk/business/11-amazing-facts-dairy-farming-india.htm>.

²³ Report of the working group on animal husbandry and dairying 12th Five-Year Plan (2012–2017).

(4) Exclusion of Landless Farmers from Dairy Farming

According to Shar and Dave (2010), the number of cattle and buffalo owners among landless farmers is very low - about one in 100 households as of 2003 - and is declining, as landless farmers have been abandoning dairy activities²⁴ since dairy farming is risky and costly for them. Since a dairy animal is larger than poultry and small ruminants, death of an animal would be large loss for them.

Table 2-10 Milch animals per 100 households by land holding group (rural)

landholding Year	Landless (-0.002ha)	Marginal (0.002-1ha)	Small (1-2ha)	Semi-medium (2-4ha)	Medium (4-10ha)	Large (10ha-)	All
1991-92	9	61	103	123	153	202	68
2002-03	1	69	108	142	210	343	62

Source: Shar and Dave (2010) A shift from crop-mixed traditional dairying to market oriented organized dairy farming

(5) Demand for Quality Improvement

Food Safety Standards Authority India (FSSAI), which is under the jurisdiction of the Ministry of Health and Family Welfare, is in charge of the hygiene management of foods, including dairy products. According to a survey conducted by the FSSAI in 2011, 70% of the milk distributed in the market did not meet the food standards prescribed by the agency. According to an FSSAI official, the results of the survey do not reflect the actual situation because they were caused by counting milk samples that were mixed with skim milk power (SMP) as non-conforming milk even though milk with SMP does not violate the rules, and it is a common practice in the dairy industry to adjust fat and SNF contents with SMP. However, it doesn't mean that milk meets the food standard as the detail is discussed in Chapter 6. Consumer awareness of food safety is increasing, and the FSSAI has made food inspections more stringent in recent years.

2.3 Indian Government Policies and Principles in the Dairy Sector and Related Sectors

2.3.1 Brief History of Dairy Development in India

Operation Flood, one of the world's largest rural development programs, was launched in 1970 with the aim to i) increase milk production, ii) augment rural incomes, and ii) ensure reasonable prices for consumers.

(1) Three Phase of Operation Flood

Operation Flood was implemented in three phases:

1) Phase 1 (1970 - 1980)

Phase 1 was financed through the sale of skimmed milk powder and butter oil gifted by the European Union (then the European Economic Community, EEC) through the World Food Programme (WFP). During the first phase, Operation Flood linked 18 of India's premier milksheds with consumers in

²⁴ Shar and Dave 2010, A shift from crop-mixed traditional dairying to market oriented organized dairy farming.

India's four major metropolitan cities - Delhi, Mumbai, Kolkata, and Chennai.

2) Phase 2 (1981 - 1985)

Phase 2 was launched in 1981 with the help of EEC gifts and a World Bank loan. It increased the milksheds from 18 to 136 and expanded to 290 urban markets. By the end of 1985, a self-sustaining system of 43,000 village cooperative societies covering 4.25 million milk producers had become a reality.

3) Phase 3 (1985 - 1996)

Phase 3 was launched in 1985 with the support of a World Bank loan and enabled dairy cooperatives to expand and strengthen the infrastructure required to procure and market increasing volumes of milk. Veterinary first-aid health care, feed, and artificial insemination services for cooperative members were extended along with intensified member education

(2) Achievement of Operation Flood

Financial outlay and fiscal achievement (milk processing capacity to be created) of the Operation Flood from phase I to III are summarized in Table 2-11.

Table 2-11 Financial outlay and fiscal achievement of the Operation Flood

Project Phase	Financial (Rs. crores)				Fiscal	
	World Bank Loan	WFP Aid (Grant)	EEC Aid (Grant)		Total	Milk processing capacity to be created (million L/day)
		Commodity	Commodity	Cash		
Phase I	-	115.441	-	-	115.441	3.60
Phase II	153.595	-	318.214	-	471.809	8.80
Phase III	754.946	-	239.480	16.250	1,010.676	19.20

Source: NDDDB

2.3.2 Livestock Policy 2013

(1) Background of the Policy

The National Livestock Policy 2013 was formulated to have a policy framework for improving the productivity of the livestock sector in a sustainable manner. The policy takes into account the provisions of the National Policy on Farmers 2007 and the recommendations of the stakeholders, including states.

(2) Aim and Objectives of the Policy

The goal of the policy is to increase livestock productivity and production in a sustainable manner while protecting the environment, preserving animal biodiversity, and ensuring both bio-security and farmers' livelihoods. To reach this goal, the policy has the following main objectives:

Objectives of the National Livestock Policy 2013

- i) To support the existing low input production systems for improving productivity and income so as to improve socio-economic status of a vast majority of the livestock producers, most of which are women and small farmers.
- ii) To support research and development initiatives on issues pertaining to livestock sector for improving production and productivity, bio-security and profitability.
- iii) To encourage establishment and growth of self-supporting financially viable, medium and large commercial livestock production units capable of adopting latest technology including facility for processing and value addition.
- iv) To improve the productivity of livestock and poultry by promoting and disseminating the technologies developed by the research system.
- v) To promote conservation of animal bio-diversity; conservation and genetic improvement of important indigenous breeds of livestock and poultry in the country.
- vi) To increase availability of feed and fodder resources to meet the requirement of livestock to attain optimal productivity.
- vii) To strengthen overall animal health cover through prevention, control and eradication of various disease conditions and encourage/enable the dairy cooperatives to extend veterinary services to farmers.
- viii) To focus on production of quality livestock products as per the international standards for food safety.
- ix) To encourage value addition of livestock products like milk and milk products, eggs, wool and meat and meat products etc.
- x) To expand capacity of milk handled by organized dairy sector including cooperatives.
- xi) To ensure transmission and application of improved technology and management practices to the doorstep of the farmers and the entrepreneurs.
- xii) To create an enabling environment to attract investment for improving infrastructure support, livestock production, processing, value addition and marketing in the sector.

The activities mentioned in the proposal prepared by the NDDB - such as the expansion of the organized dairy sector, value addition of milk and milk products, improved availability of feed, international standards for food safety, and value addition - are clearly mentioned in the policy.

(3) Role of the Central Government and the State Government

The roles of the central and state governments are as follows:

- Each state government has jurisdiction over livestock development under the constitution of India.
- The central government supplements and complements the efforts of the state governments through various schemes and programs in addition to creating an enabling environment for promoting

sustainable growth in the sector.

2.3.3 National Action Plan for Dairy Development (Vision 2024)

In July 2017, the Department of Animal Husbandry, Dairying and Fisheries (DoAHDF) of the Ministry of Agriculture and Farmers' Welfare Government of India published the National Action Plan for Dairy Development (Vision 2024) - Doubling Farmers Income by 2022 (NAP). The NAP has two goals:

Goal 1: To double national milk production from 155 million MT in 2015-16 to 300 million MT by 2023-24 for meeting the increasing milk demand by domestic milk production and also ensuring nutritional security at household level as well as exports of milk and milk products

Goal 2: To endeavor to double milk farmers income at farm level by 2023-24 by providing the milk farmer with greater access to the organized milk processing sector

To achieve Goal 1, the DoAHDF plans to increase the dairy bovine population and milk yield per animal per day, as summarized in Table 2-12.

Table 2-12 Projection for milk production

Year	Number of in-milk bovine (in million)	Milk yield per animal per day (L)	Milk production (million MT)	Marketable surplus (million MT)
2009-10	67.62	4.72	116.4	61
2010-11	69.88	4.78	121.8	63
2011-12	82.36	4.25	127.9	67
2012-13	83.15	4.36	132.4	69
2013-14	84.07	4.49	137.7	72
2014-15	85.66	4.68	146.3	76
2015-16	88.35	4.65	155.5	81
2016-17	90.49	5.11	168.8	101
2017-18	93.80	5.35	183.3	110
2018-19	97.23	5.61	198.9	119
2019-20	100.79	5.87	216.0	130
2020-21	104.48	6.15	234.5	153
2021-22	108.31	6.44	254.5	153
2022-23	112.27	6.74	276.3	166
2023-24	116.38	7.06	300.0	180

Source: DoAHDF (2017) National Action Plan for Dairy Development

Regarding Goal 2, the DoAHDF claims that the livelihoods and economic wellbeing of rural milk producers require that they need to be given greater access to the organized milk processing sector. This would require the creation of additional chilling capacity and milk processing infrastructure along with additional drying capacities and dairy product manufacturing and feed/feed supplement infrastructure. It is

assumed that 457 billion rupees and 764 billion rupees are required for the cooperative and private sectors, respectively, to meet the demand.

Table 2-13 Gap analysis of dairy infrastructure under cooperative and private sectors

	Cooperative sector			Private sector		
	2015-16	2023-24	Growth	2015-16	2023-24	Growth
Milk procurement (lakh liter per day)	440.46	1,643.90	3.73	430.00	2,465.89	5.73
Processing capacity (lakh liter per day)	662.96	2,975.42	4.49	732.52	3,082.36	4.21
Chilling capacity (lakh liter per day)	463.79	1,643.90	3.54	293.01	2,465.89	8.42
Value added products (MT per day)	3,167	8,214	2.59	3,959	10,267	2.59
Milk powder plant (MT per day)	1,496	2,086	1.39	1,465	6,165	4.21
Cattle feed plant (MT per day)	15,662	18,361	1.17	NA	2,699	NA

Source: DoAHDF (2017) National Action Plan for Dairy Development

Table 2-13 summarizes the targets of the NAP for both cooperative and the private sectors. For example, the 2023-24 milk procurement volume target requires the cooperative sector to achieve an average 18% annual increase and the private sector to achieve an average 25% annual increase.

2.3.4 Government Organization and Schemes for Dairy Development

The DoAHDF plays a major role in dairy development. The National Dairy Development Board (NDDB) promotes financing for and supports producer-owned and -controlled organizations, such as dairy cooperatives and producer companies. In addition, the Ministry of Food Processing Industries and the National Cooperative Development Cooperation have schemes for promoting dairy development. Their mandate and schemes for promoting the dairy sector are summarized below.

(1) Department of Animal Husbandry, Dairying and Fisheries, the Ministry of Agriculture and Farmers Welfare²⁵

The DoAHDF is responsible for matters relating to livestock production, preservation, disease prevention, stock improvement, and dairy development, as well as matters relating to the Delhi Milk Scheme. It also looks after all matters pertaining to fishing and fisheries, both inland and marine.

The department advises state governments/union territories (UTs) regarding the formulation of policies and programs in the field of animal husbandry, dairy development, and fisheries. The main thrust areas are

- the development of the requisite infrastructure in states and UTs for improving productivity,
- the preservation and protection of livestock through the provision of health care,
- the strengthening of central livestock farms (cattle, sheep, and poultry) for the development of superior

²⁵ Website of the Department of Animal Husbandry, Dairying and Fisheries: <http://www.dahd.nic.in/about-us/about-department>

- germ plasm for distribution to states, and
- the expansion of aquaculture in fresh and brackish water, and the welfare of fisher-folk, etc.

The dairy development schemes being implemented by the department include the following:

1) National Program for Bovine Breeding and Dairy Development (NPBB and DD)²⁶

a) Outline of the Scheme

The National Program for Bovine Breeding and Dairy Development (NPBB and DD) was launched in February 2014 by merging four ongoing schemes: The Integrated Dairy Development Program (IDDP), Strengthening Infrastructure for Quality and Clean Milk Production (SIQ-CMP), Assistance to Cooperatives (A to C), and the National Project for Cattle and Buffalo Breeding (NPCBB). The NPBB and DD have two components, the National Program for Bovine Breeding (NPBB) and the National Program for Dairy Development (NPDD). An amount of Rs. 1,800 crores, of which Rs. 1,200 crores have been made available for NPBB²⁷, has been allocated for NPBB and DD for the Twelfth Five Year Plan (2012-1017).

The NPBB component focuses on extending AI networks through the Multi-Purpose AI Technician in Rural India (MAITRI) and on encouraging the conservation and development of recognized indigenous breeds in the country. The NPDD component focuses on creating and strengthening the infrastructure for the production of quality milk and the procurement, processing, and marketing of milk and dairy products by state implementing agencies such as the dairy cooperative federation (state level) and district dairy cooperatives (district level). Details on the NPDD are provided below.

b) Financial Assistance

The NPDD provides grants-in-aid for i) the installation of BMC, ii) milk processing plants, iii) milk powder plants, and iv) the rehabilitation of milk unions and federations. The funding pattern of the NPDD is summarized in Table 2-14.

Table 2-14 Funding pattern of NPDD

State and condition		Grant %
States covered by NDP I		50%
States not covered by NDP I ²⁸	Profit-making milk unions with accumulated profits of more than Rs.1 crore n previous year	75%
	Loss-making milk unions with accumulated profits of less than Rs. 1 crore in previous year	90%
Hilly and northeastern states		90%
Milk unions assisted by the Rehabilitation Plan component		50%

Source: DoAHDF

²⁶ DoAHDF (2017) Annual Report 2016-17

²⁷ Rashtriya Gokul Mission has been initiated by the DoAHDF as a part of NPBB in December 2014 with the aim to conserve and develop indigenous breeds in scientific and holistic manner by setting aside Rs. 500 crores out of Rs. 1,200 crores allocated under NPBB (DoAHDF (2017) Annual Report 2016-17).

²⁸ The NDP does not cover Delhi, Goa, Puducherry, Himachal Pradesh, Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim, Tripura, Jammu and Kashmir, UT of Chandigarh, Daman and Diu, Lakshadweep, Andaman, or Nicobar.

In addition to pursuing infrastructure installation, the government has been helping to revitalize ailing dairy cooperatives, which have accumulated cash losses since 2000, through the Assistance to Cooperative (A to C), a component of the NPDD. It provides grants-in-aid to milk unions shared 50/50 between the central and state governments.

c) Achievements

According to the DoAHDF's annual report, 31 projects in 17 states had been approved, at a total cost of Rs. 340.77 crores by 2016-17. Against a budget provision of Rs. 110 crores, Rs. 67.81 crores had been released for 2016-17 implementation by the end of December 2016. The physical targets and current achievements are summarized in Table 2-15.

Table 2-15 Physical targets and achievements of NPDD

		Target	Achievement	% of achievement
BMC	Number	207	62	30.0%
	Capacity (thousand liters)	330.5	113.5	34.3%
AMCU/DPMCU (number)		1820	730	40.1%
Dairy plant capacity (thousand liters per day) *		1830	1070	58.5%
Average milk procurement (additional) **		1239.16	979.77	79.1%

Note: * = achievement as of end of September 2017; ** = achievement as of end of June 2017

AMCU: Auto milk collection unit, DPMCU: Data processing milk collection unit

Source: DoAHDF

Regarding achievements the A to C, 42 milk unions have been supported since 2000 by the receipt of about Rs. 290 crores as of the end of November 2017.

(2) National Dairy Development Board

The National Dairy Development Board (NDDB) was founded in 1965 to extend the success of the Kaira Cooperative Milk Producers' Union (known as Anand model) to other parts of India fulfilling the vision of the then prime minister of India, the late Lal Bahadur Shastri. The major success of the mission was achieved through the World Bank-financed Operation Flood programme, which lasted for 26 years (1970 to 1996) and made India the world's largest producer of milk. This operation was started with the objective of increasing milk production, increasing farmers' incomes, and providing fair prices for consumers.

According to the NDDB, it provided financial and technical support after Operation Flood through the "Perspective Plan" for the 10 years from 2001 to 2010 and continued until June 2015 to strengthen cooperative businesses, enhance production, ensure quality, and create a national information network by providing loans and technical assistance and pursuing other schemes. The NDDB has been implementing NDP I since 2011-12, which is detailed in the next section. Details on the NDDB's structure and financial status are provided in Chapter 3.

1) National Dairy Plan Phase 1

a) Outline of the Project

The National Dairy Plan was proposed by the NDDB in 2008 as a 15-year project with two major components: a production enhancement program and the provision of procurement, processing, and marketing infrastructure.

Based on the plan, NDP I was launched in 2011-12, focusing on productivity enhancement and village-based milk procurement systems with the support of the International Development Association, a World Bank organization. The plan had been designed to end on December 31, 2017, but it was extended to November 29, 2019. According to the World Bank, the project period was extended by about two years because the preparation stage before the fund disbursement took longer than the World Bank and NDDB had expected. Since the disbursement began, the project has been progressing smoothly, the World Bank said.

The total outlay of NDP I is summarized in Table 2-16. NDP I is being implemented by the NDDB through “end implementing agencies” (EIAs) such as state cooperative federations, district milk unions, producer companies, and state livestock development boards, etc. The EIAs need to prepare and submit their proposal to the NDDB in order to receive its support. The NDDB on request supports EIAs in preparation of their proposals.

b) Financial Assistant

Component B (village-based milk procurement systems) requires EIA contributions, but other components are 100% grants-in-aid.

Table 2-16 Outline of National Dairy Plan Phase 1

Component	Activity	Outlay (in crore rupees)
Component A	Breed improvement, including bull production through imported embryos, pedigree selection, pilot AI delivery services, progeny testing, and strengthening of semen stations	1,140
	Animal nutrition, including ration balancing program and fodder development	
Component B	Village-based milk procurement systems	488
Component C	Project management and learning	132
Subtotal		1,760
EIA contribution		282
NDDB contribution		200
Total		2,242

Source: NDDB

c) Achievement

According to the implementation status and results report published by the World Bank, the plan has been progressing as planned, or better. The target and progress of the project development objective indicators as of August 2017 are summarized in Table 2-17. Many indicators have already been achieved, even though the project has more than two years to go.

Table 2-17 Project development objective indicators of the plan

Target	Baseline	Target (November 29, 2019)	Progress (as of August 11, 2017)
% increase in milk production per animal	0.00	10.00	19.80
Proportion of in-milk female animals to adult female animals	63.00	66.00	66.00
Proportion of total milk sold to total production	65.00	65.00	67.00
Percent increase in share of milk sold to the organized sector	45.00	56.00	76.00

Source: The World Bank

As of September 2017, 350 projects had been approved with grants of Rs. 1,619 crores. The figures below show the distribution of approved projects and granted amounts in the top five states. Gujarat state received the most projects and granted amounts from NDP I.

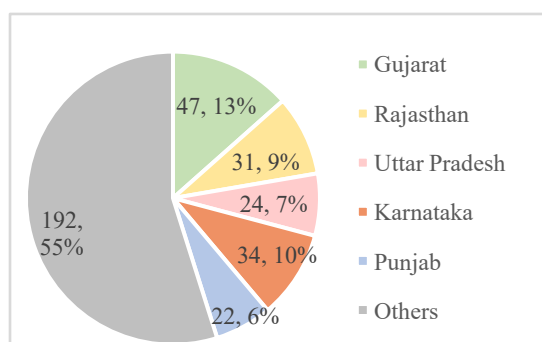


Figure 2-15 Number of NDP I approved projects

Source: NDDB website

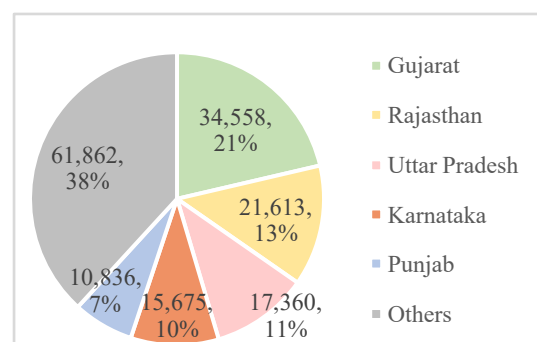


Figure 2-16 NDP I granted amounts (lakh rupees)

Source: NDDB website

The EIAs in Gujarat state have received the greatest support from NDP I in terms of number of project and granted amount. Annual milk production in Gujarat state is only 8% of India's total milk production, but EIAs in Gujarat received 21% of all NDP I grants. However, given that the annual milk procurement volume of cooperatives in Gujarat state accounts for 41% of the country's total procurement volume and that NDP I mainly supports cooperatives and producer companies, the 21% support to EIAs in Gujarat state might be reasonable.

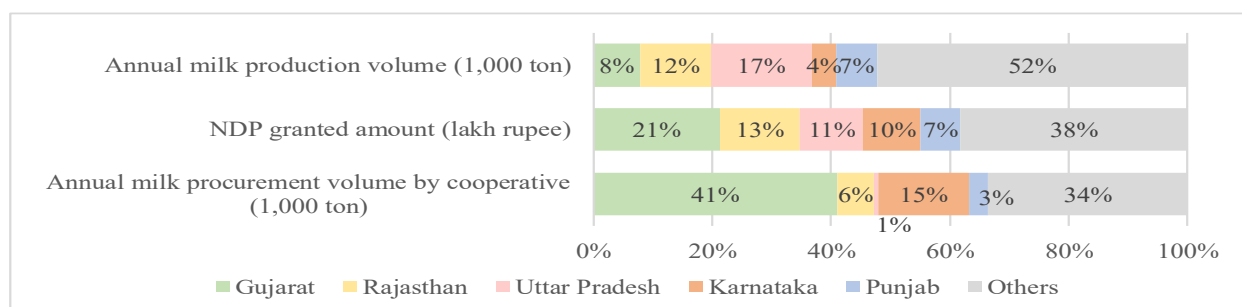


Figure 2-17 Shares of annual milk production volumes in states, NDP I grant amounts, and annual milk procurement volumes of cooperatives.

Source: NDDDB website and DoAHDF (2016) Basic Animal Husbandry and Fisheries Statistics 2016

(3) National Bank for Agriculture and Rural Development (NABARD)

The National Bank for Agriculture and Rural Development (NABARD), a government-owned bank, provides financial assistance to commercially bankable projects through loans from commercial, cooperative, urban, and rural banks and designs development schemes for the implementation of the GoI's development programs. NABARD has been implementing the following schemes for dairy development.

1) Dairy Entrepreneurship Development Scheme

a) Outline of the Scheme

The Dairy Entrepreneurship Development Scheme (DEDS) was started in September 2010 with the objective of generating self-employment opportunities in India's dairy sector. This scheme is being implemented through NABARD in collaboration with the DoAHDF.

The scheme covers milk production, processing, and sales, including the following: the establishment of small dairy units from two to 10 milch animals; the rearing of heifers (up to 20 calves); vermi-compost; the purchase of milking machines, milk testing machines, and BMCs (up to 5,000 liter capacity); the purchase of milk-processing equipment for the manufacture of indigenous milk products; the provision of transportation and cold storage facilities; the establishment of private veterinary clinics; and the setting up of milk parlor.

Individual entrepreneurs, farmers, farmer groups, self-help groups, dairy cooperative societies, district milk unions, and the Panchayati Raj Institution are all eligible under the scheme.

b) Financial Assistance

NABARD provides a back-ended capital subsidy of 25% of the project cost to the beneficiaries in the general category and 33.33% of the project cost to scheduled caste (SC) and scheduled tribe (ST) beneficiaries.

c) Achievement

Rs. 1,400 crores was provided during the twelfth five-year plan (2012-2017), and NABARD had disbursed Rs. 1,021.78 crores as back-ended capital subsidy to the beneficiaries by the end of December 2016.

2) Dairy Processing and Infrastructure Development Fund²⁹

a) Outline of the Scheme

The Dairy Processing and Infrastructure Development Fund (DIDF), with an outlay of Rs. 10,881 crores for the 2017-18 to 2028-29 period, was approved by the Cabinet Committee on Economic Affairs chaired by Prime Minister Shri Narendra Modi in 2017. The fund will focus on building an efficient milk procurement system by

- setting up a chilling infrastructure,
- installing electronic milk adulteration testing equipment,
- creating, modernizing, and expanding the processing infrastructure, and
- setting up manufacturing facilities for the value-added product.

In this scheme, the NABARD provides loans to the NDDDB and NCDC, and the NDDDB and NCDC provide loans to dairy cooperatives and producer companies. Out of a total outlay of Rs. 10,881 crores, the financial contributions summarized in Table 2-18 will be made.

Table 2-18 Financial contribution of the DIDF

Contribution	Amount (crore rupees)
Loan from NABARD to the NDDDB and NCDC	8,004
End-borrower contribution	2,001
NDDDB's and NCDC's share	21
DoAHDF	864
Total	10,881

Source: Press Information Bureau, Government of India (website)³⁰

b) Financial Support

The end-borrowers will receive loans at 6.5% interest rate per annum with a repayment period of 10 years including initial two-year moratorium on repayment of the principal amount. The respective state governments will be the guarantors of loan repayment. If the end borrower cannot contribute its share, the state government may offer necessary grant component to cover eligible end borrower contribution.

c) Achievement

The NABARD shall disburse Rs. 2,004 crores, Rs. 3,006 crores, and Rs. 2,994 crores during the 2017-18, 2018-19, and 2019-20 periods, respectively.

(4) Ministry of Food Processing Industries³¹

The Ministry of Food Processing Industries is concerned with the formulation and implementation

²⁹ <http://pib.nic.in/newsite/PrintRelease.aspx?relid=170712>.

³⁰ <http://pib.nic.in/newsite/PrintRelease.aspx?relid=170712>.

³¹ MoFPI (2017) Annual Report 2016-17.

of policies for food processing industries within India's overall national priorities and objectives. The ministry acts as a catalyst for bringing greater investment into this sector, for guiding and helping the industry, and for creating an environment conducive to the healthy growth of the food processing industry. The ministry aims at

- creating the critical infrastructure required to fill the gaps in the supply chain from farm to consumer;
- providing value added for agricultural produce;
- minimizing wastage at all stages in the food processing chain through the development of infrastructure for the storage, transportation, and processing of agro produce;
- introducing modern technology to food processing industries;
- encouraging food processing R&D for product and process development;
- providing policy support, promotional initiative, and facilities to promote value added produce for domestic consumption and exports.

The ministry provides support to the food processing sector in general, not only the dairy sector. Almost all of the schemes provided by the ministry can be applied to the dairy sector. According to the ministry, the dairy sub-sector is one of the most important in the food processing sector, and the ministry provides support to not only private companies but also dairy cooperatives. Details on the schemes that can be applied to cold chain improvement and processing infrastructure in the dairy sector - the schemes for the cold chain, value addition, and preservation infrastructure as well as for the creation of backward and forward linkages - are described below.

1) Cold Chain, Value Addition, and Preservation Infrastructure Schemes

a) Outline of the Scheme

The cold chain, value addition, and preservation infrastructure schemes aim to provide integrated cold chain and preservation infrastructure facilities, without interruption, from the farm gate to the consumer. It covers pre-cooling facilities at production sites, reefer vans, mobile cooling units, and value-addition centers, which include infrastructural facilities like processing/collection centers for horticulture, organic produce, marine, dairy, meat, and poultry.

b) Financial Assistance

Financial assistance (grants-in-aid) under the scheme is limited to a maximum of Rs. 10 crores per project for technical civil works and eligible plant and machinery, as follows:

- For storage infrastructure, including pack houses, pre-cooling units, ripening chambers, and transport infrastructure, grants-in-aid of 35% for general areas and 50% for northeastern states, Himalayan states, and Integrated Tribal Development Project (ITDP) Areas and Islands of the total cost of plant and machinery and technical civil works will be provided.
- For value addition and processing infrastructure, including frozen storage/deep freezers integral to processing, grants-in-aid of 50% for general areas and 75% for northeastern states, Himalayan states,

ITDP Areas and Islands will be provided.

c) Achievement

According to the ministry, 228 projects had been implemented under the scheme since 2009 as of September 2017 (232 projects were listed on their website, but four were canceled), of which 56 projects are in the dairy sector. According to the MoFPI, approximately half of the projects are being implemented by private dairy companies, and the rest are being implemented by dairy cooperatives. However, as confirming the project list, only six projects are for dairy cooperatives as shown in Table 2-19.

Table 2-19 Number of projects, project cost, and amount of grant released of the scheme

	Number of projects	Project cost (Rs. crore)		Amount of grant released (Rs. crore)	
		Total	Average	Total	Average
Cooperative	6	410.4	68.4	16.3	2.7
Private	50	1,379.9	27.6	159.6	3.2
Total	56	1,790.4	32.0	176.0	3.1

Source: Website of MoFPI

This will result in an increase in milk processing and storage of 10,799,000 L/day. In addition, 103 cases were sanctioned in March 2017, 35 in the dairy sector. This will result in an additional 5,948,000 L/day of milk processing and storage.

The number of supported projects this year has increased because the government allocated funds for an additional 100 projects. The number of supported projects and grant amounts depend on the budget allocation.

2) Scheme for Creation of Backward and Forward Linkages³²

a) Outline of the Scheme

The objective of the scheme is to provide effective and seamless backward and forward integration for the processed food industry by plugging supply chain gaps regarding the availability of raw material and linkages with the market. Under the scheme, financial assistance is provided for setting up primary processing/collection centers at the farm gate and modern retail outlets at the front end along with connectivity through insulated/refrigerated transport.

The scheme is applicable to perishable horticulture and non-horticulture produce such as fruits, vegetables, dairy products, meat, poultry, fish, ready-to-cook food products, honey, coconuts, spices, mushrooms, and retail shops for perishable food products. The scheme would enable the linking of farmers to processors and the market to ensure remunerative prices for agri products.

b) Financial Assistance

The maximum grant available per project is Rs. five crores at 35% of the eligible project cost for general areas and 50% for northeastern states, Himalayan states, and ITDP Areas and Islands, for a maximum of

³² <http://mofpi.nic.in/Schemes/scheme-creation-backward-and-forward-linkages>.

Rs. five crores per project. The grant is provided only for technical civil work and eligible plant and machinery. In the dairy sector, the scheme covers BMC, insulated tanks, refrigerator vans, and equipment at retail shops.

c) Achievement

It is a new scheme, begun in August 2017 for 50 projects. The first application was closed in October 2017.

(5) National Cooperative Development Cooperation

The National Cooperative Development Corporation (NCDC) was established by an act of parliament in 1963 as a statutory corporation under the Ministry of Agriculture and Farmers Welfare.

The NCDC finances projects in rural industrial cooperative sectors and for certain services in rural areas, like water conservation, irrigation and micro irrigation, agri-insurance, agro-credit, rural sanitation, and animal health.

Since its inception, the NCDC has been promoting and financing dairy cooperatives. However, its role has been limited to “Non-operation Flood States” due to the NDDDB’s implementation of Operation Flood. After Operation Flood ended in 1996, the NCDC’s role was widened, and it now can finance dairy cooperatives in erstwhile Operation Flood areas.

1) Outline of Scheme

The NCDC provides assistance to primary, district, and state dairy cooperatives for the establishment/expansion/renovation of milk collection centers and chilling plants, the purchase of milk-collection equipment and transport vehicles, the establishment of feed mixing/manufacturing units, milk testing equipment, deep freezers, BMC and UHT packaging units, and integrated dairy development projects linking the production, procurement, processing, and marketing of milk. Working capital and margin money/share capital assistance are provided to increase business turnover. Further, as per a revision of the scheme in 2002, the NCDC also finances the purchase, rearing, and breeding of milch animals as per the existing pattern of assistance for cooperatives engaged in dairy activities.

2) Financial Assistance

Table 2-20 summarizes the financial assistance pattern of the major schemes that can be applied to the dairy sector. A higher percentage of subsidy is provided to less-developed states. State governments receive a share capita of cooperatives when these schemes are applied. For example,, if the Bihar state government applies the scheme for dairy cooperatives to invest milk processing facilities, the Bihar state government, as a least-developed state, would get loan of 70% of the total project cost and subsidy of 25% of the total project cost, and it needs to manage the rest of 5% of the total cost by itself or dairy cooperatives. The NCDC can procure fund from any financial agencies including commercial banks. Based on the interest rate of procured fund, the interest rate to borrowers of the NCDC would be determined. In case of the scheme for dairy cooperatives in Bihar, the interest rate for the dairy cooperatives became 9.2% per annual.

Table 2-20 Financial assistance pattern of NCDC schemes

Lending channel Type of state	NCDC to society through state government		Direct funding from NCDC to society	
	NCDC to state gov.	State gov. to society		
Scheme for Infrastructure	(%)	(%)	(%)	
Least-developed states	Loan	70	Loan	50
	Subsidy	25	Subsidy	25
		Share capita	20	
	Total	95	Total	95
Underdeveloped states	Loan	70	Loan	50
	Subsidy	20	Subsidy	20
		Share capita	20	
	Total	90	Total	90
Developed states	Loan	75	Loan	50
	Subsidy	15	Subsidy	15
		Share capita	25	
	Total	90	Total	90
Scheme for processing	(%)	(%)	(%)	
Least-developed states	Loan	70	Loan	50
	Subsidy	25	Subsidy	25
		Share capita	20	
	Total	95	Total	95
Underdeveloped states	Loan	70	Loan	50
	Subsidy	20	Subsidy	20
		Share capita	20	
	Total	90	Total	90
Developed states	Loan	75	Loan	50
	Subsidy	15	Subsidy	15
		Share capita	25	
	Total	90	Total	90

Source: NCDC (2016) annual report 2015-16

3) Achievement

The NCDC had sanctioned Rs. 2,013.5 crores and released Rs. 612.7 crores by the end of March 2016 to dairy and livestock cooperatives for integrated projects and other activities in various states/UTs.

According to the Bihar State Milk Cooperative Federation (COMFED), it invested Rs. 573.35 crores for processing plants and other facilities at their milk unions with the support of the NCDC and the Bihar state government. It means that Rs. 573.35 crores out of Rs. 612.7 crores are provided to Bihar state, and only Rs. 59.35 crores are provided to other dairy cooperatives.

COMFED received a subsidy of 25% of the total investment and a loan for 75% of the total investment at 9.2% interest for eight years with a one-year moratorium period. It means that the Bihar state government provide 5% of the total investment from their own resources. In addition, the Bihar state government became a guarantor of the loan provided by the NCDC and has been paying the 9.2% interest.

2.4 Value Chain in Dairy Sector and its Actors

2.4.1 Outline of Value Chain in Dairy Sector

(1) Unorganized and Organized Sector in Dairy Sector

According to the NAP, 48% of the milk produced is self-consumed or sold to non-producers in rural areas, and 52% of produced milk is available for sale to consumers in urban centers. About 40% of the milk sold is handled by the organized sector (20% by dairy cooperatives, 1% by producer companies, and 19% by private dairy companies), and the remaining 60% is handled by the unorganized sector without a cold chain, as summarized in Figure 2-18. Details on the value chain in each state are presented in Chapter 4.

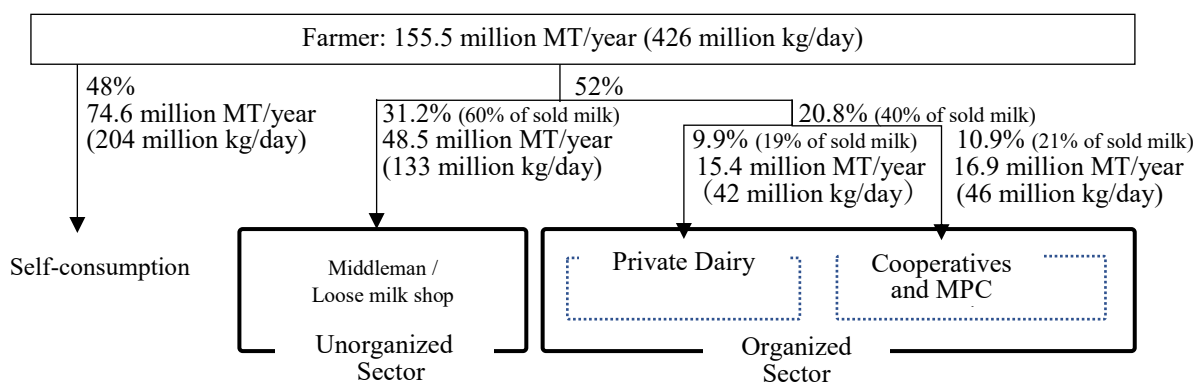


Figure 2-18 Outline of value chain in India

(2) Outline of Stakeholders in the Dairy Sector

The value chain structure and key actors in the dairy sector are shown in Figure 2-19. The major players in the modern distribution channel can be broadly divided into private dairy companies and dairy cooperatives. Apart from these, producers' organizations, called "producer companies," established under the Part IX-A of the Companies Act 1956 have been increasing in recent years through the support of the NDDB. Private dairy companies and dairy cooperatives are competing for milk collection, processing, and sales as well as dairy products. In some cases, private dairy companies and dairy cooperatives are business partners. For example, some dairy cooperatives subcontract milk powder processing to private dairy companies.

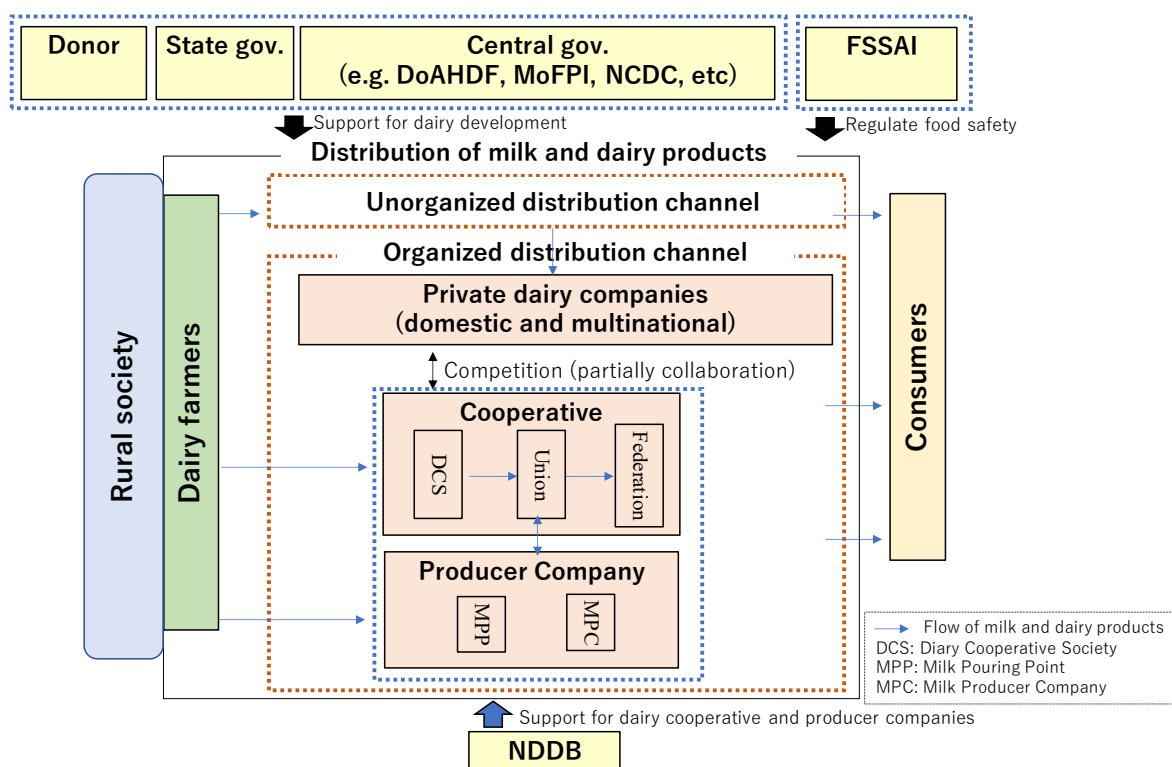


Figure 2-19 Outline of stakeholders in dairy sector in India

Competition between cooperatives has also begun. The Gujarat Cooperative Milk Marketing Federation Ltd (GCMMF), a state dairy cooperative federation of Gujarat state, has expanded their business from Gujarat to Uttar Pradesh, Assam, and other states, where they collect, process, and sell milk. As a result, competition between GCMMF and local unions has begun. In other states where outside milk unions are not collecting milk, they are competing in the states' retail market. For example, 15% of Karnataka state's pouch milk is sold in other states such as Tamil Nadu and Maharashtra. In addition, milk unions in Maharashtra state are competing in the northern part of Karnataka, and milk unions in Bihar state sell their products in the eastern part of Uttar Pradesh state. An outline of the main actors is provided in the next section.

2.4.2 Outline of Stakeholders

(1) Government of India

The Government of India supports dairy development via the DoAHDF, MoFPI, and NCDC, as explained above.

(2) Food Safety and Standards Authority of India

The FSSAI was established under the Food Safety and Standards Act, 2006, which consolidates various acts and orders on food-related issues in various ministries and departments. The FSSAI was created to lay down science-based standards for food items and to regulate their manufacture, storage, distribution, sale, and import to ensure the availability of safe and wholesome food for human consumption under the

jurisdiction of the Ministry of Health and Family Welfare.

The standards and regulations are mainly enforced by state governments. Traders, processors, and sellers of food items are obligated to acquire or register licenses from the state government or the central government based on their scale of business.

According to a survey conducted by the FSSAI in 2011, 70% of the milk distributed in the market did not meet the food standards prescribed by the agency. According to this survey, the most common problem was adulteration with water, detergent and pain. According to the NDDB, consumer awareness of food safety is also increasing, and the FSSAI has made food inspections more stringent in recent years.

(3) State Governments

1) Structure

Under the Constitution of India, livestock development falls within the jurisdiction of the state government pursuant to the National Livestock Policy 2013. Therefore, each state government is responsible for dairy development in its respective state. In many states, the department or directorate of animal husbandry plays a major role in the livestock sector. The name of the department or directorate differs from state to state. The responsible department or directorate implements various activities with the support of the central government and using their own resources.

The state governments' major dairy development activities can be divided into four kinds: i) animal health and veterinary services, ii) breeding, iii) dairy development, and iv) fodder development. The Government of India helped the state governments establish livestock development boards or agencies responsible for breeding; thus, the state governments all have separate organizations for breeding.

Table 2-21 Organization in charge of breeding in each state

State	Name of organization
Gujarat	Gujarat Livestock Development Board
Bihar	Bihar Livestock Development Agency
Assam	Assam Livestock Development Agency
Karnataka	Karnataka Livestock Development Agency
Madhya Pradesh	Madhya Pradesh Poultry and Livestock Development Cooperation
Uttar Pradesh	Uttar Pradesh Livestock Development Board

Regarding dairy development, especially after production, the dairy cooperatives play major roles in procuring, processing, and selling milk as well as supporting farmers. However, some state governments play a role in dairy development in their state. For example, Assam state has a department of dairy development, which used to procure, process, and sell milk; those activities are now being transferred to dairy cooperatives and societies. Uttar Pradesh state has a milk commissioner, the major role of which is the registration of state cooperative federations, district milk unions, and dairy cooperative societies at the village level; the commissioner is not involved in the procurement, processing, or marketing of milk and

dairy products.

The relations between dairy cooperatives and state governments differ from state to state. In Gujarat, the dairy cooperative federation (GCMMF) is independent from the state government. However, in Bihar, Karnataka, Madhya Pradesh, and Uttar Pradesh states, Indian Administrative Service (IAS) officers - the elite public management cadre of the Government of India - are appointed at high levels of management. For example, IAS officers are appointed as managing directors of the dairy cooperative federation in Bihar (COMFED) and Uttar Pradesh (PCF).

2) Support for Dairy Cooperatives

The state governments provide support for dairy development by channeling the centrally sponsored schemes, such as the NPBB and DD and RKVY. The state government is a guarantor of financial assistance schemes, such as the DIDF. In addition to the centrally sponsored schemes, state governments also provide support through their own budgets. For example, the Karnataka state government provides a Rs.5/L incentive to milk producers when they sell their milk to cooperatives. This incentive started in 2008, with Rs.2/L, and the amount per liter gradually increased up to Rs.5/L. The Karnataka state government released about Rs. 1,004 crores during 2016/17 for this incentive. The Karnataka State Dairy Association, composed of private dairy companies in Karnataka state, claimed that the incentive has been hindering private dairy companies' business and distorting the market. Other states such as Rajasthan state provide similar incentive to farmers who sell their milk to cooperatives³³.

(4) Dairy Cooperatives

Due to the success of dairy cooperatives in Gujarat state, the Government of India has promoted a three-tier cooperative structure known as the "Anand model." The Anand model is an integrated cooperative structure for procuring, processing, and marketing produce. It has three levels: the village dairy cooperative society (DCS) at the village level, the district milk union at the district level, and the milk federation at the state level, as summarized in Table 2-22. According to the NAP, there are 210 milk unions in India. Details on dairy cooperatives are provided in Chapter 4.

³³ Source: Interview with the NDDB and private dairy companies

Table 2-22 Three-tier cooperative structure

Level	Outline
Village dairy cooperative society (DCS)	It is formed by milk producers in villages. It procures milk from its producer members. The milk of every member is tested for quality, with payments based on it.
District milk union	District-level milk unions are formed by member DCS. They buy milk from its member DCS, then processes and market the milk and milk products
Milk federation	The milk unions in a state form a state federation, which is responsible for marketing the surplus milk and milk products of its member milk unions within and outside the state

Source: NDDB (2017) Detailed Project Report on Dairying through Cooperatives

(5) Private Dairy Companies

1) Growth of Private Dairy Companies

Many private companies, including domestic and multinational companies, have been entering the dairy business since India's economic liberalization began. Nestle, a multinational dairy company based in Switzerland, is an exception. Nestle started operating in India in 1912. It imported and sold their finish products in India, and established a factory at Moga, Punjab state, in 1961. Nestle is one of the largest private dairy companies in India, with five dairy processing units in Moga (Punjab state), Samalkha (Haryana state), Ponda and Bicholim (Goa state), Pantnagar (Uttarakhand state), and Tahiwal (Himachal Pradesh state). The turnover of Nestle's dairy business is only about Rs. 9,200 crores, while GCMMF's turnover has reached about Rs. 23,000 crores.

Some entrepreneurs start a dairy business by themselves and expand it. Some large private companies enter the dairy business with enough financial and human resources. For example, Mahindra, headquartered in Mumbai (Maharashtra) and the largest manufacturer of tractors in the world, entered into the dairy business in Madhya Pradesh in 2016.

Mergers and acquisitions are also continuing. In 2014, Lactalis of France, the world's largest dairy company, with turnover of 17 billion euro,³⁴ entered India by acquiring Hyderabad-based Tirumala Milk Products Private Limited, the second largest dairy company in South India.³⁵ Lactalis also acquired Anik Milk Products Private Limited in 2016, along with three processing factories of about 10 lakh L/day capacity from Hindustan Unilever Limited, one of the largest consumer goods companies in India. Several other private dairy companies are operating. For example, Reliance Industries Limited, one of the largest retail chains in India, sold their dairy business to Heritage Foods Limited, which made Rs. 2,642.89 crores in fiscal 2016-17. India's private dairy sector is changing dramatically. By the mergers and acquisitions, owners of giant dairy companies can be changed. Changing owners would cause changing market and procurement strategies so that consumers and producers may be affected.

³⁴ <http://www.lactalis-international.com/en/the-lactalis-group.html>.

³⁵ <http://www.thehindu.com/business/Industry/lactalis-acquires-hyderabadbased-tirumala-milk/article5553805.ece>.

2) Entry Barriers to Dairy Sector for Private Companies

As mentioned, members of the Karnataka State Dairy Association claimed that the Rs.5 incentive to dairy farmers who sell their milk to cooperative hinders their business. They also claim that private companies have to obtain a “no objection certificate” (NOC) from the cooperative federation, the Karnataka Milk Federation (KMF), before they can start a dairy business in Karnataka. Since the KMF rarely provides NOCs to private companies, newcomers cannot start a dairy business in Karnataka state.

3) Growth Rate

Figures 2-20 and 2-21 depict the average annual turnover and growth rates of nine major private dairy companies³⁶ in India. Although annual turnover has been steadily increasing since 2010-11, average growth rates have been stagnating. According to the NDDDB, major reasons behind the reduction in growth rate of annual turnover of dairy cooperatives in 2015-16 are due to decrease in sales price of SMP and procurement price of milk; SMP prices during 2015-16 were about 22% lower as compared to 2014-15, which had direct bearing on turnover of dairy cooperatives. Therefore, the growth rate of annual turnover of dairy cooperative in 2016-17 is expected to recover.

According to the NDDDB and DoAHDF, support for the cooperative sector does not hinder private businesses since the share of the unorganized sector is still large. However, some private companies and public sector entities such as the MoFPI claim that support should be provided to private dairy companies for dairy development. As mentioned in Section 2.3.3, a 25% annual growth in the private dairy sector is required to achieve the NAP target. The figures of private dairy sector are calculated based on only nine private companies whose annual turnover is available. Therefore, the detail analysis needs to be conducted to capture the detail situation of private dairy companies. However, government intervention to promote the private dairy sector seems to be required to achieve the NAP target if the growth rate is lower than 25% per annual.

³⁶ The averages of the nine major private dairy companies: Nestle India Ltd., Hatsun Agro Product Ltd., Tirumala Milk Products Pvt. Ltd., Milk Food Ltd., Heritage Foods India Ltd., VRS Foods Ltd., Kwaliti Ltd., Parag Milk Foods Pvt. Ltd., and SMC Foods Ltd. The total annual turnover of the nine companies in 2012-13 was about Rs. 200 billion. Considering the sale of milk and dairy products in 2016 was Rs. 6,910 billion and the sales of the GCMMF was about Rs. 380 billion, the share of the nine companies is not so large.

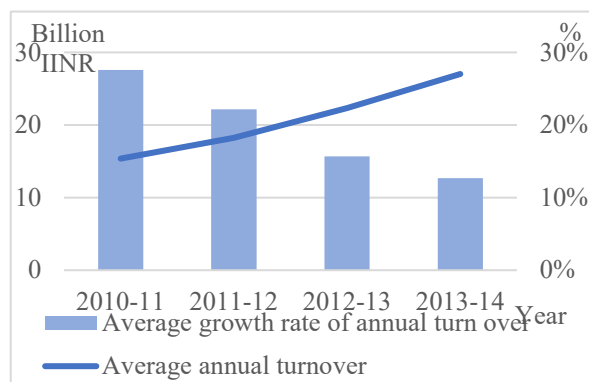


Figure 2-20 Average annual turnover and growth rates of nine major private companies

Source: The study team based on IMARC (2017) Dairy Industry in India 2017 Edition

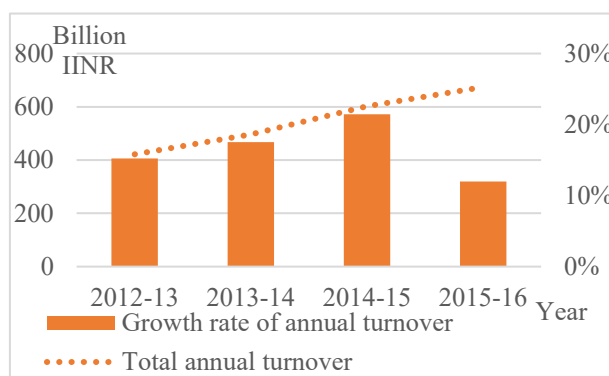


Figure 2-21 Total annual turnover and growth rates of milk unions

Source: NDDDB

(6) Funding Agency

1) World Bank

The World Bank is a major funding agency to the dairy sector in India. The World Bank supports dairy development in India through Operation Flood Phase II and III, which started in 1981 for 15 years. The National Dairy Plan (NDP) Phase I, which began in 2011-12, is being carried out through a World Bank loan³⁷, and the NDDDB is an implementing agency. The plan started in 14 states and then expanded to 18 states. The implementation period was extended from December 2017 to November 2019.

The World Bank is implementing various projects in India, including dairy sector support. For example, Assam Agribusiness and Rural Transformation Project, with a total project cost of USD 262.40 million, was approved by the World Bank in August 2017. This project aims to “add value and improve resilience of selected agriculture value chains, focusing on smallholder farmers and agro-entrepreneurs in targeted districts of Assam.” The dairy sector is a part of the project.

³⁷ Government of India received IDA credit and passed it on to NDDDB as grant for onward disbursement to eligible end implementing agencies

Chapter 3 National Dairy Development Board

3.1 Organizational Structure

The NDDB, initially registered as a society under the Societies Act 1860, was merged with the erstwhile Indian Dairy Corporation, a company formed and registered under the Companies Act 1956, by an Act of India's Parliament (the NDDB Act 1987), with effect from 12 October, 1987. The new body corporate was declared an institution of national importance by the Act.

The NDDB is headquartered in Anand, Gujarat state and has four regional offices in Mumbai, Noida, Bangalore, and Kolkata. The regional offices cover in each region in western, northern, southern, and eastern India, and coordinate with governments and NDDB activities in the regions

Table 3-1 States covered by headquarters and each regional office

Office	Covered states
Noida	Uttar Pradesh, Rajasthan, Punjab, Haryana, Himachal Pradesh, Uttarakhand, Jammu and Kashmir
Bangalore	Karnataka, Tamil Nadu, Kerala, Andhra Pradesh, Telangana
Mumbai	Maharashtra, Goa, Madhya Pradesh
Kolkata	West Bengal, Odisha, Bihar, Chhattisgarh, All North Eastern states except Assam
Anand (headquarters)	Gujarat, Assam and Jharkhand

Source: NDDB

3.1.1 Board

The NDDB Act, 1987 stated that the general superintendence, direction, control, and management of the affairs and business of the NDDB shall be vested in a Board of Directors, which shall exercise all powers and perform all activities of the NDDB. The Board of Directors of the NDDB is determined by the NDDB Act, 1987. Its personnel as of June 9, 2017 are listed in Table 3-2. According to the NDDB Act, 1987, the Chairman and the directors are nominated by the Government of India among persons professionally qualified in one or more specialties, namely, dairying, animal husbandry, rural economics, rural development, business administration or banking. The current chairman is ex-managing director of the NDDB.

Table 3-2 Board of directors of the NDDB

NDDB Act, 1987	Board of directors as of June 9, 2017
(a) Chairman	Shri Dilip Rath Chairman, National Dairy Development Board
(b) One director from amongst the officials of the Central Government	Joint Secretary (Dairy Development) Department of Animal Husbandry, Dairying & Fisheries Ministry of Agriculture & Farmers' Welfare, Government of India, Krishi Bhavan, New Delhi
(c) Two directors from amongst the Chairmen of the State Co-operative Dairy Federations	Shri Jethabhai P. Patel Chairman, Gujarat Cooperative Milk Marketing Federation Ltd, Anand Smt Mandakini Khadse Chairperson, Maharashtra Rajya Sahakari Dudh Mahasangh Maryadit, Mumbai
(d) Fulltime directors, not more than three in number, from amongst the executives of the highest grade of the National Dairy Development Board ³⁸	Shri Sangram Chaudhary Executive Director, National Dairy Development Board, Anand Shri Y Y Patil Executive Director, National Dairy Development Board, Anand
(e) One director, an expert, from outside the National Dairy Development Board	Prof. Guru Prasad Singh Institute of Agricultural Sciences, Banaras Hindu University, Varanasi

Source: NDDB Act, 1987 and NDDB website (<http://www.nddb.org/about/board>).

3.1.2 Organizational Chart

Figure 3-1 depicts the organizational chart of the NDDB. A Chairman and a Managing Director are posted under the board. The NDDB has headquarters at Anand, Gujarat, and four regional offices. In addition, officers are appointed in each state to follow up on NDDB activities. The West Assam Milk Producers' Cooperative Union (WAMUL) and Jharkhand Milk Federation (JMF) are being revitalized with the support of the NDDB, and several NDDB officers have been appointed to the WAMUL and JMF.

³⁸ According to the NDDB, the managing director and executive directors of the NDDB are posted. Since the post of the managing director of the NDDB is currently vacant, only two executive directors are posted in this criterion.

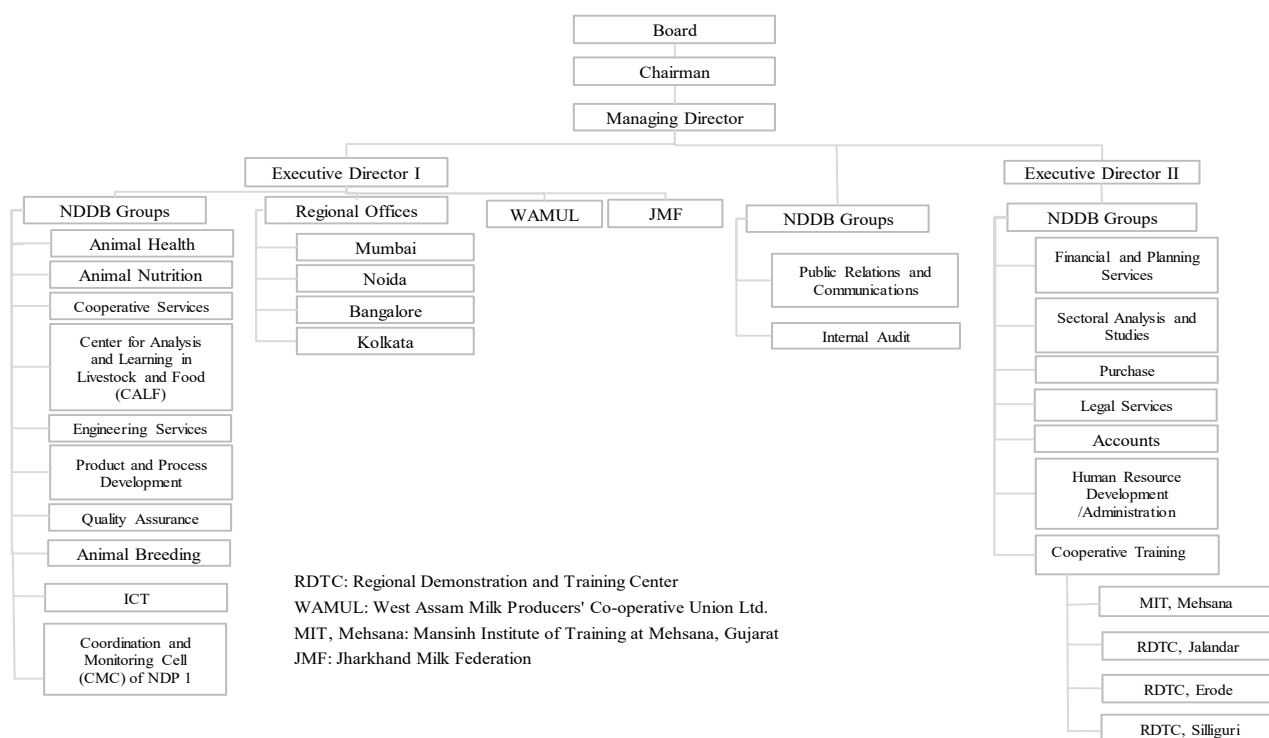


Figure 3-1 Organizational chart of the NDDB as of December 2017

Source: NDDB

The officers and staff are listed group-wise in Table 3-3. As of September 2017, 370 officers and 149 staff were working for the NDDB.

Table 3-3 Number of officers and staff working for the NDDDB as of September 2017

Group	Officers	Staff	Total	Group	Officers	Staff	Total
Animal Breeding	27	5	32	Engineering Services	75	3	78
Accounts	18	14	32	Human Resource Development	6	3	9
Administration	4	47	51	Information and Communication Technologies	17	3	20
Administration, Utility Services	6	1	7	Legal Services	2	2	4
Animal Health	11	5	16	Financial and Planning Services	17	1	18
Animal Nutrition	29	4	33	Coordination and Monitoring Cell of Project Management Unit	15	2	17
Centre for Analysis and Learning in Food and Feed (CALF)	14	16	30	Product and Process Development	6	3	9
CEO office	2	3	5	Public Relations and Communication	5	21	26
Cooperative Services	48	3	51	Purchase	14	3	17
Cooperative Training	24	8	32	Quality Assurance	9	1	10
Executive Director's Office	2	0	2	Sectoral Analysis and Studies	19	1	20
				Total	370	149	519

Note: Officers include managing director to private secretary while staff is rather assistant work (workers are not included).

Source: NDDDB

3.1.3 NDDDB's Role

Fundamental to NDDDB's efforts are cooperative principles and cooperative strategies. The NDDDB was created to promote, finance and support producer-owned and controlled organization such as dairy cooperatives and producer companies. NDDDB's programs and activities seek to strengthen farmer cooperatives and support national policies that are favorable to the growth of such institutions.

For the purpose, the following groups of the NDDDB provide supports to cooperatives and producer companies as summarized in Table 3-4.

Table 3-4 Groups providing supports to cooperatives and producer companies⁶

Group	Activities
Animal breeding	To provide technical assistance for improvement of animal breeding such as increase in the percentage of breedable animals inseminated, increase in high quality disease free semen doses production, increase in the number of bulls for semen production, and increase in percentage of bull with progeny testing and pedigree selection program
Animal health	To provide technical assistant to create awareness among dairy farmers on animal health issues, formulate and field test disease control models for economically important diseases, provide inputs to the DoAHDF in matters related to veterinary in matter related to international trade of animals and animal products, provide inputs to the DoAHDF in matters related to veterinary legislation and disease control, facilitate the DoAHDF in developing appropriate

	bio-security protocols for semen stations and bull production areas to ensure disease free semen production.
Animal nutrition	To provide technical assistant and advisory services in the areas of ration balancing programme, area specific mineral mixture, bypass protein supplement/feed, bypass fat supplement, methane measurement from ruminants, calf nutrition, compounds cattle feed, urea molasses mineral block licks, R&D initiatives for developing feed supplements, and green fodder production enhancement
Cooperative services	To assist cooperatives for institution building ³⁹ , strengthening procurement system, enhancing women involvement, legal framework of cooperatives, village based milk procurement system under NDP I, and new generation cooperatives leading to producer companies
Cooperative training	To provide trainings to various stakeholders in dairy sectors in collaboration with various national and international agencies. The NDDB established five dedicated training centers across India ⁴⁰ .
Engineering services	To provide technical support on consultancy basis to dairy cooperatives, such as site selection, selection of technology, preparation of plant layout, engineering drawings, tender documents, when dairy cooperatives set up infrastructural facilities for milk processing and manufacturing plants of dairy products, cattle feed.
Quality assurance	To facilitate cooperatives and producer companies to provide clean, safe and wholesome milk through science based intervention.

Source: NDDB's website

3.2 Financial Status

The financial indicators show that the NDDB makes a net profit and has a low but positive return-on-assets ratio and return-on-equity ratio, a high capital adequacy ratio, a low gross loan portfolio-to-total asset ratio, and a high cash and bank balance-to-assets ratio. The NDDB has non-performing assets and has occasionally written off bad debts, but it has sufficient assets to cover them, and its assets have not decreased for the past six years. Those indicators indicate that the NDDB has been steadily providing loans at a profit. Details on these financial indicators are provided below.

3.2.1 Financial Indicators

(1) Net Profit

Net profit after tax (surplus during the year after tax) of the NDDB during the last six years is summarized in Table 3-5. The NDDB has been making a net profit for the last six years.

³⁹ Supports for cooperative's branding and marketing are also included. Marketing analysis is supported by Sectoral Analysis and Studies Group

⁴⁰ The training are mainly provided at regional training center and headquarter of the NDDB to staff of dairy cooperatives and farmers. In case of exposure visit and some training for cooperative staff are provided in the field.

Table 3-5 Net profit after tax of the NDDB from 2010-11 to 2015-16 (in million rupees)

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Net profit after tax	1,366.70	523.49	384.82 ⁴¹	969.32	734.67	1,124.38

Source: NDDB

(2) Return on Assets

Although the NDDB's return on assets and return on equity are relatively low, the NDDB has been profitable over the past six years.

$$\text{Return on Assets Ratio} = \frac{\text{Net profit after tax}}{\text{Assets}}$$

Table 3-6 Net profit after tax of the NDDB from 2010-11 to 2015-16 (in million rupee)

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Net profit after tax	1,366.70	523.49	384.82	969.32	734.67	1,124.38
Assets	34,251.00	32,781.42	33,405.62	33,384.81	34,002.79	35,360.52
Return on Assets Ratio	4.0%	1.6%	1.2%	2.9%	2.2%	3.2%

Source: NDDB

(3) Return on Equity

Assuming "NDDB fund" on the financial report as equity (capital) of the NDDB, the return on equity ratio has been relatively low in the range of 1.5% to 5.6% but has kept positive for six years.

$$\text{Return on Equity (Capital) Ratio} = \frac{\text{Net profit after tax}}{\text{Equity (Capital)}}$$

Table 3-7 Net profit after tax of the NDDB from 2010-11 to 2015-16 (in million rupees)

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Net profit after tax	1,366.70	523.49	384.82	969.32	734.67	1,124.38
Equity (Capital)	24,335.26	24,804.41	25,184.46	26,153.42	26,887.73	28,032.67
Return on Equity (Capital) Ratio	5.6%	2.1%	1.5%	3.7%	2.7%	4.0%

Source: NDDB annual report from 2010-11 to 2015-16

(4) Capital Adequacy Ratio

The capital adequacy ratio indicates financial soundness: the higher the ratio, the healthier the financial state. Taking the "NDDB fund" in the financial report as the equity (capital) of the NDDB, the capital adequacy ratio has been quite high, in the range of 71.0% to 79.3%.

$$\text{Capital Adequacy Ratio} = \frac{\text{Capital}}{\text{Assets}}$$

⁴¹ The profit in 2012-13 is low because of writing off of bad debts, lower write back of excess provision as compared to previous year, and lower interest income on investment in bonds according to the NDDB.

Table 3-8 Net profit after tax of the NDDB from 2010-11 to 2015-16 (in million rupees)

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Capital	24,335.26	24,804.41	25,184.46	26,153.42	26,887.73	28,032.67
Assets	34,251.00	32,781.42	33,405.62	33,384.81	34,002.79	35,360.52
Capital Adequacy Ratio	71.0%	75.7%	75.4%	78.3%	79.1%	79.3%

Source: NDDB annual report from 2010-11 to 2015-16

(5) Gross Loan Portfolio to Total Assets

The gross loan portfolio-to-total assets ratio indicates the effectiveness of the NDDB's use of assets for lending activities. Taking the "NDDB fund" in the financial report as the equity (capital) of the NDDB, the gross loan portfolio-to-total assets ratio has been relatively low, in the range of 24.7% to 43.8%.

$$\text{Gross Loan Portfolio to Total Assets} = \frac{\text{Gross loan portfolio}}{\text{Assets}}$$

Table 3-9 Gross loan portfolio to total assets of the NDDB from 2010-11 to 2015-16 (in million rupees)

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Loans to dairy cooperatives	4,020.34	3,911.91	4,924.38	6,792.45	7,673.86	9,328.24
Loans to oil cooperatives	1,984.23	1,953.94	1,950.48	1,426.82	3,271.30	2,412.83
Loans and advances to subsidiary companies/managed units	2,448.75	2,961.99	2,835.87	2,497.73	3,771.00	3,735.38
Total loans and advances to cooperatives and subsidiary companies /managed units	8,453.32	8,827.84	9,710.73	10,717.00	14,716.16	15,476.45
Assets	34,251.00	32,781.42	33,405.62	33,384.81	34,002.79	35,360.52
Gross Loan Portfolio to Total Assets	24.7%	26.9%	29.1%	32.1%	43.3%	43.8%

Source: NDDB annual report from 2010-11 to 2015-16

(6) Cash and Bank Balances to Assets

In 2015-16, the NDDB had 23.8% of cash and bank balances (Rs. 8, 423 million) out of total assets (Rs. 35,360 million), which means that its financial resources are stable because it holds a relatively large amount of cash and deposits.

$$\text{Cash and Bank Balances to Assets} = \frac{\text{Cash and Bank Balances}}{\text{Assets}}$$

Table 3-10 Gross loan portfolio to total asset of the NDDB from 2010-11 to 2015-16 (in million rupees)

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Cash and bank balances	1,353.85	4,597.76	6,406.76	9,391.79	7,772.71	8,422.88
Assets	34,251.00	32,781.42	33,405.62	33,384.81	34,002.79	35,360.52
Cash and bank balances to asset ratio	4.0%	14.0%	19.2%	28.1%	22.9%	23.8%

Source: NDDB annual report from 2010-11 to 2015-16

(7) Non-performing Assets

The NDDB has non-performing assets and has occasionally written off bad debts, as shown in Table 3-11. Non-performing assets were large, Rs. 2,578 million, in 2015-16, but the NDDB has sufficient assets to cover them, and its assets have not decreased.

Table 3-11 Gross loan portfolio to total assets of the NDDB from 2010-11 to 2015-16 (in million rupees)⁴²

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Non-performing assets	5,972.25	4,444.63	4,190.87	3,492.62	3,444.30	2,578.16
Bad debts written off	20.91	0.46	119.20	422.49	-	319.92

Source: NDDB annual report from 2010-11 to 2015-16

3.3 Scheme for Supporting Cooperatives and Loan Condition

3.3.1 Loan Disbursements for Last Ten Years

The NDDB has continued to provide technical and financial assistance to dairy cooperatives to augment processing facilities and implement their programs. Its financial assistance can be divided into two categories: long-term project funds and working capital (short-term loans). The NDDB's loan disbursements over the last ten years are given below.

Table 3-12 Loan disbursements by the NDDB from 2007-08 to 2016-17 (in crore rupees)

Particulars	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Long-term project funds	110.61	92.77	100.33	31.62	153.52	168.82	274.25	235.92	278.56	224.28
Working capital/ Short-term loans	300.01	161.86	37.47	58.4	133.93	78.5	71.12	153.78	259.24	111.84
Total	410.62	254.63	137.8	90.02	287.45	247.32	345.37	389.71	537.8	336.12

Source: NDDB

⁴² This includes Rs. 2,412.82 million as loan outstanding against oil cooperatives most of which are under liquidation. Initially, these oil cooperatives were viable and making profit. However, after announcement open general license by the Government of India in early 1990s, cheaper oils were imported, which distorted the market for domestically produced oil, so that many oil cooperatives started making losses and closed their operations.

Table 3-13 Statement of principal and interest repayments during last five years

Particulars	2012-13	2013-14	2014-15	2015-16	2016-17
Principal Repayment					
Term Loan	82.81	108.83	86.78	197.56	162.71
WC Loan	63.82	82.35	84.35	177.59	275.24
Total	146.63	191.18	171.13	375.15	437.95
Interest Payments					
Interest on Term Loan	34.23	48.17	63.44	71.02	73.48
Interest on WC Loan	12.97	12.67	15.49	22.51	14.66
Loan Interest Total	47.19	60.85	78.93	93.53	88.14

Source: NDDDB

In 2015-16, while the NDDDB continued to provide financial assistance to projects approved under the Perspective Plan, a new scheme for “providing financial assistance for infrastructure activities, skill development and training” was introduced.

3.3.2 Loan Term and Loan Eligibility Criteria

(1) Loan Term

As mentioned above, the NDDDB provides both the long term and short term loans. The loan terms of them are summarized below. As of September 2017, the loan terms of them are summarized in Table 3-14.

Table 3-14 Loan terms of short and long term loans provided by the NDDDB

	Interest rate	Tenure of the loan	Security and other conditions
Short term	Changeable at a floating rate of interest (8.5% per annum as of September 2017)	Maximum 12 months	First charge on entire movable assets including stock and debtors by way of hypothecation
Long term	8.25% per annum	Maximum ten years including maximum two years moratorium period	Minimum borrower's contribution is 20% of project costs.

Source: NDDDB

(2) Loan Eligibility Criteria

As per the NDDDB's lending policy for new schemes (“providing financial assistance for infrastructure activities, skill development and training”), the NDDDB set up the following basic eligibility criteria (please see the Annex 12 for details of these criteria).

After providing a 10% sensitivity for both liquid milk sales and milk procurement, financial assistance projects for infrastructure activities should meet the minimum viability criteria of

ROI = 12% and

Debt Service Coverage Ratio (DSCR) more than 1.5 times

Calculation of DSCR is as follows:

$$\text{DSCR} = \frac{\text{Sum of projected (Profit after tax + Depreciation + Interest) over the repayment period}}{\text{Total repayment (i. e., Principal + Interest)}}$$

Chapter 4 Current Status of Dairy Cooperatives and Major Issues

4.1 Target Milk Unions of the Study and Selection Method

Table 4-1 depicts the target states of this study. One state was selected from five regions in India,⁴³ in addition to Gujarat state, which is the most progressive state for dairy cooperative development. The milk unions examined in this study's field survey were selected through discussions between the study team and the NDDB. These unions are listed in Table 4-1. The selection of target unions was conducted based on the following principles:

- The selected districts must have characteristics typical of their state
- There should be diversity in the targets' financial situations and scales of production

Table 4-1 Target milk unions examined in the study⁴⁴

Region	State	Union/producers company name and its abbreviation
Western region	Gujarat	Kaira District Co-operative Milk Producers' Union (Kaira milk union) Gandhinagar District Cooperative Milk Union (Gandhinagar milk union) <u>Banaskantha District Cooperative Milk Producer' Union (Banaskantha milk union)</u>
	Madhya Pradesh	Bhopal Shakari Dugdh Sangh Maryadit (Bhopal milk union) Indore Sahakari Dugdh Sangh Maryadit (Indore milk union) Jabalpur Sahakari Dugdh Sangh Maryadit (Jabalpur milk union)
Eastern region	Bihar	<u>Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna milk union)</u> <u>Mithila Dugdh Utpadak Sahkari Sangh Ltd (Samastipur milk union)</u>
Northeastern region	Assam	<u>West Assam Milk Producers' Cooperative Union Ltd. (WAMUL, Kamrup)</u> <u>East Assam Milk Producers' Cooperative Union Ltd. (EAMUL, Jorhat)</u>
Southern region	Karnataka	<u>Bangalore Cooperative Milk Union Ltd. (Bangalore milk union)</u> <u>Kalaburagi, Bidar and Yadri Milk Union (Gulbarga milk union)</u>
Northern region	Uttar Pradesh	Lucknow Producer's Cooperative Milk Union Ltd. (Lucknow milk union) Kanpur Producer's Cooperative Milk Union Ltd. (Kanpur milk union) <u>Varanasi Producer's Cooperative Milk Union Ltd. (Varanasi milk union)</u> <u>Meerut Producer's Cooperative Milk Union Ltd. (Meerut MPC)</u> Saahaj Milk Producers Company (Saahaj MPC)

During the survey, the study team visited the 17 milk unions shown above and the cooperative federation of each state, as well as several DCS operating under these unions. The locations of these unions are shown in Figure 4-1.

⁴³ Two states from the western region were selected, as it is important to include Gujarat state, the most advanced state in the dairy sector, as a benchmark for this study.

⁴⁴ Unions that are underlined are the targets of a socioeconomic situation survey.



Figure 4-1 Locations of target unions

Source of the map: https://commons.wikimedia.org/wiki/File:India_states_and_union_territories_map.svg

Table 4-2 presents the basic facts on milk production, milk procurement by dairy cooperatives, and milk sales for the cooperatives for each state. The shaded rows indicate the target states of the study. One can see the significant differences among the target states. For example, even though Uttar Pradesh has the largest milk production, the procurement volume of its cooperatives is quite small. Gujarat has the largest cooperative procurement volume and ratio to milk production, followed by Karnataka. Assam's cooperatives have the smallest volume of milk production and procurement. Bihar and Madhya Pradesh are somewhere between Assam and Karnataka.

Table 4-2 Basic facts on milk production, milk procurement, and sales by state cooperatives (2015-16)⁴⁵

State	Production of cow and buffalo milk (thousand tons)	Procurement volume of milk by cooperatives (TKgPD) ^{46 47}	% of procurement by cooperatives to total production	Number of functional DCS	Number of members of functional DCS	Volume of milk sales by cooperatives (TLPD) ⁴⁸
Andhra Pradesh	15,259	2,044	5%	4,426	612,216	1,790
Assam	843	22	1%	178	12,214	42
Bihar	8,228	1,726	8%	14,179	787,252	880
Chhattisgarh	1,277	74	2%	654	23,282	44
Goa	54	66	45%	176	19,088	83
Gujarat	12,262	17,481	52%	16,020	3,124,341	4,749
Haryana	8,381	450	2%	3,461	128,407	335
Himachal Pradesh	1,283	57	2%	442	22,239	23
Jammu & Kashmir	2,273	12	0%	341	7,000	14
Jharkhand	1,812	61	1%	46	16,557	339
Karnataka	6,344	6,480	37%	13,287	1,950,911	3,344
Kerala	2,650	1,099	15%	2,891	879,172	1,264
Madhya Pradesh	12,148	1,029	3%	6,315	236,306	703
Maharashtra	10,153	3,646	13%	11,334	1,234,965	2,352
Meghalaya	84	11	5%	66	N/A	12
Mizoram	22	7	12%	31	788	5
Nagaland	77	3	1%	30	1,175	4
Odisha	1,930	526	10%	3,871	209,030	406
Punjab	10,774	1,392	5%	6,557	348,120	965
Rajasthan	18,500	2,602	5%	9,991	452,646	1,890
Sikkim	67	27	15%	323	9,660	31
Tamil Nadu	7,244	3,040	15%	8,550	1,526,383	988
Tripura	152	5	1%	99	1,605	11
Uttar Pradesh	26,387	322	0%	7,169	513,013	175
Uttarakhand	1,656	173	4%	2,472	83,682	146
West Bengal	5,038	160	1%	1,528	106,492	28
Total	155,490	42,557	10%	114,437	12,306,544	20,603

Sources: Milk production data re extracted from DoAHDF (2017) “Basic Animal Husbandry and Fisheries Statistics 2017”. The number of functional DCS and the number of members of functional DCS are provided by the NDDDB. The other figures are based on the NDDDB Annual Report 2015-16.

4.2 Basic Descriptions of Dairy Cooperatives

4.2.1 History of Dairy Cooperatives in India⁴⁹

Dairy cooperatives in India have developed through the expansion of the Anand model, a framework for dairy cooperative created in Anand, Gujarat state. It is a three-tier integrated cooperative

⁴⁵ The figures for milk sales by cooperatives represent the sum of the milk sales by unions. The milk sales by the federations are not included.

⁴⁶ TKgPD stands for “thousand kg per day.”

⁴⁷ The figures in this column do not include the procurement volumes of MPC. On the other hand, the figures of procurement volumes of cooperatives shown in Section 2.4.1(1) include those of MPC. Percentage of procurement by cooperatives to total production shown in the table is thus slightly smaller than that is shown in Section 2.4.1 (1).

⁴⁸ TLPD stands for “thousand liters per day.”

⁴⁹ The term “dairy cooperative” is used as a collective term for state federations, milk unions, and DCS in this report.

structure for procuring, processing and marketing milk. The basic framework of the Anand model is composed of the following three closely related but financially independent institutions:

- Dairy Cooperative Society (DCS):⁵⁰ This is formed by village milk producers and procures milk from its producer members. Members' milk is tested for quality, and payment is based on it.
- Milk Union: District-level milk unions are formed by member DCSs. The union buys milk from its member DCS, then processes and markets the milk and dairy products.
- State federation: The milk unions in a state form a state federation, which is responsible for marketing the surplus milk and dairy products of its member milk unions within and outside the state.

The Anand model was extended to other states of India by the NDDB through Operation Flood programs, which helped establish 73,000 DCSs in 22 states between 1970 and 1996. When the program ended in 1996, 9 million milk-producing households had joined dairy cooperatives, and total milk production had increased from 21.2 million tons in 1968/69 to 69.1 million tons by the end of 1996/97. The table below shows the historical progress of the number of organized DCS all over India.

Table 4-3 Historical progress of the number of organized DCS

Financial Year	Organised DCS (thousand)
1971-72	1.8
1981-82	18.4
1991-92	64.4
1995-96	73.0
2001-02	1,00.8
2011-12	1,47.9
2015-16	1,73.5

Source: NDDB

4.2.2 Milk Producer Company

The formation of milk producer companies (MPCs) is a significant recent phenomenon in India's dairy sector. MPCs are producer-owned enterprises incorporated under Part IX A of the Companies Act; DCS and milk unions fall under the Cooperative Act of each state. MPCs are expected to prosper under the liberal regulatory framework of the Company Act while maintaining the institutional strengths offered by

⁵⁰ In cases of village-level dairy cooperation, a Milk Producers Institute (MPI) is often established. If the management of the MPI becomes stable, it usually becomes a DCS. While the DCS is registered with the designated department of the state government, the MPI is not. Otherwise, there is no real difference between a DCS and MPI in terms of management or the rights of members.

mutual assistance, which is also shared with the principles of cooperative. The formation of MPCs was prompted by the following problems in the management of dairy cooperatives:

- There is a widespread recognition that many dairy cooperatives have not functioned well due to inappropriate political intervention. Examples include the fact that board member elections and the management of cooperatives are often influenced by partisan politics, and subsidies are provided inefficiently.
- In many state federations, large volumes of shares are owned by the state governments, and some board members are representatives of these governments. Moreover, interventions by state governments are frequent, and affect personnel affairs and retail and procurement prices.
- The speed of decision making is slower than in private companies.

Between 2012 and 2014, five MPCs were formed via the facilitation of the NDDB Dairy Services (NDS), a subsidiary of the NDDB.⁵¹ Table 4-4 provides basic descriptions of the five MPCs. Another eight MPCs have also recently been formed by the NDS.

Table 4-4 Basic description of MPCs

Name of MPC	State	Number of members	Volume of milk procurement (TKgPD)	Turnover 2016/17 (million rupees)
Paayas	Rajasthan	112,460	650	106.2
Maahi	Gujarat	99,913	633	119.1
Shreeja	Andhra Pradesh	67,883	270	30.2
Baani	Punjab	40,805	180	26
Saahaj	Uttar Pradesh	91,085	345	49.8

Source: Presentation by NDS

The important characteristics of the management of MPCs are as follows:⁵²

- While the Cooperative Act is enacted by the state governments, the Company Act is legislated by the central government. Therefore, the scope of intervention by the state government is limited.
- They do not rely too much on subsidies from state governments in order to avoid interventions. Their major source of funding is the soft loans from the NDDB.
- Their members of the MPCs are the shareholders of the MPC they belong and can convey direct voices to the management of the MPC. On the other hand, the voices of members of dairy cooperatives can be only indirectly conveyed in the management of milk unions and state federations. The managements of the MPCs are thought to be more autonomous than those of dairy cooperatives.

⁵¹ These MPCs have received financial support from the NDP to build the necessary infrastructure for their procurement activities and cold chains.

⁵² These points were raised during the interview with the NDS.

- Where DCS are not present or have weak coverage, the formation of MPCs are generally encouraged⁵³. Conversion from existing Cooperative to Producer company is possible as per Part IX of the Companies Act. However, it is voluntary for milk cooperatives to convert into MPC.
- There is no difference between milk union and MPC for the financial or other supports they could get from public institutions.

4.2.3 Value Chains of Dairy Products

The basic characteristics of the value chains for milk production, procurement, processing, and sales differ from state to state.

Figure 4-2 depicts the value chain for milk in Bihar state, Karnataka state, Madhya Pradesh state, and Uttar Pradesh state. The left-hand side of the figure shows the value chain for milk in the unorganized sector, where the end-products are loose milk and local dairy products such as ghee, curd, and local sweets. Most of the milk in this sector is brought to loose milk and dairy product shops⁵⁴, hotels, and restaurants by middlemen, who usually buy the milk at the farm gates. Some farmers who live near urban areas bring their own milk directly to the shops or hotels/restaurants themselves.

The central portion of the figure indicates the value chains for milk packed by private dairy firms. In this chain, some of the milk is brought by farmers to the collection centers of private dairy firms located in the village. The milk is delivered to the firms' plants for processing and packing. Some private dairy firms receive milk from middlemen. The packed milk and other dairy products processed at the plants are sold through distributors (wholesalers) and retailers.

The right-hand part of the figure shows the value chains of milk cooperatives and milk producer companies (MPCs). Cooperative members bring their milk to the DCS collection point. Some of the milk is delivered to the dairy plant of the milk union through BMCs or chilling centers. If the village is located near the union's plant, it is delivered directly to the plant. After the milk is processed and packed, liquid milk, yogurt and sweets are sold by unions and delivered to retailers and cooperative parlors through distributors. Other dairy products produced at the union plants such as ice cream are sold by the state federations. Moreover, the surplus milk, which are excess to the quantity demanded in the state, are sold to cooperatives in other states. Many state federations have their own dairy processing plants; the products manufactured at the plants of the state federations are also delivered to distributors and eventually sold at retailers and parlors.

The members of MPC bring their milk to milk pooling points (MPP). As the MPC do not have their own processing plant yet, the milk is taken from MPP to the hired plants and then sold to distributors.

⁵³ This description is written in the PIP paper of the NDP project.

⁵⁴ Loose milk shops refer to the shops which sell raw milk.

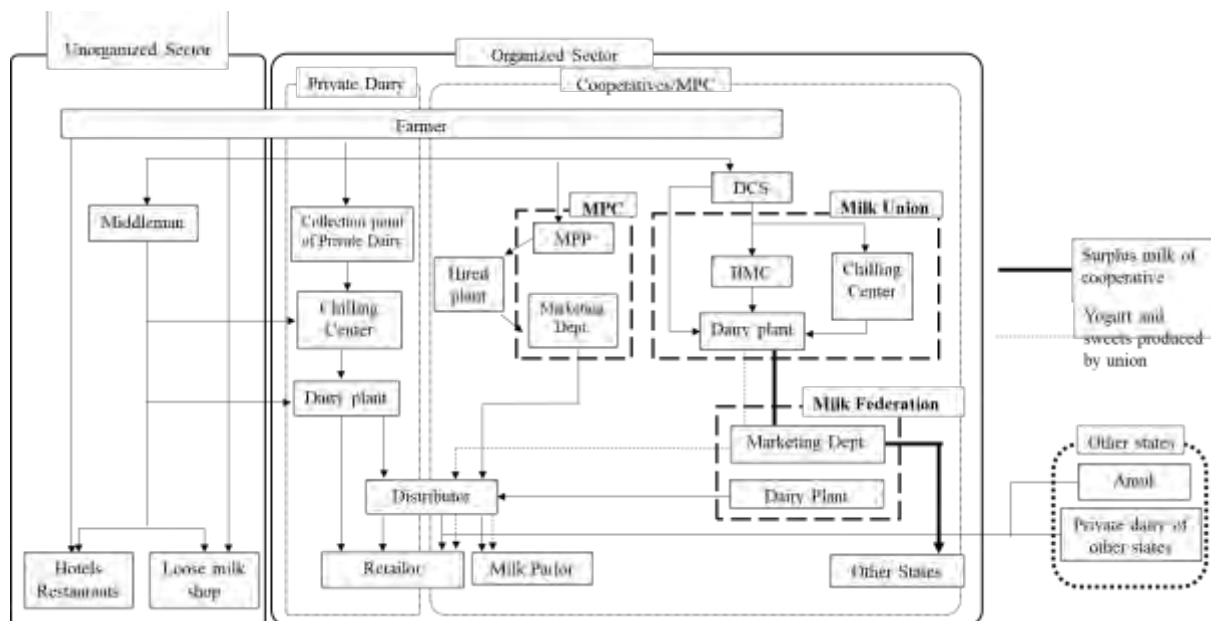


Figure 4-2 Graphical representation of value chain of dairy products for Bihar, Karnataka, Madhya Pradesh, and Uttar Pradesh

In Gujarat, the state federation is responsible for selling all the products produced by the unions, as shown in Figure 4-3. The dairy products produced by milk unions in Gujarat are sold all over India and exported to more than 20 countries under the brand name “Amul.” Gujarat has no major private dairy companies; collection and sales are conducted by very small-scale private companies.

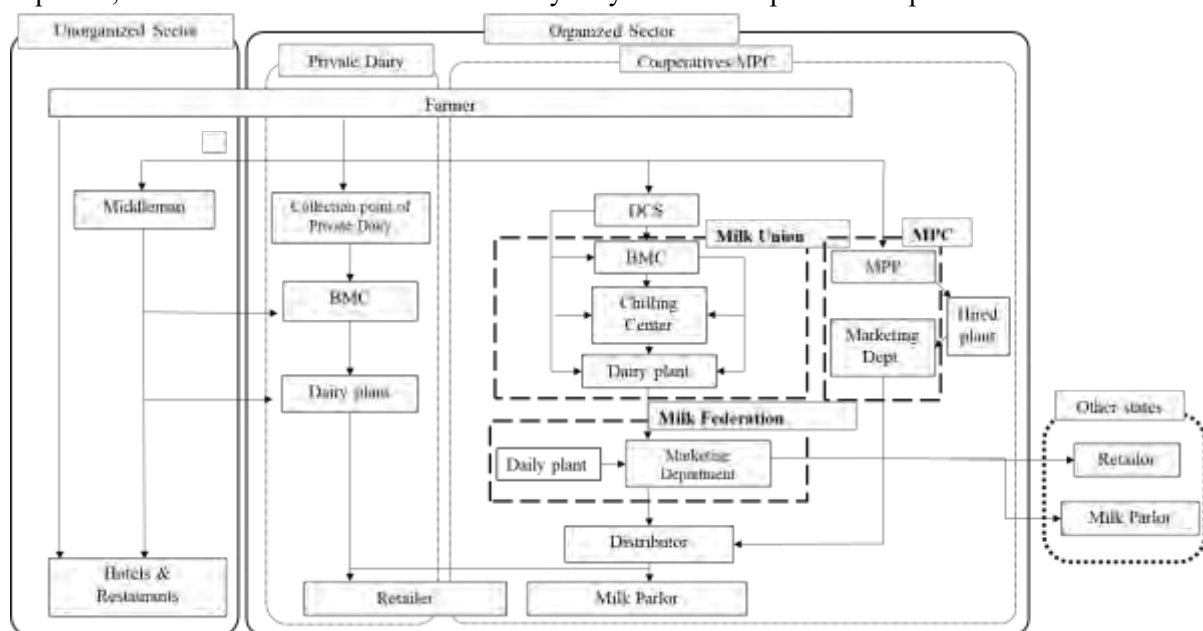


Figure 4-3 Value chain of dairy products in Gujarat

Assam has no state federation. It thus has a two-tiered system consisting of milk unions and DCSs. Amul (Kaira milk union) and some private dairy companies sell their packed milk in Assam by taking milk from other states.

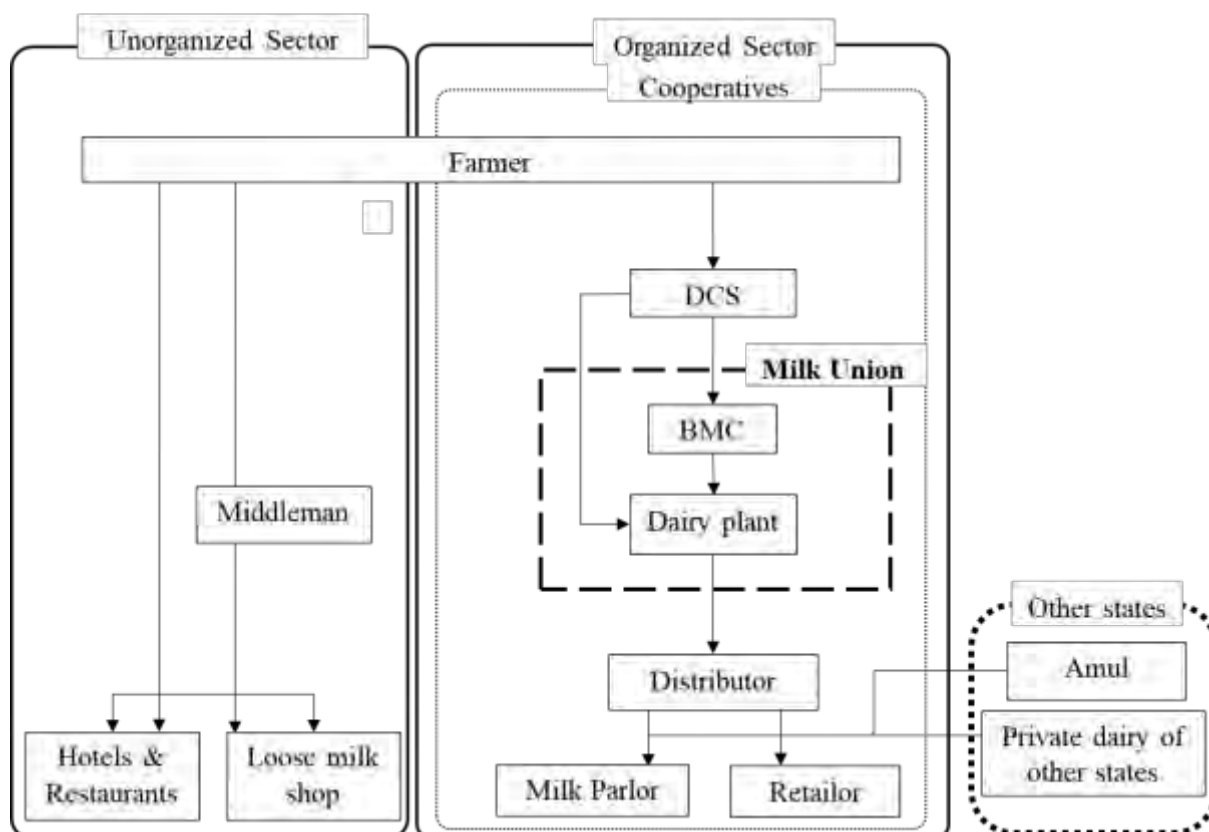


Figure 4-4 Value chain of milk in Assam state

Each milk union covers one or more districts of milk procurement. The areas of procurement for unions do not overlap in most cases. Exceptions include the Banaskantha milk union of Gujarat, which procures milk for villages near their plants in Uttar Pradesh.

Some milk unions and federations sell their dairy products outside their states, and the competition between cooperatives and private dairy companies is intense in some areas.

4.2.4 Membership of Dairy Cooperative

Eligibility for membership in dairy cooperatives has several conditions, which are specified by the Cooperative Act of each state. The major conditions are as follows:

- Members must contribute some amount of share capital (in many cases Rs. 5-10) to their DCS at the time of admission
- Only one person in one household is eligible to be a member (in Bihar, only one person per milking animal is eligible) ⁵⁵
- Members have to pour milk a certain number of times at their DCS⁵⁶
- Members are obliged to sell all the milk they produce to their DCS

Aside from the first one, these conditions are often not met. For example, as described in Section

⁵⁵ However, in Karnataka, more than two people are eligible to be members of dairy cooperatives.

⁵⁶ In Bihar, members are obliged to pour milk at their DCS for at least 90 consecutive days in a year.

5.5.1, the socio-economic situation survey found that some of the DCS members sell their milk to middlemen or private dairy firms. This tendency is more significant when the purchase price of milk rises in the summer⁵⁷.

It is actually very difficult for DCS or Milk Unions to monitor the sales behaviors of all the members. Also, DCSs cannot annul the membership of those who sell their milk to other institutions even if they found it, as the increase in the livelihood of member is a major target of the dairy cooperatives and sales of milk to other institutions is a way to do it in some cases.

4.3 Management and Financial Situation of Dairy Cooperatives

4.3.1 State federation

Table 4-5 lists the names of state federations for the target states and the brand names of the dairy products produced by the dairy cooperatives.⁵⁸

Table 4-5 Names of state federations for the target states and the brand names of the dairy products produced by dairy cooperatives for each state

State	Name of state-level organization	Brand name	Procurement volume of milk by cooperatives (TKgPD)
Gujarat	Gujarat Cooperative Milk Marketing Federation Ltd. (GCMMF)	Amul	17,481
Bihar	Bihar State Cooperative Milk Producers' Federation Ltd (COMFED)	Sudha	1,726
Assam	N/A	Purbi	22
Karnataka	Karnataka Cooperative State Federation Ltd. (KMF)	Nandini	6,480
Madhya Pradesh	Madhya Pradesh State Cooperative Dairy Federation Ltd. (MPCDF)	Sanchi	1,029
Uttar Pradesh	Pradeshik Cooperative Dairy Federation Ltd. (PCF)	Parag	322

Source: NDDDB

(1) Composition of Board of Directors

Table 4-6 depicts the composition of the board of directors (the decision-making body) of the state federations of the target states.⁵⁹ In all these state federations, the board members consist of members elected by the cooperative members as their representatives as well as nominated members, who mostly represent various bodies of state governments and the NDDDB. Except for Gujarat, large proportions of the board members are representatives of the state government, which indicates the significant influence of the

⁵⁷ As a result, the procurement volumes of milk unions tend to more fluctuate if they face more competition in procuring milk. This point will be discussed further in Section 4.7.2.

⁵⁸ All the dairy products produced by the dairy cooperatives (milk unions and federations) of each state are sold under a single brand name.

⁵⁹ Assam has no state federation.

state governments in the decision making of the state federations.

Many experts in the dairy sector pointed out that where the state governments have significant influences on the management of the state federation (sometimes of the milk union), the interventions of the state government often harm the sound management of the federations. The intervention of the state governments sometimes extends to the human affairs of the state federations (and sometimes milk unions) where many of the personnel are hired by the political interests which make it difficult to hire professional personnel⁶⁰.

Table 4-6 Composition of the boards of directors of the state federations

State	Number of elected members	Number of nominated members	List of nominated members
Gujarat	18	2	<ul style="list-style-type: none"> • Registrar (IAS) • Managing Director
Bihar	6	5	<ul style="list-style-type: none"> • Representative of Finance Dept. of Bihar Government • Registrar of Cooperatives (IAS) • Representative of the NDDB • Representative of Department of Animal Husbandry (Bihar government) • Managing Director (IAS)
Karnataka	14	4	<ul style="list-style-type: none"> • Two Representative of Department of Animal Husbandry • Representative of the NDDB • Managing Director (IAS)
Madhya Pradesh	5	7	<ul style="list-style-type: none"> • Principle Secretary of Department of Animal Husbandry (IAS) • Registration Commissioner of Cooperative Society (IAS) • Director of Animal Husbandry (Government of MP) • Representative of the NDDB • Representative of Cooperative Bank • Joint Secretary of Department of Animal Husbandry (GoI) (IAS) • Managing Director
Uttar Pradesh	-	-	<ul style="list-style-type: none"> • Currently, there is no board. • Managing Director is the Principal Secretary of Animal Husbandry and also plays the role of chairman.

Source: Field surveys of the study team

(2) Activities of the State federations

The major activities of the state federations include the following:

- Selling and purchasing milk among the state federations, adjusting their surplus and shortages among the states
- Planning and implementation of marketing strategies for the cooperative brand⁶¹
- Supporting unions and DCS for investment and financing by linking the demands of finance to the government subsidies and loans from government-related banks. An example is the technical assistance provided to milk unions when milk unions apply for the public grants and/or NDDB loans. Also, in case the Milk Unions provide adequate collateral security for availing loan from the NDDB, there is no need for taking permission from State federations. However, if there is any shortfall in

⁶⁰ This is typically found in the cases of the state federation and milk unions in Uttar Pradesh.

⁶¹ The dairy cooperatives of each state sell their products under one brand name.

providing security for the loan, the milk union may request the respective State federation to provide additional security to meet the shortfall.

The federations of some states conduct sales activities for the products manufactured by their milk unions. For example, all the products produced by milk unions in Gujarat are sold through the state federation, while some of the dairy products manufactured by the milk unions in Karnataka and Uttar Pradesh are sold through the state federations. Some state federations retain their own dairy plants (to process the surplus milk collected by the unions), cattle feed plants, and other facilities. Table 4-7 summarizes the target federations covered by this study. The size of the staff working for the state federations differs depending on their activities and facilities they own.

At present, NDDDB representatives are nominated in the Board of 11 state federations and 89 milk unions across the country. If there is a provision in the Bye Laws of state federations for having NDDDBs representatives in their Board, they request the NDDDB to nominate its representatives in the Board. In addition, as per the policy of the NDDDB, milk unions and federations who have availed loan from NDDDB need to compulsorily appoint NDDDB representative as nominated member in their Board.

Table 4-7 Sales activities, facilities, and size of staff of state federations

State	Sales of products produced by unions	Major facilities owned	Size of staff
Gujarat	Sales of dairy products produced by unions of Gujarat are sold through the federation	1 dairy plant	950 (including 7 regional offices and 62 branch offices).
Bihar	Sales of products other than liquid milk and yogurt (such as butter, ice cream, and sweets)	3 dairy plants in Jharkhand	180 at headquarters
Karnataka	Sales of products other than liquid milk and yogurt (such as butter, ice cream, and sweets)	4 dairy plants 1 ice cream plant 5 cattle feed plant 1 pouch film plant	About 1,000 staffs (including the workers at the plants)
Madhya Pradesh	Sales of products other than liquid milk and yogurt (such as butter, ice cream, and sweets)	None	-
Uttar Pradesh	Sales of butter and ghee	3 cattle feed plants 1 fodder seed plant 1 semen station 3 training center	46 working for the federation.

Source: Field surveys of the study team

(3) Financial Situation of State federations

The financial situations of the state federations differ significantly, as their roles and responsibilities vary from state to state. For example, as all the products made by unions in Gujarat are sold by its federation, the incomes, expenditures, and profits of that federation are considerably large (see Table 4-8). On the other hand, those of the MPCDF (Madhya Pradesh state federation) are relatively small, as it does not conduct large-scale sales or production activities (see Table 4-9).

Table 4-8 Profit and loss statement for GCMMF (Gujarat state federation) for 2015-16 (Rs.)

Income		Expenditure		% of expenditure to total sales
Milk and milk products	227,230,696,000	Purchase of traded goods	181,779,554,000	80.0%
Others	2,807,566,000	Cost of materials consumed	40,072,740,000	17.6%
Less excise duty	-318,708,000	Manufacturing expenses	1,414,802,000	0.6%
Other operating income	131,513,000	Changes in inventories	-2,809,742,000	-1.2%
Other income	355,137,000	Marketing, admin and other expenses	6,834,978,000	3.0%
		Employee benefit expenses	1,048,509,000	0.5%
		Depreciation and authorization expense	871,003,000	0.4%
		Finance cost	327,043,000	0.1%
Total	230,206,204,000	Total	229,538,887,000	
Profit before tax	667,317,000			
Tax expenses	229,502,000			
Profit for the year	437,815,000			

Source: Annual report of GCMMF 2015/16

Table 4-9 Profit and loss statement for MPCDF (Madhya Pradesh state federation) for 2015-16 (Rs.)

Income		Expenditure	
Income of MPCDF	72,672,441	Staff expenses	62,496,034
Interest from bank/unions	3,084,444	Office and admin expenses	2,047,874
Other income	1,792,641	Financial and audit expenses	9,283,764
Closing stock	82,473	Marketing expenses	514,993
		Repair and maintainance expenses	1,010,956
		Other expenses	995,649
		Net profit	1,282,729
Total	77,631,999	Total	77,631,999

Source: Annual report of MPCDF 2015/2016

Among the target states of this study, only the PCF (Uttar Pradesh state federation) has been running losses. Table 4-10 shows the net profit of each institution of the federation. It shows that the sales activities of the federation, which are reflected as the “Regional Marketing Offices” account, cannot cover the other expenses, indicating the weakness of the sales of the cooperatives of that state.

Table 4-10 Net profit of PCF (Uttar Pradesh state federation) for each institution (2015-16)

Institution of PCF (number of institutions)	Net profit (Rs.)
Regional marketing offices (3)	-16,013,727
Cooperative Dairy Training & Research Institute (3)	-23,429,954
Cattle feed factory (3)	12,379,051
Frozen semen bank (1)	-12,009,378
Fodder seed processing unit (1)	-5,925,733
Headquarters	-225,858,191
Total	-270,857,932

Source: Field study of JICA study team

PCF (Uttar Pradesh state federation) is restructuring its operations; 700 employees (about one-third of the staff) chose early retirement. The federation reports the extraordinary loss of Rs. 318,518,856 for the retirement allowance of the early retirement program in 2015/2016, besides the operating losses.

4.3.2 Milk Unions

(1) Composition of Board of Directors

The board members of the milk unions typically consist of representatives of the village dairy cooperative societies members who are elected by the members of the societies. In some cases, nominated members representing the government and related institutions are also included.⁶²

(2) Activities of the Milk Unions

The responsibilities of milk unions typically include the procurement of milk from the DCS and the processing and sale of dairy products. Milk unions usually own processing and cold chain facilities and machinery and thus regularly make investments in these facilities. Details on these activities are provided later in this chapter.

(3) Financial Situations of Unions

The financial situations of milk unions vary significantly. One important factor that influences their financial condition is the scale of procurement and production volume. Figure 4-5 shows the relation of the average volume of milk procurement to the accumulated profits and losses of milk unions and MPCs.⁶³ Figure 4-6 depicts those data for the milk unions and MPCs of the six target states. One can see that the unions and MPCs with smaller procurement volumes tend to post losses. Table 4-11 depicts the percentages of unions and MPCs with accumulated profits and losses for various procurement scales. It shows that most of the unions and MPCs with procurement volumes under 50,000 liters per day incur accumulated losses, while that ratio decreases as the procurement volume increases. One can see that most of the milk unions and MPCs with procurement volumes over 500,000 liters per day make accumulated profits.

One can also see that the amounts of accumulated profits do not increase significantly as the procurement volume increases. This reflects the fact that a large portion of union profits are reimbursed to cooperative members in the form of bonuses, various services, and welfare funds.

⁶² For example, the board members of Banaskantha union in Gujarat consist of 14 elected members and four representatives of the state government, one representative of a bank affiliated with the cooperation, one representative of the state federation, two representatives of the NDDB, and a managing director.

⁶³ There are more than 220 milk unions and MPCs in India, but Figures 4-5 and 4-6 and Table 4-11 include the 156 unions and MPCs for which the relevant data are available.

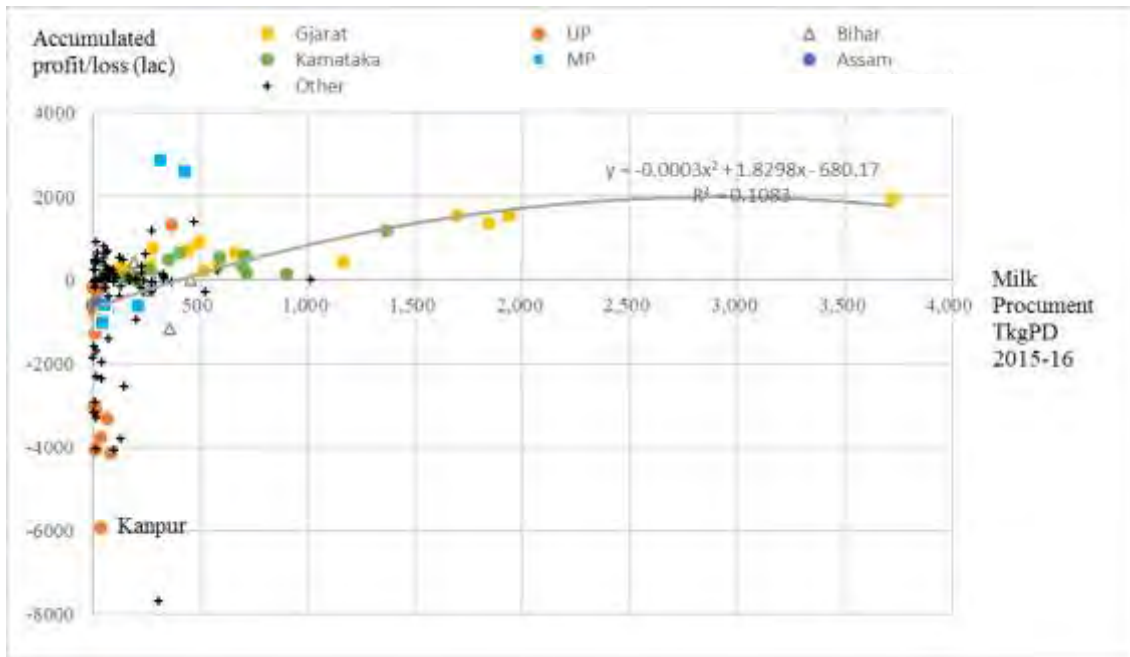


Figure 4-5 Relation between accumulated profit/loss and milk procurement volumes (all unions)
Source: NDDB

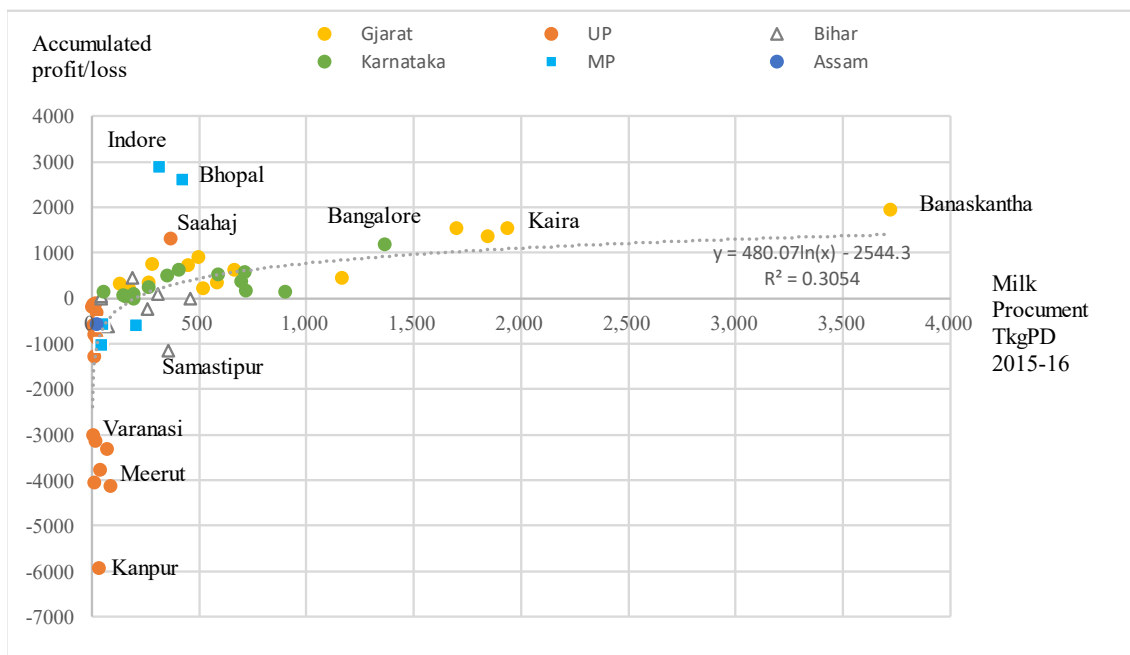


Figure 4-6 Relation between accumulated profit/loss and milk procurement volumes (six target states)
Source: NDDB

Table 4-11 Percentage of milk unions with accumulated deficits and profits by range of milk collection volume (all India) in 2015/16

Milk procurement (TKgPD)	% of unions and MPCs with deficits	% of unions and MPCs with profits	Total number of unions
0 - 50	69%	31%	52
51 - 100	53%	47%	30
101 - 500	23%	77%	57
500 <	6%	94%	17
Total	42%	58%	156

Source: NDDDB

One reason for the close relation between procurement volume and the financial conditions of milk unions is the large amount of investment needed for processing and cold chain facilities. A certain scale of production and sales is needed to cover the costs of these facilities. In addition, there are economies of scale in both production and procurement, whereby the unit cost of procurement and production decreases as the scale of procurement and production increases (this will be further discussed in Sections 4.5 and 4.6). Furthermore, the larger the production and sales volumes, the larger the market share of the cooperative, and hence the stronger the brand of the cooperative in that state, which benefits their business (this will be further discussed in Section 4.4).

The table below shows the various financial indicators of selected milk unions and MPC. One can see that, the Return on Asset (ROA) and Return on Equity (ROE) are not significantly high, except for Bhopal milk union. This reflects the fact that a large portion of union profits are reimbursed to cooperative members.

Still, Bangalore and Bhopal milk unions, whose sales volumes are relatively large, the net profits of the year are more than Rs.300 million, indicating that the capacity for large scale investments or repaying the loan to finance large scale investments.

Also, the net profits of Saahaj MPC and Patna milk union, whose sales volume is smaller than the Bangalore and Bhopal, are making profits even though the amounts of profits are relatively small. This indicates that the milk unions and MPC with relatively small scale can make profits and have some capacity to expand their scales by themselves, if they are properly managed.

On the other hand, Lucknow milk union are running net loss in their business, even though the scale of their business (in terms of the sales volumes) is not so different from Saahaj and Patna. The poor financial performance of Lucknow milk union is derived from various problem in internal management, sales, and procurement, which will be discussed in the later parts of this chapter.

Table 4-12 Financial indicators for selected milk unions and MPC (2016-2017)

Union	Bangalore	Bhopal	Saahaj (MPC)	Patna	Lucknow
Sales (million Rs.)	19,473	7,123	4,961	3,555	3,045
Net profit/loss (million Rs.)	303	308	18	18	-271
Assets (million Rs.)	6,736	2,423	1,886	2,116	20,183
Capital Asset Ratio	55%	39%	16%	33%	6%
ROA	4.5%	12.7%	0.9%	0.9%	-1.3%
ROE	8.1%	32.5%	5.9%	2.6%	-22.1%

Source: Financial statements of each milk union and MPC.

4.3.3 Village-level Dairy Cooperative Societies

(1) Composition of Board of Directors (known as DCS Management Committee)

The board members of DCSs consist of the representatives of members who are elected by members of the society. The term of the office of the members are 3 to 5 years for most of the DCSs in the target milk unions of this study.

(2) Activities of the DCS

The major function of the DCS is the procurement of milk within the jurisdiction of each DCS (typically a village or hamlet). Members of each DCS bring their milk to its collection point(s), which is collected by the responsible union for processing. Many DCSs also sell cattle feed bought from the milk union or federation to the society members. Furthermore, many DCSs conduct various social activities to the members of DCSs and/or the communities out of the profits they earned from the collections and sales of milk. The examples of social activities include the provision of medical services, health insurance, and loans for education.

(3) Financial Situation of DCSs

The financial conditions of DCSs vary widely. Table 4-13 shows an example of a ranking of DCSs according to their financial performance as evaluated by auditors of the State Government. “A” indicates the best financial performance.⁶⁴ Many of the DCSs ranked “D” seem to be on the brink of becoming non-functional.

⁶⁴ Only some DCSs are the targets of audit by the central government.

Table 4-13 Percentages of DCSs at each rank of financial performance

	Banaskantha milk union in Gujarat	Patna milk union in Bihar
A	7%	20%
B	88%	30%
C	3%	35%
D	2%	15%

Source: Field surveys of the study team

A certain percentage of DCSs are struggling to maintain their activities or are not functioning at all, by failing to procure milk from members or to retain their members. Table 4-14 shows the number of registered and functional DCSs in the six target states. One can see that there are significant differences among the states in the ratios of functional DCSs to total registered DCSs. For example, the ratios for Gujarat and Karnataka are more than 80%, which indicate that most of the DCSs formed have been maintaining their functions. However, the ratio of Uttar Pradesh is only 31%, indicating that a large number of DCSs that were formed have been failed to be functioning.

Table 4-14 Number of registered and functional DCSs for the six states in 2016

State	Number of Registered DCSs	Number of functional DCSs	% of functional DCSs of registered DCSs
Assam	332	178	54%
Bihar	19,483	14,179	73%
Gujarat	18,546	16,020	86%
Karnataka	14,794	13,287	90%
Madhya Pradesh	8,371	6,315	75%
Uttar Pradesh	22,790	7,169	31%

Source: NDDDB

Still, most of the DCSs that collect milk regularly from their members show sound financial performance, as they are able to retain a certain margin when trading milk and other products. For example, while the DCS buys milk from its members based on the liter, it sells milk to unions based on the kilogram. As 100 liters of milk equal 103 kg, the DCS retains a margin of 3%. In addition, the union gives the DCS a commission of 1 to 3% (the rate differs from state to state). The DCS thus typically keeps a 4 to 6% margin by trading milk. Many DCSs keep around a 0.5% margin when buying and selling cattle feed. As most DCSs do not have to spend on machinery or facilities,^{65,66} these margins are sufficient to cover the day-to-day expenses of the DCS.

⁶⁵ For most DCSs, quality analysis equipment (such as AMCU and DPMCU) is the only capital investment needed, yet the equipment is provided by the state government in most cases. Further, many DCS also put their own fund for purchasing the equipment.

⁶⁶ Many of the DCSs in Gujarat have large enough procurement volumes and profits to buy their own BMCs, yet even Gujarat state gives subsidies of 25% to 50% of the total cost of BMCs when DCSs buy them.

Table 4-15 shows the profit and loss statement of Rahamatenagar DCS under the Lucknow milk union in Uttar Pradesh, a medium-size society with 155 active members and an average milk procurement volume of 600 liters per day. Table 4-16 shows the profit and loss statement of Amarpur DCS under the Jabalpur union in Madhya Pradesh, a rather small society with 54 active members and an average milk procurement volume of 150 liters per day. One can see that the expenses incurred by the DCS are small and that even a small DCS can be operated without incurring losses.

Table 4-15 Profit and loss statement of Rahamatenagar DCS for 2015-16

Income		Expenses and profit	
Sales of milk to union	4,745,095	Purchase of milk	6,208,586
Sales of milk at DCS	1,968,060	Salary to secretary	70,000
Sales of cattle feed	1,698	Salary to tester	23,500
Interest	12,423	Stationary	209
RKVY funds ⁶⁷	2,000	Welfare fund	1,603
		Cleaning material	38,561
		Printing of brochures	120
		Testing equipment	642
		Service charge	3,921
		Electricity	17,137
		Mobile balance	135
		Awards	60,000
		Reserve fund	4,809
		Net profit	300,053
Total	6,729,276		6,729,276

Profit of sales of milk	504,569	Profit rate of sales of milk	7.5%
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Source: Financial statement of Rahamatenagar DCS for 2015/16

⁶⁷ RKVY Fund is the abbreviation of Rashtriya Krishi Vikas Yojana Fund, which is a fund given by the Ministry of Agriculture and Farmer Welfare, Government of India. The main objectives of the fund are to achieve the sustainable growth of productions of agricultural products and to reduce the yield gaps of various agricultural products among the states.

Table 4-16 Profit and loss statement of Amarpur DCS for 2015-16

Income		Expenses and profit	
Sales of milk to union	1,446,212	Purchase of milk	1,398,718
Sales of milk at DCS	14,546	Purchase of medicine	300
Sales of ghee	8,720	Purchase of ghee	8,702
Sales of minerals	1,700	Purchase of minerals	1,700
Sales of cattle feed	58,368	Purchase of cattle feed	56,958
Sales of medicine	300	Testing charge	440
Interest	1,359	Salary	25,900
		Computer charge	360
		Stationery	94
		Sundry expenses	2,150
		Office expenses	235
		CDF	1,175
		RBF expenses	588
		Bank commission	69
		Audit fee	2,500
		Travel expenses	700
		Net profit	30,616
Total	1,531,205	Total	1,531,204

Profit of sales of milk	62,040		4.2%
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Source: Financial statement of Amarpur DCS for 2015/16

4.4 Sales and Marketing of Dairy Products by Cooperatives

4.4.1 Sales Performance of Cooperatives

Table 4-17 shows the sales performance of the cooperatives of the six target states, indicating the significant differences between them.⁶⁸ For example, the market share of Gujarat's dairy cooperatives is quite high, and there are no major competitors in the state. The market share of Karnataka dairy cooperatives is also high, though not as high as that of Gujarat. One of the reasons for the high sales performance of Karnataka dairy cooperatives is the state government's subsidy to producers for milk sales to cooperatives, which makes it very difficult for other private firms to procure milk. Bihar dairy cooperatives also retain a sound market share within the state.

On the other hand, the market share of Uttar Pradesh's dairy cooperatives is very low, partly due to the existence of many competitors, including various private dairy companies and Amul (the Gujarat dairy cooperatives' brand). The market shares of Assam and Madhya Pradesh are also very small, mainly because consumers prefer loose milk to pouched milk, and the shares of sellers in the unorganized sector are quite high in those states.

Milk sales have been increasing in the last five years for all of the cooperatives except in Uttar Pradesh. The main reason for the sales decrease of Uttar Pradesh's dairy cooperatives is the decrease in

⁶⁸ The market share data in the table are estimates by the relevant personnel at the respective dairy cooperative institutions. Reliable data for market shares are not available.

procurement volume due to the increased competition with other private companies and dairy cooperatives and the reduction of the services provided by the cooperatives to members (this will be discussed further in Section 4.7).

As indicated in Table 4-17, the cooperatives of Gujarat, Karnataka, and Bihar sell their products outside of their states. Gujarat's dairy cooperatives conduct sales activities all over India and are competing with other cooperatives in the markets of many states. In addition, the cooperatives in Gujarat and Karnataka have been exporting their products.

One can see that these sales performance indicators for cooperatives are correlated with the financial indicators discussed in the previous section: cooperatives with larger market shares show better financial performance.

During the field survey, the study team found that the milk unions showing poor financial performance (such as the unions in Uttar Pradesh and the Gulbarga milk union in Karnataka) had difficulty enhancing their marketing capacities due to fierce marketing competition. The study team also found that there was great demand for the support needed to strengthen marketing capabilities from these milk unions.⁶⁹

⁶⁹ Recognizing the need to strengthen the marketing capacity of the milk unions, the PCF (Uttar Pradesh state federation) is going to hire a third-party marketing consultant for each dairy union in the state to support them in their marketing activities. In addition, Parag Milk Marketing Ltd., which will be responsible of the marketing of the products of the dairy cooperatives in the state, will be established under the Company Act.

Table 4-17 Sales performance of the dairy cooperatives of the six states

	Gujarat	Bihar	Assam (WAMUL)	Karnataka		Madhya Pradesh	Uttar Pradesh
				South	North		
Market share of organized institutions	90%	50–60% (depending on district)	4%	65%	40%	25%	25–35% (depending on district)
Market share of cooperative in the organized sector	90%	40–75% (depending on district)	100%	70%	30–70% (depending on district)	30%	1–10% (depending on district)
Share of cooperatives (including both organized and unorganized sectors)	80%	20–40%	4%	50%	10–40% (depending on district)	8%	0.5–4% (depending on district)
Change in the volume of milk sales from 2011 to 2015	35%	69%	30%	16%		34%	-50%
Sales of their products outside of the state	There are 60 sales offices all over India	Sold in 11 states in the northeastern, western, and northern regions and Nepal		15% of liquid milk is sold outside of the state. Dairy products butter, ice cream, and sweets are sold all over India through the federation			
Exports	Exporting to more than 20 countries			Has exported to 22 countries so far.			
Major competitors in the state	No major competitor in Gujarat state	Ganga Dairy Anuj Dairy	None. Amul is going to start sales and procurement in this state.	Hudson (AP) and private companies such as Heritage and Gokul exist.	Arogya (Tamil Nadu), Dodla (AP), Maharastra Cooperatives	Nalanda, Amur, Reliance, Haldhaun	Amul, Sudha, Shyan, Ananda, Sudh, Kothai, Ghan, Milklay, SMC, Namaste India

Source: Field survey of the study team

Marketing departments of state federations and milk unions are in charge of the marketing and sales of the dairy products processed at the state federations and milk unions. The major marketing and sales activities the department conducts include the followings.

- Regular communication with the distributors and retailers on orders and deliveries of the products
- Negotiation with the distributors and retailers on the prices of the products
- Promotion activities such as the production and distribution of marketing material (such as board and posters) and radio and/or TV advertisement
- Design of packages of the products
- Work with production department for developing new products

It is actually quite difficult to differentiate the dairy products such as milk and yogurt, so the brand

power and the publicity of the brand are important factors for the success of the sales of these products. Therefore, those dairy cooperatives whose market share is low and has low brand power⁷⁰ are struggling to increase the sales volume of their products. It is also quite difficult for the dairy cooperatives to enter the new markets where their brand names are not familiar with the consumers. So far, only the dairy cooperative in Gujarat and Karnataka which have large enough supply volume and capacity to conduct large scale promotion activities are successful in expanding their sales to outside of the states they are registered.

The capability to develop new products (especially high value-added products) is also important factor to see the marketing potency of dairy cooperatives. The table below shows the major high value-added products procured by each brand of the dairy cooperatives. It indicates that only the dairy cooperatives of Gujarat have been successful in developing wide range of high value-added products. The product development capability of the state federation of Gujarat (including the capacity of finding the market and marketing these high value products as well as the development and production of new products) is a key for the expansion of the sales of its products (Amul products) all over India and the expansion of dairy cooperatives all over Gujarat.⁷¹

Table 4-18 Major high value-added products procured by each brand of the dairy cooperatives⁷²

State	Brand	Major high value-added products
Gujarat	Amul	Ice cream, milk powder, chocolates, lactose free milk, sour cream, probiotic yogurt, bread spread, flavoured milk, protein malt drinks
Bihar	Sudha	Ice cream, milk powder
Assam	Purabi	Cream
Karnataka	Nandini	Flavoured milk, sliced butter, milk powder, frozen dessert
Madhya Pradesh	Sanchi	Flavoured milk, cream, milk powder
Uttar Pradesh	Parag	Flavoured milk

Source: Field surveys of the study team

For the dairy cooperatives which are struggling to increase the sales of their products, the enhancements of the capacity to strengthen their brands and the to develop high value-added products would be necessary to overcome their problem in sales. The capacity enhancements of the state federations in these fields, rather than milk unions, would be more important, as the sales coverages of milk unions are generally too small to effectively market the high value-added products.

4.4.2 Retail Prices of the Products

Methods of deciding the retail prices of cooperative products also differ from state to state. In

⁷⁰ State federations and milk unions in Madhya Pradesh and Uttar Pradesh are the examples of this.

⁷¹ Based on the discussion with NDDB staffs as well as Gujarat state federation staffs.

⁷² Liquid milk, yogurt, lassi, butter, ghee, and traditional sweets are not considered as high-value added products here.

some states, each milk union sets the prices; in others, the state federation does. Table 4-19 shows the decision-making system for retail prices in the states covered by the study.

Table 4-19 Ways of setting retail prices for products

Gujarat	Decided by the federation (at the board of directors meeting). Milk Unions also decide the retail price of products sold in the Unions' operational area.
Bihar	Decided by the federation (at a meeting where the managing directors of all unions participate)
Assam	Decided by each union
Karnataka	Decided by the federation, with the approval of the state government
Madhya Pradesh	Unions can decide their retail prices, yet the maximum retail prices are set by the federation.
Uttar Pradesh	Decided by the union (at the board of directors meeting)

Source: Field surveys of the study team

As milk is an important commodity for many consumers in India, some state governments have controlled or intervened in the pricing of the cooperatives' liquid milk. For example, in Tamil Nadu, the state government is responsible for setting the retail prices of the liquid milk made by the dairy cooperatives. In Karnataka, the dairy cooperative is required to obtain the approval of the state government in order to change the retail prices of liquid milk.

4.4.3 Effect of Competition among Cooperatives

Amul (Kaira milk union in Gujarat) started the sales of pouched milk in Assam in September 2017. Their selling prices are slightly lower (about 2%) than those of the local cooperative, WAMUL. The competition created by the entry of Amul generated downward pressure on the prices of milk sold at the markets in Assam, which benefits the consumers. The impacts of Amul's entry on WAMUL's business have not yet become apparent. However, WAMUL might be negatively impacted if Amul increases the scale of its business in Assam. In addition, if Amul continues to procure milk outside of the state, where milk production costs are lower, the milk producers in Assam, whose productivity is lower, will be harmed and might be driven out of the dairy business.⁷³

Amul has extensive sales channels for their products all over India and is one of the biggest competitors for local dairy cooperatives in some states, such as Madhya Pradesh, and Uttar Pradesh. The competition with Amul (and with other private dairy firms) put pressures to the local cooperatives in these states. For example, the state federations and Unions has started a couple of measures to restructure their business and management by laying off a number of staffs, strengthening their marketing capabilities (as discussed in Section 4.4.1), and constructing a number of new processing facilities.

⁷³ Amul is selling their products at almost the same prices as their competitors in most of the markets they entered outside of Gujarat. One evidence is found that they sell their products at lower prices than local cooperatives other than Assam.

4.5 Processing

4.5.1 Milk Processing Machinery

Processing milk requires many types of machinery. The major machinery and equipment in the milk value chain, from collecting to selling, are listed in Table 4-20. A more detailed list is attached as Annex 11.

Table 4-20 Major dairy processing machinery and equipment

Milk collection	Milk can, milk analyzer (automatic/manual), bulk milk chiller (BMC), milk tanker, etc.
Milk processing	Can conveyor, dump tank, weighing balance, silo, cream separator, homogenizer, pasteurizer, chiller, packing machine, fridge, freezer, etc.
Dairy product processing	Milk powder plant, ice cream plant, processing line of ghee, butter, yogurt, cream, lassi, and sweets, etc.
Plant utilities	Steam generator (boiler), refrigeration system (compressor, ice bank), cleaning in process (CIP) tanks, air conditioner, pumps, pipes, generator, effluent treatment plant (ETP), etc.
Laboratory	Chemical inspection equipment and microbiological testing equipment
Selling	Insulated track, refrigerated truck, fridge, freezer, etc.

Source: The study team

In India, the high temperature short time (HTST) method is widely applied for pasteurized milk. Since the milk processing method is commonly used, there are no major differences among the types of processing machinery used by dairy plants. Milk unions and private dairy companies have almost identical processing unit components. Depending on the scale of the organization and its plant, the capacity and types of machineries differ to produce various volumes and different types of products.

Table 4-21 summarizes the major manufacturers of machinery in India's dairy sector. GEA⁷⁴ and Tetra Pak are major manufacturers as foreign company in India. They are world-renown companies and their machinery are used by major dairy companies in Japan as well. They establish their factory in India and make the price affordable for Indian milk processors. They manufacture a series of machinery for milk processing and packing except pouch packing machinery.

⁷⁴ GEA is one of the largest suppliers of process technology for the food industry and a wide range of other industries. It is listed on the German MDAX stock index and had revenue of 4,674 million euro in 2016 (<https://www.gea.com/en/index.jsp>).

Table 4-21 Major manufacturers of machinery in India's dairy sector

Equipment	Major Indian Company	Advantage/Remarks
Milking machine	DeLaval Pvt. Ltd.	<ul style="list-style-type: none"> Top share (65%) in India One of Tetra Pak Group companies (Swedish capital company) The company's major products are milking machine and milking parlor (milking machine with pipeline)
	IDMC	<ul style="list-style-type: none"> Less than 10% share in India NDDDB subsidiary company
BMC	IDMC	<ul style="list-style-type: none"> Top share (60-70%) in India
	Venture Steels Pvt. Ltd	<ul style="list-style-type: none"> Manufacturing BMC, silo, paneer plant, ghee plant, IMCU (Instant Milk Chilling Unit) Sold 10,000 BMC in Kerala, Maharashtra, Karnataka
	ISF Industries Pvt. Ltd.	<ul style="list-style-type: none"> Originated in Sri Lanka Competition of BMC became intensified: BMC sales 600 in 2015 to 350 in 2017 Totally 22 UHT packing machines (for paper bag) are imported from Finland and are sold to Amul, KMF, Vishanapatnam dairy cooperative
	DeLaval Pvt. Ltd.	<ul style="list-style-type: none"> Small share in India
Milk analyzer/ Automatic Milk Collection Unit (AMCU)	Rajasthan Electronics and Instruments Ltd (REIL)	<ul style="list-style-type: none"> Started manufacturing and selling milk tester in 1981 requested by the NDDDB
	Everest Instruments Pvt. Ltd	<ul style="list-style-type: none"> 35% share in India Annual turnover: Rs. 80 crores (mostly milk tester) Established in 1997 Total sales of milk testing machine: 70,000 13,000 machines installed in Uttar Pradesh state
Homogenizer	GEA	<ul style="list-style-type: none"> 25% share in world German capital company HQ in Vadodara, offices in Bangalore, Pune, Thane, and Delhi Advantage on powder milk processing machinery (90% of powder milk processing machineries installed to Amul is GEA) Range from 500-80,000L/h
	Tetra Pak India Pvt. Ltd	<ul style="list-style-type: none"> -
	IDMC	<ul style="list-style-type: none"> 10% share in India
	GOMA Engineering Pvt. Ltd.	<ul style="list-style-type: none"> Annual turnover Rs. 130 crores Sold 2,500 homogenizer since 1982 of its establishment Approximately 20 to 30% share in India
Pasteurizer	GEA	<ul style="list-style-type: none"> Range from 500 - 1 lakh L/h
	Tetra Pak India Pvt. Ltd	-
	IDMC	<ul style="list-style-type: none"> 50% share in India
	GOMA Engineering Pvt. Ltd.	-
Cream separator	GEA	<ul style="list-style-type: none"> Range from 500 - 60,000L/h
	Tetra Pak India Pvt. Ltd	-
Packing machine	Tetra Pak India Pvt. Ltd	<ul style="list-style-type: none"> 99% share of UHT milk in India No pouch packing machinery is manufactured
	GEA	<ul style="list-style-type: none"> No pouch packing machinery is manufactured (when GEA propose for whole plant machineries, pouch packing machinery manufactured by Samarpan and Nichrome are proposed) PET packing machine is manufactured
	R.M.C. Packaging System Pvt. Ltd.	<ul style="list-style-type: none"> 60% share in India Headquarters in Hyderabad
	Samarpan Fabricators Pvt. Ltd.	<ul style="list-style-type: none"> 40% share in India
Milk analyzer (Lab. Use)	IndiFosss Analytical Pvt. Ltd.	<ul style="list-style-type: none"> 95% share of organized sector in India MilkoScan FT1 (Rs. 70 lakhs) is major products Exporting to Nepal and Sri Lanka

Source: The study team

Among the dairy plants of the milk unions and federations, Indian machinery is widely used. This

is because they are cheaper than foreign companies' machineries and "good enough quality" (by plant engineers of milk unions). One of the major Indian manufacturers is Indian Dairy Manufacturing Company Ltd (IDMC). However, the study team observed that machinery, especially pasteurizers, homogenizer, and UHT milk packing machineries, manufactured by foreign companies such as Tetra Pak⁷⁵ and GEA are widely used. According to milk unions, they selected foreign company's machineries because of quality.

Table 4-22 summarizes the number of installation of major machinery at visited milk unions which the study team could confirm during the field survey. Foreign company has 52% share for pasteurizer and 24% for compressor.

Table 4-22 Number of installation of major machinery

	Total installation confirmed	Indian company		Foreign company	
		Number	%	Number	%
Pasteurizer	21	10	48%	11	52%
Packing machine	16	15	94%	1	6%
Compressor	17	13	76%	4	24%

Note: The information was collected from 11 milk unions visited

Source: The study team

Japanese machinery suppliers are not active in India's dairy industry. The study team found Japanese machinery in a few plants, such as a compressor from Mayekawa Manufacturing Company⁷⁶ and some measuring instruments in laboratories. According to Mayekawa Manufacturing Company, the company has a 60% share of large-scale screw compressors in India; Banaskantha milk union in Gujarat has installed this machine. A few milk processors install Japanese products such as programmable logic controller of Delta Electric Inc. and Mitsubishi Electric Corporation as well as automation/instrumentation components of Yokogawa Electric Corporation.

In general, contractors are chosen through open bidding following a common tendering process. In Uttar Pradesh, the IDMC was chosen by the state government as a general contractor for the new establishment of ten processing plants and the expansion of four other processing plants. The cabinet of the state government made this decision in order to complete the task on time with high-quality parameters, as IDMC is a NDDB subsidiary. The state government has the power to make this decision, as they are the guarantor of the investment.

4.5.2 Needs of Milk Processing Machinery

According to the collected information and interviews with milk unions, milk processing machinery has three types of needs, as described below.

⁷⁵ The study team confirmed that the Tetra Pak pasteurizer is used in five plants out of the 15 visited.

⁷⁶ Ammonia Screw Compressor (Mayekawa India Pvt. Ltd. (<http://www.mayekawa.co.in/>) for refrigeration.

(1) Need for Capacity Expansion

It is necessary to increase procuring, processing, and selling volumes in order to meet the growing domestic demand in India, as pointed out in the NAP. Therefore, the BMCs and milk analyzers (automatic/manual) in the villages, the processing and laboratory machinery at the dairy plants, and insulated truck and fridges are needed to expand the capacity of the milk value chain. Expanding dairy plants can happen in two main ways:

- If space is available in the existing plant: Install additional equipment or replace it with bigger-capacity equipment.
- If the space inside the existing plant is limited: Establish a new plant at another place.

Establishing a new dairy plant requires a huge investment. For example, according to the NDDB, the approximate cost of the establishment of a dairy plant of a one lakh liters per day capacity is Rs. 35 crores, including the cost of building and equipment and excluding the cost of land. For a plant of 10 lakh liters per day capacity, the approximate cost would be Rs. 196 crores, as shown in Table 4-23.

Table 4-23 Approximate budget of plants (Rs. crore)⁷⁷

Capacity	Land	Building	Equipment	Total
1 LLPD	Cost of land depends upon its location	13.50	21.50	35.00
5 LLPD		56.78	103.22	160.00
10 LLPD		74.71	121.29	196.00

Source: NDDB

The whole milk value chain must be expanded at the same time. It is not efficient to increase only the milk collection volume or processing volume. Therefore, investments should be made in all processes, such as milk procurement, processing, and marketing.

(2) Needs of Processing Plants for Dairy Products

There is a dire need of the processing plants for manufacturing dairy products such as powdered milk, butter, ghee, yogurt, cheese, UHT milk, flavored milk, and ice cream. There are two main reasons:

- Surplus milk is not wasted: Milk production volumes fluctuate seasonally, and do not necessarily match with market demand of liquid milk. Dairy cooperatives commit on buying the all milk produced by the members in all seasons. Therefore, milk unions need to manufacture milk dairy products to consume surplus milk and to extend its shelf life.
- There are higher profit margins: Dairy products have higher margins than liquid milk.

(3) Need to Replace Machinery

Processing machinery has a long lifespan of approximately 10 to 15 years,⁷⁸ but it must be

⁷⁷ The budget was made based on prices at dairy plants of various capacities in 2015/16. It does not include the goods and service tax (GST) of around 10%.

⁷⁸ According to the NDDB. However, a Japanese expert said it is 20 to 30 years depending on its condition and maintenance.

replaced sooner or later. The renewal of equipment is usually implemented along with the expansion of plant capacity due to increases in milk collection volume. In some cases, machinery has been replaced due to malfunction.

According to the NDDB, about 70% of 30 years old dairy plants are expanded or refurbished but about 30% are not. When it comes to 20 years old dairy plants, about 60% are expanded or refurbished but about 40% are not (See Table 4-24).

Table 4-24 Existing condition of processing infrastructure of milk cooperatives

Particulars		Dairy Plant (Nos)	% of Total
30 years old dairy	Expanded in last 5 years	31	29.2%
	Expanded in last 10 years	11	10.4%
	Expanded in last 15 years	10	9.4%
	Expanded in last 20 years	23	21.7%
	No Expansion	31	29.2%
	Total	106	
20 years old dairy	Expanded in last 5 years	24	36.4%
	Expanded in last 10 years	10	15.2%
	Expanded in last 15 years	5	7.6%
	No Expansion	27	40.9%
	Total	66	
15 years old dairy	Expanded in last 5 years	8	18.2%
	Expanded in last 10 years	0	0.0%
	No Expansion	36	81.8%
	Total	44	
10 years old dairy	Expanded in last 5 years	6	21.4%
	No Expansion	22	78.6%
	Total	28	
5 years old dairy	No Expansion (Total)	53	100.0%
Grand Total		297	

Source: NDDB

Table 4-25 summarizes installation year of major machinery at 11 milk unions which the study team could confirm during the field survey. All the 11 milk unions were established more than 30 years ago; Among them, six plants were established in 1970s, four in 1980s, and one⁷⁹ in 1930s. None of them, except one compressor, are using pasteurizer, packing machine, and compressor over 25 years old. It means that they have been occasionally replacing or newly installing machinery.

The study team found that some machinery apart from pasteurize, packing machine, and compressor has been used at milk unions in Uttar Pradesh since the 1970s, but those machines will be replaced along with the establishment of new plants in 2018.

⁷⁹ Lucknow milk union in Uttar Pradesh was established in 1938.

Table 4-25 Year of installation of machinery

Year of installation	- 1992	1993-1997	1998-2002	2003-2007	2008-2012	2013-	Total
Period of use	Over 25 years	Less than 25 years	Less than 20 years	Less than 15 years	Less than 10 years	Less than 5 years	
Pasteurizer	0	4	6	3	3	6	22
	0%	18%	27%	14%	14%	27%	100%
Packing machine	0	1	1	5	9	2	18
	0%	6%	6%	28%	50%	11%	100%
Compressor	1*	2	1	1	7	0	12
	8%	17%	8%	8%	58%	0%	100%

Note: * One compressor of Lucknow Milk Union's plant was installed in 1953 and still on use.

Source: The study team

In addition, production/processing costs using old machinery tend to increase. For example, the electrical and thermal efficiency of old machinery is lower, and the amount of water required for milk production per liter is higher in manual plants, according to the engineers of milk unions.

Along with the renovation, the process automation is also required to reduce production costs. The process automation decreases the solid losses of liquid milk production from 1%⁸⁰ to 0.6 - 0.8% according to the NDDB⁸¹. The validity of the number is difficult without detail

Currently, only five out of 89 processing plants are automated in the five states of Assam, Bihar, Madhya Pradesh, Karnataka and Uttar Pradesh, according to the data provided by the NDDB.

4.5.3 Needs of Improvement of Plant Management

The study team observed large room for improvement on plant management at dairy plants visited. For example, non-used machinery and item are not properly stored and dairy products are not sorted in their fridge. Not only installing machineries but also improvement of plant management seems necessary. The NDDB has provided training to the milk unions in Japanese management methods such as 5S and Kaizen since the 1990s. For instance, the dairy plant of Banaskantha milk union introduced 5S and Kaizen to their plant in 1999 and improved by more than 16,000 points.

The study team found that these methods are used by the unions. However, they are not implemented properly in some of the visited plants, and there is still room for improvement. Some milk unions asked the study team for direct training in 5S and Kaizen. The points needing improvement via 5S in the dairy plants are summarized in Table 4-26.

⁸⁰ Information from interviews of milk unions

⁸¹ Presentation (Engineering1) INFRASTRUCTURE UPGRADATION

Table 4-26 Points to be improved by 5S in dairy plants

Situation			
	Unused machinery and items (Assam).	Randomly placed milk cans in plant (Gujarat).	Bugs (fly) in the processing plant (Patna)
5S	"Sorting"	"Set-in-Order"	"Shining"
Point to improve	Only essential items should be kept in plant and eliminate things not required	There should be a place for everything and everything should be in its place.	The workspace and all equipment should be kept clean.
Situation			
	Disorder in fridge (Assam)	Workers without cap (Karnataka)	Workers without mask (Patna)
5S	"Standardizing"	"Sustaining the Discipline"	"Sustaining the Discipline"
Point to improve	Maintain Sorting, Setting-in-Order, and Shining.	Set rules and procedures and ensure everyone is following them.	Set rules and procedures and ensure everyone is following them.

Source: The study team

Apart from the unions' need to renew and install their processing machinery, as mentioned above, plant management can be improved by implementing the improvement points described in the table.

4.6 Cold Chain

Since milk is a perishable commodity and spoils very easily, milk unions have to establish a cold chain when procuring milk from a wide area to maintain quality. Through the cold chain, the temperature of collected milk is kept low to prevent bacteria in the milk from increasing.

4.6.1 Overview of the Milk Cold Chain

The temperature of raw milk extracted from livestock is around 35 to 37°C. Manual milking is a common practice among farmers. The farmers put the extracted milk in stainless steel milk cans.⁸² After

⁸² The study team observed plastic cans in use as well in some villages, although the usage of plastic can is not recommended by the NDDB.

the milking, the milk temperature varies depending on the air temperature and the time range of transportation from farmers to collection points.








The farmers bring the milk to a collection point organized by the DSC. If the collection point has a chilling facility such as a Bulk Milk Chiller (BMC) or chilling center, which is a bigger and faster-cooling facility than the BMC, the milk is chilled and maintained at a temperature of 4 to 5 °C. The chilling center is set up in case the volume of collected milk is large.⁸³ To keep the milk temperature low, the chilling facility is located strategically. The BMC (in case of cluster village) and chilling center are ideally located in a range of 20 to 30 km from the villages so that the milk will be chilled within two to three hours after the milking. The collected milk is transported in an insulated milk tanker, which maintains the same temperature. If the collection point has no chilling facility, which is located near the processing plant in most cases, the collected milk is transported directly to the plant. Hence, a key condition for organizing a DCS is that the village should be accessible to the BMC or chilling center. The plant is located within 100 to 150 km from the BMC and chilling center so that the collected milk is processed within eight hours at maximum. If the farmers live near the dairy plant, they collect the milk in cans and send them directly to the plant by a lightweight truck.

At the processing plant, the milk is pasteurized at a temperature of 76 to 78°C for 15 seconds; this common practice in India is called the “High Temperature Short Time” (HTST) method. After the pasteurization, the milk is chilled again and maintained at a temperature of 4 to 5°C. The milk is packed and dispatched to the selling points by reefer truck, with a temperature kept at 6 to 8°C.

At the selling points, such as a parlor, the milk products are kept in the refrigerator or visi-cooler (glass front refrigerator) at 4 to 10°C to be sold.

⁸³ A BMC has a 500 to 5,000 L capacity, while a chilling center has a 10,000 to 200,000 L capacity.

Table 4-27 Milk cold chain

	Producing	Collecting	Processing	Marketing
Cold chain				
Milk temperature	35 - 37°C	⇒4 - 5°C	⇒73 - 75°C ⇒4 - 5°C	⇒4 - 10°C
Tools and machinery	-Milk can	-Manual/Automatic milk analyzer (AMCU/ DPMCU ⁸⁴) -BMC/Chilling center	-Pasteurizer -Chiller	-Refrigerator -Visi-cooler
Transportation	 walk, bicycle, motorbike, cow carriage	 Milk tanker	 Reefer truck	N/A

Source: The study team

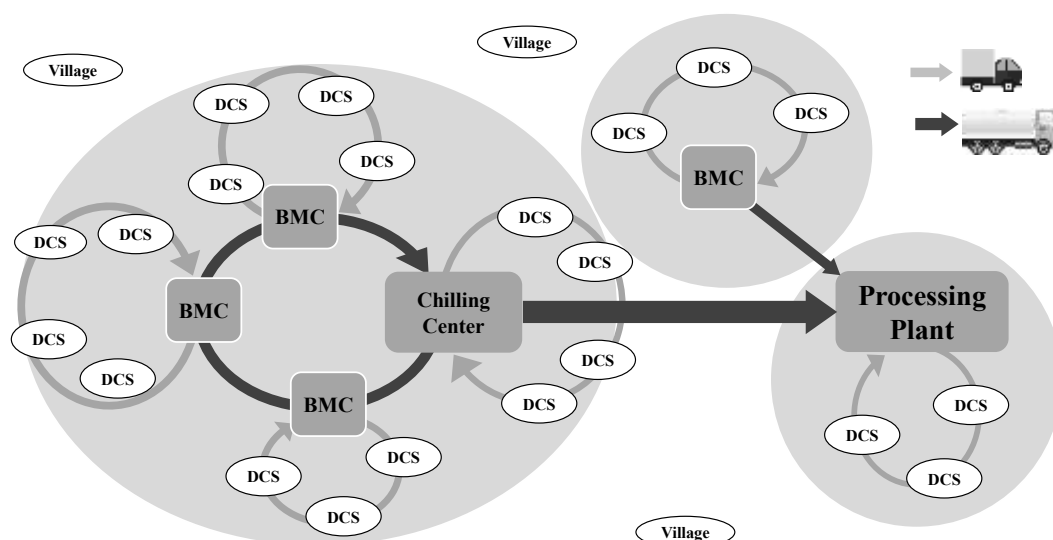


Figure 4-7 Typical route of milk collection

Source: The study team

4.6.2 Cost of Cold Chain

To establish a cold chain for the milk, a certain amount of investment is needed. The costs of the items comprising a cold chain (except processing) are summarized in Table 4-28. Regarding the tanker and reefer truck shown in the table, most unions do not own these but lease them for reasons of cost efficiency.

⁸⁵ <http://www.milkycreamseparator.com/milk-cans.html#stainless-steel-milk-cans>.

Table 4-28 Costs of cold chain items

Item	Capacity	Unit Cost (Rs.)
Milk can	40 L	2,500 ⁸⁵
AMCU	NA	1.5 lakhs
BMC	0.5 KL	8.5 lakhs
	1 KL	9.7 lakhs
	2 KL	11.3 lakhs
	3 KL	13.0 lakhs
	5 KL	16.4 lakhs
Chilling Center	50 KL	847.0 lakhs
	100 KL	1,005.0 lakhs
Tanker	20 KL	5.5 lakhs ⁸⁶
Reefer truck	4.7 KL	5.0 lakhs ⁸⁷
Visi-cooler	360 L	0.25 lakhs ⁸⁸

Source: NDDDB and other websites listed in footnote

4.7 Procurement of Milk

4.7.1 Trend in Milk Procurement Volumes

Table 4-29 shows the milk procurement volumes of cooperatives and the number of functional DCSs and their trends for the selected states. One can see that the procurement volumes have been steadily increasing over the last five years in most of the states. Uttar Pradesh is one of the exceptions; its procurement volume has decreased by 35% in the last five years. One reason for this decrease is the increased competition with other private and cooperative dairy companies. The competition became especially intense when Amul (Gujarat dairy cooperative) started procuring milk in Uttar Pradesh after some unions in Gujarat set up their dairy plants there. The purchasing price of Amul milk was higher than that of other private companies, and private firms were forced to increase their purchasing prices. Currently, the purchasing price of Amul and some private firms is about 15% higher than that of the cooperative in Uttar Pradesh. Under these circumstances, many cooperative members started to sell their milk to other dairy companies that buy milk at higher prices. In addition, as discussed in Section 4.3, the financial performance of many of the milk unions in Uttar Pradesh has been very poor; accordingly, they were forced to cut services to members (which will be discussed in Section 4.8). The benefits to cooperative members thus decreased, and the number of functional DCSs has declined, as shown in Table 4-29.

⁸⁵ <http://www.milkycreamseparator.com/milk-cans.html#stainless-steel-milk-cans>.

⁸⁶ <https://www.indiamart.com/proddetail/road-milk-tanker-20000-liter-10934725155.html>.

⁸⁷ <https://www.indiamart.com/proddetail/chill-kart-van-17185751512.html>.

⁸⁸ <http://www.zenethkitchenequipment.com/restaurant-kitchen-equipment.html#visi-cooler>.

Table 4-29 Volumes of milk procurement by cooperatives and number of functional DCSs and their trends

	Procurement volume of milk (TKgPD) in 2015	% change in procurement from 2011–2015	Number of functional DCSs in 2015	% change in the number of functional DCSs from 2011–2015
Andhra Pradesh	2,044	8%	2,748	5%
Assam	22	226%	178	84%
Bihar	1,726	63%	14,179	67%
Chhattisgarh	74	146%	654	129%
Goa	66	61%	176	2%
Gujarat	17,481	67%	16,020	22%
Haryana	450	-16%	3,461	-13%
Himachal Pradesh	57	-16%	442	-2%
Jharkhand	61	1194%	46	21%
Karnataka	6,480	52%	13,287	15%
Kerala	1,099	37%	2,891	5%
Madhya Pradesh	1,029	43%	6,315	31%
Maharashtra	3,646	16%	11,334	-9%
Nagaland	3	64%	30	0%
Odisha	526	75%	3,871	54%
Punjab	1,392	25%	6,557	-3%
Rajasthan	2,602	49%	9,991	16%
Sikkim	27	111%	323	65%
Tamil Nadu	3,040	41%	8,550	3%
Tripura	5	86%	99	19%
Uttar Pradesh	322	-35%	7,169	-12%
West Bengal	160	-27%	1,528	13%

Source: NDDB

4.7.2 Seasonal Fluctuation in Milk Procurement

The milk yields of cattle and buffalo have typically decreased in the summer and increased in the winter, so the procurement volumes of milk from dairy cooperatives usually show seasonal fluctuations. Their scope varies among the cooperatives. Figure 4-8 shows the monthly milk procurement volumes for the Patna milk union in Bihar and Varanasi milk union in Uttar Pradesh between April 2016 and March 2017. One can see that the fluctuation in procurement volumes is much larger for the Varanasi milk union; a major reason is the more intense procurement competition with other dairy firms. In summer, demand for dairy products grows, whereas milk production decreases. This usually drives milk purchasing prices for many companies, which makes it difficult for cooperatives to buy milk from producers⁸⁹. Large fluctuations in milk procurement volumes make it difficult for cooperatives to regularly operate at full capacity. Many

⁸⁹ This is derived from the fact that some DCS members tend to sell their milk to other institutions if it is beneficial to the members, even if it is not approved by the rules of DCSs (Section 4.2.4). On the other hand, DCS are obliged to buy all the milk the members bring to the collection points. In the past, some of the milk unions in Bihar and Orissa had “Milk Holidays” where the union stop buying milk at the time the market demands of milk were low. This practice has, however, been not exercised in the recent years.

unions often buy raw milk from other unions or federations in lean seasons, but the unit cost is higher, as it includes transportation costs, which adds to the costs of production.



Figure 4-8 Monthly volumes of milk procurement for Patna milk union and Varanasi milk union (index numbers where yearly average is 1.0)

Source: Field survey of the study team

4.7.3 Milk Collection Networks of Cooperatives

One significant feature of dairy cooperatives, in contrast to private dairy companies, is their extended coverage for milk collection. The milk collection networks of private dairy companies usually do not extend to remote areas or villages with a small amount of surplus milk because extending their cold chains to these areas would not be economically efficient. On the other hand, the dairy cooperatives will extend their collection networks to any village that has surplus milk by forming a DCS in the village.⁹⁰ The dairy cooperatives thus provide dairy farmers in those villages with market access.

The milk collection coverage of cooperatives is limited to only 58% of the potential villages with surplus milk.⁹¹ The extent of DCS coverage to all villages and potential villages differs significantly from state to state, as depicted in Table 4-30.

There are a number of hinderances for spreading the coverage of DCSs, which are often specific to particular region. For Uttar Pradesh and Assam, the poor management and business performance of milk unions are a major obstacle for the expansion of the DCS coverage. For Telangana, the intense competitions with private dairy firms is one major hinderance. For Madhya Pradesh, the lack of initiatives of the state government for setting up milk unions made a limited coverage of milk unions over the state. For some parts of Assam and other north eastern states, its mountainous environment and lack of road infrastructure pose difficulties for the expansion of cold chain coverage⁹².

⁹⁰ This evidence was verified by extensive field work at remote areas in the six target states.

⁹¹ The figure is an estimate by the NDDDB.

⁹² Based on the interview with NDDDB staffs.

Table 4-30 DCS coverage for selected states⁹³

State	% of DCS coverage of total inhabited villages	% of DCS coverage of potential villages ⁹⁴
Gujarat	92%	100%
Odisha	12%	96%
Tamil Nadu	73%	93%
Haryana	87%	90%
Karnataka	59%	86%
Bihar	50%	84%
Punjab	76%	79%
Rajasthan	55%	67%
Maharashtra	34%	63%
Andhra Pradesh	45%	62%
Uttar Pradesh	30%	44%
Kerala	19%	43%
West Bengal	11%	31%
Madhya Pradesh	16%	27%
Telangana	20%	24%
Jharkhand	2%	15%
Assam	1%	14%

Source: NDDB

The prospect of the further extension of milk collection networks by cooperatives partly depends on the availability of road infrastructure because the BMCs and chilling centers have to be placed near paved roads in order for procured milk to be delivered by milk lorries. However, according to the field survey, the areas that face this kind of problem are small areas such as in southeastern Bihar, near the border of Maharashtra in northern Karnataka, and in Bundelkhand in Uttar Pradesh. Thus, the availability of road infrastructure would not be a serious hindrance to the extension of the milk collection network.

Some of the rural areas in many states have limited access to electricity. However, this would not prevent the setting up of cold chain facilities such as BMCs, as generators are attached to BMCs when dairy cooperatives set them up.

4.7.4 Purchasing Prices of Milk

The purchasing prices of cooperatives' milk are usually decided at a meeting of the board of directors of the milk union or federation. Table 4-31 shows the different ways purchasing prices are decided in each of the six target states. What is common among all the cooperatives is that their decision is institutionalized where the voices of producers are reflected (as the representatives of members share some of the seats on the board of directories).

The milk prices paid to the members are set depending on the quality of the milk, which is

⁹³ The figures for coverage in the table may be overestimated, as the fact that some villages have more than two DCSs is not reflected in the estimates.

⁹⁴ Potential village is defined as the one where estimated milk production is more than 200 kg per day.

indicated by the SNF and fat content.⁹⁵

Table 4-31 Ways of setting milk prices for cooperatives

Gujarat	Decided by each union (at the board of directors meeting)
Bihar	Decided by the federation (at a meeting where the managing directors of all unions participate)
Assam	Decided by each union
Karnataka	Decided by the federation, with the approval of the state government
Madhya Pradesh	Decided by each union (at a meeting of the board of directors; it has to be approved by the federation)
Uttar Pradesh	Decided by each union (at a meeting of the board of directors; it has to be approved by the federation)

Source: Field survey of the study team

The milk prices charged by cooperatives are liable to change according to shifts in demand and supply as well as inflation, but they do not change in a way that harms the producers. In areas where dairy cooperatives procure milk, private dairy companies are forced to purchase raw milk at prices similar to those of dairy cooperatives.

Still, some private companies and middlemen in the unorganized sector change their purchasing prices considerably in response to the market situation. They also change their purchase quantities and decline to buy milk supplied by farmers when market demand is weak. This is most conspicuous where there is no other competitor to buy milk. On the other hand, dairy cooperatives are obliged to purchase all the milk brought to the DCS by their members if the quality is satisfactory.

The stable milk prices and the guarantee that all the milk supplied will be bought serve to stabilize members' incomes. This is a significant contribution to the livelihoods of farmers who face income instability because the prices of agricultural products fluctuate considerably. Many cooperative members whom the study team interviewed mentioned that they were able to give their children higher education after joining the dairy cooperative because they can expect stable incomes from their dairy activities.

4.7.5 Procurement of Milk by Cooperatives Outside the State

Most of the dairy cooperatives are engaged in processing and procurement activities within the state where they are registered under the state's Cooperative Act. Gujarat's dairy cooperatives have dairy processing plants outside of Gujarat state.⁹⁶ For example, the Banaskantha milk union has three dairy plants (Faridabad in NCR and Lucknow and Kanpur in Uttar Pradesh) and seven hiring plants (in NCR, Uttar Pradesh, and Rajasthan) outside the state. Other milk unions in Gujarat, such as Mehsana, Sabrkantha,

⁹⁵ The quality of milk is analyzed at the DCS. If an automatic milk analyzer is available, the quality and price of the milk of each member are decided instantly. If the DCS is not equipped with an analyzer, the DCS staff analyze the quality using Electronic Milko Tester (EMT), Gerber and lactometer after the milk collection, and the price is communicated to the member later.

⁹⁶ COMFED (the state federation in Bihar) also has processing plants in Jharkhand, which have been operated by the federation since before the separation of Bihar and Jharkhand states.

Kaira, Botad, and Surat, also have their own or hired plants outside of the state. Seven dairy processing plants are owned by the unions of Gujarat, and 32 plants are hired by them outside of the state.

Some of these milk unions also procure milk in areas neighboring these plants. The volume of milk procured by the milk unions of Gujarat reached 86 million liters in 2015/16 (about 12% of the milk procured by the unions of Gujarat).⁹⁷

The beginning of milk procurement by milk unions of Gujarat had significant impacts on the dairy farmers there as well as the local private dairy companies and dairy cooperatives. For example, the Banaskantha milk union (under the brand name “Amul”) started the procurement of milk in central Uttar Pradesh in 2014, supplying raw milk to their plants there. As their milk prices are higher than that of any other dairy maker (both private and dairy cooperatives in Uttar Pradesh), many dairy farmers started to sell their milk to Amul. Major private dairy companies such as NIF Private Limited (known as “Namaste India”) and Gopaljee Dairy Foods Private Ltd. (known as “Ananda”) were forced to raise their purchase prices to levels similar to Amul’s, which benefited most of the dairy farmers in these areas.

The increased competition for milk procurement caused by the entry of Amul put pressure on the dairy cooperatives of Uttar Pradesh, which had already been struggling financially. The milk unions of Uttar Pradesh are now in the process of restructuring their operations and expanding their volume of production and sales by constructing several new plants. There is, however, little or no prospect of an increase in their volume of procurement, as their milk prices are lower than Amul’s (about 15% less) and those of other major private companies, and they do not provide any major services to their members.

4.8 Cooperative Services to Members

Dairy cooperatives provide various services to their members, but their scopes differ among states and sometimes among milk unions. Table 4-32 shows the major services provided by the cooperatives in the five target states. The dairy cooperatives in Uttar Pradesh do not provide any services to their members, except for a periodic provision of medicine for livestock.

Among the services provided by cooperatives to their members, the provision of AI is the service that the majority of dairy cooperatives consider most important, as the spread of high-yield livestock is imperative for increasing productivity. AI services are available to most of the DCSs in the five states, but some milk unions, such as Gulbarga milk union in Karnataka and those in Assam, do not have enough AI technicians to cover all of their DCSs, and demand for expanded AI services is high in those areas.

The provision of cattle feed at subsidized prices is another common service offered by cooperatives. This is very popular among members, and many members purchase such feed regularly if it is available at the DCS.⁹⁸

Some dairy cooperatives, such as those in Gujarat and Karnataka, hire veterinarians and provide mobile veterinary services to their members. This is highly appreciated by many members. There are many

⁹⁷ Annual report of GCMMF, 2015/16.

⁹⁸ Verified by the field surveys of the study team.

areas where veterinary services are not available,⁹⁹ and the high death rate of livestock is a serious problem in those areas.

The provision of free vaccines is also a common service offered by dairy cooperatives, but the Department of Animal Husbandry in each state usually provides the same services. Some cooperatives collaborate or work closely with the department in this regard.

Some DCSs in Gujarat and Assam help their members obtain loans for livestock purchases. Small farmers usually have difficulty obtaining such loans, as they lack the necessary collateral. The DCSs become guarantors for the members when they apply for the loan. The quantity of livestock in some villages increased significantly after the DCS started this service.¹⁰⁰ Many milk unions and DCSs recognize the effectiveness of this service in increasing the production of milk but cannot provide it due to a lack of resources. Some claim that the provision of funds to cooperatives for the provision of this kind of service would enhance their members' livelihoods.

Milk unions and some DCSs give part of their profits to their members at the end of the financial year if they have operated at a profit. The amounts are usually decided at the annual meeting of the board of directors.

The scope of the services provided by milk cooperatives to their members is closely related to the performance of the cooperative. Milk unions and federations that perform well financially can provide better services to their members. This attracts new farmers, which in turn increases the procurement volumes of milk and the sales of the dairy cooperatives. This kind of cycle can be seen in Gujarat and Karnataka. On the other hand, the cooperatives in Uttar Pradesh stopped providing most of their member services due to poor business performance and financial difficulties. Many members then started to sell their milk to other private dairy companies. The procurement volumes of the state's dairy cooperatives then decreased, further dampening their business.

⁹⁹ The numbers of government veterinary stations and hospitals are usually limited, and many do not provide mobile services, so the farmers have to bring their livestock to the hospital, which makes it difficult to use veterinary services.

¹⁰⁰ Examples include Thavar and Sarsa villages in Gujarat and Nityananda village in Assam.

Table 4-32 Major member services provided by cooperatives in the five target states

	Gujarat	Bihar	Assam	Karnataka	Madhya Pradesh	Uttar Pradesh
AI service	<ul style="list-style-type: none"> Available to all DCSs Cost of service is Rs.15 for one time. 	<ul style="list-style-type: none"> Available to most DCSs (600 AI centers in Patna and 587 in Samastipur) Cost of service is Rs.60 for one time. 	<ul style="list-style-type: none"> There are 120 mobile AI technicians in WAMUL Limited number of AI technicians in EAMUL Cost of service is Rs.60 	<ul style="list-style-type: none"> Available to most DCSs. Cost of service is Rs.50 for one time. 	<ul style="list-style-type: none"> Available to most DCSs. Cost of service is Rs.100 for one time. 	<ul style="list-style-type: none"> Not available (some unions had provided this until a couple of years ago)
Sales of cattle feed at subsidized prices	Yes. Sold at Rs.17.5/kg	Yes. Sold at Rs.16-17/kg	Available at some DCSs The price is Rs.20/Kg which is quite expensive	Yes. Sold at Rs.17–22.5/kg depending on the contents.	Yes. Sold at Rs.14–15/Kg.	Not available (some unions had provided this until a couple of years ago)
Animal health service	<ul style="list-style-type: none"> Mobile veterinary service is available to most DCSs. Regular fee for prescription is Rs.100. There is no connection to government animal hospitals. 	<ul style="list-style-type: none"> Veterinary service is not available from cooperatives. There are, however, a number of trainers who are trained by unions and can provide basic medical treatment 	None	<ul style="list-style-type: none"> Mobile veterinary service is available to many DCSs. Regular fee for prescription is Rs.50. There is no connection to government animal hospitals. 	None, but AI technicians conduct first aid services.	None
Provision of vaccines	Yes	Yes	Yes, but at a limited scale.	Yes	Yes	None. (some unions had provided this until a couple of years ago)
Training and technical assistance	Various training programs on hygiene, livestock management, and animal health at villages and training centers	Various training programs on hygiene, livestock management, and animal health at villages and training centers	<ul style="list-style-type: none"> 4 or 5 days of training on livestock management Exposure visits to Anand and other states 	Various training programs on hygiene, livestock management, and animal health at villages and training centers	<ul style="list-style-type: none"> Training on livestock management at training centers Training for secretaries of DCS at training centers 	<ul style="list-style-type: none"> Training on livestock management at training centers Training for secretaries of DCS at training centers
Loans for purchase of livestock	Some DCSs act as the guarantors for the members	Limited funds from government to obtain loans to purchase cows are available through cooperatives	Government loan scheme is available since 2013. DCS can be the guarantor for the loan	Limited government funds for obtaining loans to purchase cows are available through cooperatives	-	-
Other livestock-related services	<ul style="list-style-type: none"> Group cattle insurance scheme 75% subsidy for chuff cutter 75% subsidy for milking machine 	<ul style="list-style-type: none"> Subsidy for mineral mix. Subsidy for livestock insurance 	-	<ul style="list-style-type: none"> 50% subsidy for livestock insurance 25% subsidy for sterilization kit. 40% subsidy for chuff cutter. 50% subsidy for milking machine 25% subsidy for mineral 	-	Provision of some medicines for major diseases.
Other services	Support for various foundations that provide medical services, education, and health insurance	<ul style="list-style-type: none"> Health insurance Micro pension plans 	-	<ul style="list-style-type: none"> Health insurance Medical services 	-	-

Source: Field surveys of the study team

Many of the private dairy companies also provide similar kinds of services to farmers. Table 4-33 shows some examples.

Table 4-33 Examples of services provided by private dairy makers to farmers

State	Name of private firm (brand name)	Services provided to farmers
Bihar	Naturals Dairy	<ul style="list-style-type: none"> • Provision of foot-and-mouth disease (FMD) vaccine, AI services, and sensitization programs in collaboration with the Department of Animal Husbandry • Provision of medical camps to women • Provision of bonuses for large milk suppliers • Provision of education materials to local elementary schools
Karnataka	Heritage Foods Limited	<ul style="list-style-type: none"> • Provision of clean milk training and stainless containers • Setup of farmer welfare trust • Provision of vaccination
Madhya Pradesh	Mahindra Agri Solution Ltd.	<ul style="list-style-type: none"> • Provision of veterinary, AI, and breeding services in collaboration with NGOs • Support for obtaining livestock loans and insurance • Sales of cattle feed
Uttar Pradesh	CP Milk and Food Products Pvt. Ltd (Gyan)	<ul style="list-style-type: none"> • AI Service at Rs.130 for one time • Provision of animal insurance • Help line for animal health • Sale of cattle feed
	Gopaljee Dairy Foods Pvt. Ltd. (Ananda)	<ul style="list-style-type: none"> • Provision AI service by 150 AI technicians • Provision of veterinary services by 15 veterinarians. • 1,500 field staff for supporting farmers in various ways • Sales of cattle feed • Provision of vaccines (5,000 cattle health camps per year) • Provision of loans to farmers for purchasing livestock

Source: Field surveys of the study team

Many dairy farmers sell their milk to middlemen in the unorganized sector, who deal with loose milk. One major motivation for selling their milk is that the middlemen usually pay the farmers on the spot whereas dairy cooperatives and private dairy companies usually make payments every 10 to 30 days. In addition, middlemen sometimes pay the farmers in advance, which is a great help to the financial management of many small farmers.

Moreover, many middlemen also provide loans to farmers to help them buy livestock. These farmers are obliged to sell their milk to the middleman with whom they are in debt. These practices are especially common in Uttar Pradesh and Assam; this is one of the reasons why the milk and dairy products markets of the unorganized sector are relatively large in these states (this is also discussed in Chapter 5).

4.9 Investments and Finances of Dairy Cooperatives

Table 4-34 depicts the major investments, their finance sources, and future credit demand for the milk unions and federations the study team visited during the field survey. The following characteristics were found concerning investment and funding:

- The state federation and some of the milk unions in Gujarat with large production capacities and sound creditworthiness have been utilizing loans from private banks.
- Many milk unions and the federation use government grants to finance at least part of the large-scale investments for building dairy processing plants and other plants.
- The most important source of funding for capital investments are loans from government-related financial institutions such as the NDDDB, NCDC, and NABARD. The roles of the federation, and sometimes the state government, are important for milk unions' acquisition of funding for large-scale investments.
- Some of the small milk unions, such as those in Uttar Pradesh and Assam and Gulbarga union in Karnataka, do not have the capacity to obtain and repay loans. These milk unions typically rely on subsidies and grants for capital investments for processing and for procurement facilities and machinery.
- Some milk unions have had difficulty repaying their loans. For example, the milk unions of Madhya Pradesh have not been able to repay the loans they received from the NDDDB in the 1980s. In 2013, the Madhya Pradesh government took over the Rs.535 million of outstanding debts of these unions for a one-time repayment to the NDDDB.
- In the study's target states, the facilities and machinery needed at the village level such as BMCs and AMCUs are 100% funded through grants from state governments, except for Gujarat. In Gujarat, as the procurement volume of each DCS is quite large, most of the DCSs have their own BMC. Also, some DCSs obtained supports of Dairy Development Schemes where 25 to 50% of the cost is financed through state government grants.
- There is a huge demand for funding to enhance production capacities in order to meet the expected increase in the volumes of milk procurement and the expected growth in market demand.
- State federations generally provide necessary technical assistances to milk unions for the application of public grants and loans.

As indicated in the column of "Future demand for credit" of the table, most of target milk unions of the study are currently searching for the low interest loans to finance the investment they require (except for the milk unions in Bihar which has just secured a large amount of loans for the major expansion of processing facilities and those in Assam which are in the process of restructuring their business under the NDDDB). The demands of the low interest loans (including the conversion of loans) look quite high for the milk unions of all over India in order to finance the investments to maintain and expand their processing capacities and cold chain networks.

Table 4-34 Descriptions of major investments, their sources of finance, and future demand for credit

Federation /Union	Major investments in recent years	Source of finances for the investment	Future demand for credit
Gujarat			
Federation	<p>The federation has been the guarantor for the milk unions when they borrow funds.</p> <p>The production volumes of the unions in Gujarat have been increasing at 10–15% annually, and they need about US\$150 million of funds per year for investments in increasing production capacity.</p> <p>The federation obtains the highest credit rating (AAA) from the private banks.</p> <p>Private banks in Japan such as SMBC are offering loans to the federation (the interest rate offered by SMBC is 7.05%)</p> <p>The federation is the only one that is allowed to issue commercial paper and has issued it at an interest rate of 6.75%.</p>		
Gandhinagar	Enlarged plant capacity in 2014, and production capacity was increased from 1,200 to 2,500 TLPD	The total cost for enlarging production capacity was Rs.90 million, and 30% of it was financed by subsidies such as the RKVY.	-
	Plans to construct a new processing plant, which will increase the total production capacity to 5,000 TLPD.	Total cost will be Rs. 1,250 million. 40% of this is to be financed by a grant from RKVY (at application stage). 48% of it is to be financed by a loan from the NDDB (at 7–8% interest and 5-year repayment). The other 12% is to be financed by their own funds.	-
Banaskantha	<p>Investment in the last 3 years:</p> <ul style="list-style-type: none"> • Dairy plant in Palanpur -Skim milk powder factory: Rs.1.8 billion -Cheese factory: Rs.3.5 billion -UHT factory: Rs.1.2 billion • Dairy plan in Faridabad (NCR): Rs.3.8 billion • Dairy plan in Lucknow (Uttar Pradesh): Rs.1.9 billion • Dairy plant in Kanpur (Uttar Pradesh): Rs.2.6 billion 	<p>70% of the total investment in the last 3 years was financed by loans and 30% of it was financed by their own funds.</p> <p>For the construction of Palanpur plant, they obtained a loan from the NDDB (at 6% interest).</p> <p>For the construction of the plants in NCR and Uttar Pradesh, they obtained loans from the NCDC (as 11% interest).</p>	<p>The following plans for investment were approved by the board.</p> <ul style="list-style-type: none"> • Dairy plan in Palanpur (capacity of 2,500 TLPD, cost of construction Rs. 3 billion) • Cattle feed plant (capacity of 2,000MT per day, cost of construction Rs.3.5–4.0 billion) • Oil refinery plant (capacity of 200 ton per day, cost of construction Rs.2.5 billion) • Dairy plant in Varanasi (capacity of 5 million liters per day, cost of construction Rs.2 billion) • Provision of milking machines to members (Rs.1.5–2.0 billion)
Bihar			
Federation	State federation provide technical supports to the milk unions for the application of NDDB and NDDB loans.		
Patna	Cattle feed plant	Total cost was Rs.870 million, and it was financed by their own funds.	<p>All the funds for the investment needed to enhance production capacities of the unions are secured.</p> <p>Funds may be needed to increase the number of BMCs to keep up the increase in production.</p>
	Dairy processing plant in Hajipur	Of a total cost of Rs.500 million, 25% is financed by a subsidy from the state government, 70% by a loan from the NCDC (8% interest and 6-year repayment), and 5% is by their own funds. If the repayment of the loan is made without arrears in the first 3 years, the interest for the rest of the period will be borne by the state government.	
	Ice cream plant in Patna	Of a total cost of Rs. 200 million, 10% is financed by the state government, 30%	

Federation /Union	Major investments in recent years	Source of finances for the investment	Future demand for credit
		by a loan from the NCDC, and the rests by their own funds.	
	Skim milk powder plant in Hajipur	Of a total cost of Rs.420 million, 25% is financed by a subsidy from the state government and 75% by a loan from the NCDC (7% interest and 6-year repayment).	
	Working capital	They sometimes obtain short-term loans from private banks for their working capital. They can also obtain long-term loan from the NDDB.	
Samastipur	<ul style="list-style-type: none"> • Skim milk powder plant (capacity of 30MT) • Dairy plant (500 TLPD of capacity) 	25% of the cost for constructing the two plants is financed by a grant from the NCDC, 70% is financed by a loan from the NCDC, and 5% is financed by their own funds. Total loan received from the DCDC is Rs. 700 million. The interest (7%) will be paid by the state government.	
Karnataka			
Federation	80% of the investment in the last 5 years is financed by their own funds, and 20% is financed by external funds. 70% of the external funds is a loan from the NDDB, 20% is a grant from the NDDB under NDP I, and 10% are investment funds from the unions of Karnataka. State federation provide technical supports to the milk unions for the application of the NCDC and NDDB loans.		Rs. 31.58 billion is needed to finance all the investments plans of the unions and federation in the state. They have applied for a Rs. 25.28 billion loans to the DIFD. The state government needs to be a guarantor, and 20% of the investment will be financed by their own funds to apply for the DIFD loan, as 6% interest. They expect that the proposed loan amount can be financed by soft loans from JICA.
Bangalore	Rs. 1.72 billion in investment has been made in the last 5 years. Rs. 0.13 billion is financed by a loan of the NDDB (interest rate 8%, 8-year repayment period), Rs. 0.23 billion is a grant from the NDDB under the NDP I, Rs. 50 million is a grant and loan from the NCDC, the rest is financed by their own funds.		Plans to make a capital investment of Rs. 6.72 billion. They have secured Rs. 5 billion of funds so far. Another new plant is also needed to keep up with the increase in procurement volume, which will cost Rs. 2.7 billion. So, Rs. 4.42 billion is needed for financing.
Gulbarga	They have invested about Rs. 500 million for the renewal of buildings, facilities, and machinery in the last 5 years. All of them are financed by grants from the state government. They have not received any loans in the last 10 years.		They would like to obtain subsidies to increase the number of AI centers.
Assam			
WAMUL EAMUL CAMUL	As the milk unions in the state have been reorganizing their management and operation through the NDDB, they have not made any major capital investment in recent years.		The APART project of the World Bank will be conducted from 2017/18 to 2023/24. Proposals to expand the capacity of the WAMUL dairy plant (from 60 to 150TLPD) and the construction of an EAMUL plant (capacity of 60TLPD) and CAMUL (capacity of 60TLPD) were made, but the proposal for the CAMUL plant was rejected.
Madhya Pradesh			
Federation	State federation is giving technical supports to the milk unions for applications of loans to the DIFD.		
Bhopal	Expanded the production capacity of dairy plant from 1,500 TLPD to 3,000 TLPD in 2012.	Financed by NDDB loan (8.75% interest)	Bhopal and Indore milk unions plan to jointly apply to the DIFD for the loans of total Rs.3 billion in order to expand their processing capacities. If the soft loans of JICA are available, they would like to apply to it instead of applying to the DIFD.

Federation /Union	Major investments in recent years	Source of finances for the investment	Future demand for credit
Jabalpur	Cattle feed plant was built in 2013 (production capacity is 50 MT per day)	The total cost was Rs. 53.7 million, financed by a 100% grant from the central government.	They are proposing investments for building a new plant (with a capacity to produce 20 MT of skim milk powder and 5 MT of paneer per day) to the federation. The estimated cost is Rs. 330 million. They wish to finance part of it by grants.
	Dairy plant in Jabalpur	They renewed all the facilities and machinery of their plant by utilizing various government subsidies between 2007 and 2012.	
Uttar Pradesh			
Federation	The federation have been providing the technical supports to milk unions for the application of NABARD loans.		
Various unions	To invest in the construction of dairy plants (10 greenfield plants and the renewal of 4 plants, total production capacity are 20.5 million liters per day) and to install 750 BMCs, Rs. 10.45 billion in loans were financed from the NABARD as Rural Infrastructure Development Funds. The interest rate is 6.5%, and loan repayments will start in 2020.		As NABARD’s interest rate is high, they wish to convert the loans to soft loans, which are expected to be provided by the JICA.
Saahaj (MPC)	Set up data processor-based Milk Collection Units at all the milk pouring points. Attached GPS to all the milk lorries.	50% of the total cost was financed by the grant of NDP I.	As they do not have their own processing plant, they wish to construct their own plant in the near future.

Source: Field surveys of the study team

4.10 Summary

4.10.1 Business Performance of Dairy Cooperatives

As discussed in the previous sections, there are significant differences in the business performance of milk unions and federations. For example, Amul (dairy cooperative of Gujarat) has been expanding sales all over India as well as abroad and has become a competitor to other dairy cooperatives outside of Gujarat. On the other hand, the dairy cooperatives of Uttar Pradesh have been performing very badly and are being forced to lay off many of their workers.

Small milk unions tend to have difficulty finding stable business conditions, as their small scale of production does not allow them to rationalize large investments for processing and cold-chain facilities and machinery. Thus, financial support is typically required for dairy cooperatives with small production scales. A few milk unions, such as Kaira and Banaskantha, have the capacity to invest and expand their business without outside support. These unions have gained this capacity by increasing their procurement, production, and sales volumes simultaneously. Other milk unions, however, face factors that hinder this virtuous cycle of business expansion, as will be discussed in Section 4.10.3.

It is thus important to note that the volume of procurement, production, and sales should increase simultaneously; when the feasibility of investment in processing facilities is assessed, the prospects for future procurement and sales volumes should also be evaluated.

4.10.2 Competition among Cooperatives

As discussed in Section 4.4, some milk cooperatives have sold their products outside of the state

where they are registered, which creates competition between the milk cooperatives operating in the market they have entered. When they enter new markets in other states, they usually set their retail prices at almost the same level as their competitors. However, when Amul entered the Assam market in September 2017, they set their price lower than that of the local dairy cooperative. Though this benefits consumers, it may negatively impact the business of the local cooperative. Moreover, if Amul continues to procure milk outside of Assam state, the milk producers in Assam, whose productivity is relatively low, will be harmed.

As discussed in Section 4.7, Amul has been procuring milk outside of the state. After they started procuring milk in central Uttar Pradesh in 2014, major private companies were forced to increase their procurement prices, as Amul's purchase price was higher than the prices of its competitors. The milk unions in Uttar Pradesh have had difficulty in increasing their procurement volumes because of the increased competition.

In general, the increase in market competition through the entry of cooperatives from other states will benefit consumers. The increase in competition also put pressures to existing processors and farmers. The competitive pressure sometimes induces the restructuring of the management of local dairy cooperatives (as in the cases of the State federation and Unions in Uttar Pradesh). This may result in the enhancement of capabilities of the local State federation and unions, but may result in further financial difficulties of these institutions.

4.10.3 Applicability of Anand Model to India

As mentioned in Section 4.1, Anand model have been introduced to all over India. The model can be characterized as¹⁰¹

- a three-tiered organizational system consisting of a DCS, milk union, and federation
- an organization whose members pursue democracy

The three-tiered system of the Anand model is an extremely suitable framework for most areas in India because most of the dairy animals are owned by small farmers, who own only one or two animals and are scattered across rural areas in India, where there is a vast and increasing demand of dairy products. The extended organizations of DCSs are necessary for mobilizing the dairy animals owned by small farmers. However, DCSs lack the production volume required for investing in processing plants or cold chains. Thus, the role of milk unions, which can process a large amount of milk procured from DCSs, is important for linking small farmers to the market. Moreover, the state federations make it possible to conduct large-scale marketing and branding activities, which are necessary if cooperatives are to run their business effectively.

As discussed in Section 4.10.1, dairy cooperatives with growing sales volumes have been increasing their members and procurement volumes. Thus, in areas where cooperative management has been good, this cooperative model has spread smoothly, showing the effectiveness of the Anand model.

¹⁰¹ Based on the discussions in *Kyodokumiai to Nomin Sosiki* edited by Yoshiki Kubota and Toshiaki Kitaide.

However, as discussed above, the performance levels of cooperatives vary, and some are poor. Their business performance is influenced by the following factors:

- Productivity of dairy sector at village level
When the productivity of the dairy sector in the area are lower, it is more costly for the dairy cooperatives to procure raw milk
- Market condition
The preference of packed milk is lower in the areas, it is more difficult and costly for dairy cooperatives to increase the sales volume
- Competitiveness
If there are more competitors in the areas, dairy cooperatives face more difficulty in procurement and sales
- Government support
As the construction of cold chain and processing facilities require a huge amount of investment, it is difficult for the dairy cooperatives to construct it without financial supports of the governments, especially when the scales of the dairy cooperatives are small
- Government intervention to the management
As discussed in Section 4.3.1(1), where the intervention of the state governments to the management of state federations and milk unions are high, the autonomies of their managements and their performances tend to be disrupted. This tendency is more conspicuous when the state governments have more influences in human affairs in the state federations and milk unions.

The effectiveness of the Anand model is lower in areas where the productivity of dairy sector is lower, the preference for packed milk is lower, market competition is higher, and support from the state government is weak.

Table 4-35 shows the negative factors that affect the business performance of cooperatives (milk unions and federation) for the five target states of this study.

Table 4-35 Positive and negative factors affecting the business performance of cooperatives

State	Negative factors	Positive factors
Bihar	<ul style="list-style-type: none"> The market for dairy products in the state is small compared to the volume of milk production. 	<ul style="list-style-type: none"> No major competitor in the state
Assam	<ul style="list-style-type: none"> Productivity of dairy farmers is very low as most of the cows and buffaloes are indigenous breeds. The unit cost to procure milk is thus quite high. Consumers prefer loose milk to pouched milk, so it is difficult to expand sales volumes 	-
Karnataka	Gulbarga Union <ul style="list-style-type: none"> Productivity of dairy farmers is very low as most of the cows and buffaloes are indigenous breeds. The villages are dispersed. The unit cost to procure milk is thus quite high. 	<ul style="list-style-type: none"> There is a subsidy of Rs.5/liter for sales of milk to cooperatives, which hinders the growth of other private dairy companies.
Madhya Pradesh	<ul style="list-style-type: none"> Consumers prefer loose milk to pouched milk, so it is difficult to expand sales volumes Human affairs of the state federation and milk unions are influenced by the state government to some extent. 	-
Uttar Pradesh	<ul style="list-style-type: none"> The scale of each union has been quite small; there is one union in each district (in 2013, they are merged into bigger unions) There are many private dairy companies that compete with the unions for both procurement and sales. AMUL (Gujarat dairy cooperative) is the biggest competitor. Human affairs of the state federation and milk unions are highly influenced by the state government. 	<ul style="list-style-type: none"> Very little financial support from the state government until recently

The three-tiered system is not the only system used by dairy cooperatives. For example, there is no state federation in Assam. In addition, the formation of MPCs, which have a two-tiered system with milk pooling points at the village level, has been facilitated. It is probably desirable to adopt the Anand model flexibly by adjusting it according to the specific conditions of each area while keeping the basic principles of the model.

Regarding the second characteristic of the Anand model (the pursuit of democracy by members), even though the cooperatives in Gujarat are run in highly democratic ways, the management teams of cooperatives in many other states are influenced more by the state government. This can be seen in the composition of the boards of the state federations (see Table 4-6). Many of the board members come from the government or related institutions. Their interventions in the affairs of cooperative management teams are especially frequent concerning investment and finance, except in Gujarat, as financial support from government is necessary for infrastructure building (processing and cold-chain facilities and various support to members).

Thus, while the dairy cooperatives in Gujarat have developed while keeping their democratic institutional framework without significant government support or intervention, some of the cooperatives' autonomous and democratic nature was lost when the Anand model was extended to other states. However,

there is no clear relation between the performance of cooperatives and government intervention, as some of the cooperatives, such as those in Karnataka, show good performance despite a strong government influence.

The principle of democratic management by members is compromised when some of the cooperatives conduct procurement activities outside of the state of registration. For example, Amul has formed DCSs in the central area of Uttar Pradesh, but the members there do not have the right to vote for board members and do not receive the services given to members in Gujarat, such as AI and animal health services (though they have the right to bonuses). The procurement activities of Amul in other states can be justified on the basis that they benefit the farmers there, as discussed in Section 4.10.1. It is more desirable for the responsible milk unions of Gujarat who manage DCSs in Uttar Pradesh to provide services that would increase dairy production and enhance the livelihoods of members outside the state.

4.10.4 Expansion of DCS Coverage

As discussed in Section 4.2.1, under the Operation Flood, the Anand Model has been introduced to all states in India. The DCSs now cover about 58% of all the potential villages, as discussed in Section 4.7.1. The next challenge for the dairy cooperative would be to expand the coverage of DCSs to all the potential villages.

The expansion of DCS coverages to all potential villages would require the investments to extend the cold chains to these villages. Moreover, as the procurement volumes of milk increases with the expansion of DCSs, the processing volumes of milk unions and state federation should increase at the same rate. Thus, the investments for processing facilities to expand the production capacities are needed. Financial scheme accessible by dairy cooperatives for the investments may be necessary for those milk unions and state federations which lack financial capacities to expand their cold chains and production capacities.

However, as discussed in Section 4.3.1(1) and 4.10.3, there are some state federations and milk unions which do not have enough capacities to manage their business due to different factors. For these unions it seems to be very hard to extend their DCSs coverage by only utilization of financial schemes. To ensure that the increased volumes of dairy products are marketed, enhancement of marketing capacities, especially on branding and product development fields are needed. In addition to financial schemes available for dairy cooperatives, technical enhancement of their marketing capabilities is required.

4.10.5 Future Prospects of Cooperative Model

In some countries, such as Australia, Brazil, and China, large-scale dairy farms have been taking over small farmers as the major suppliers of milk, eroding the importance of cooperatives. In India, however, despite the growing prominence of large-scale farmers,¹⁰² small farmers are likely to continue to be the

¹⁰² For example, in Madhya Pradesh, the state government has been facilitating an increase in large-scale dairy farms. There are hundreds of livestock farmers who own more than 100 buffaloes in the suburbs of Jabalpur.

major suppliers of milk, for several reasons.

First, households with less than two ha constitute more than 90% of the rural population, and this ratio is not likely to significantly decrease in the near future. Moreover, livestock holding is likely to continue to be a popular way for small farmers to gain a stable income; they are thus likely to continue keeping livestock. Furthermore, improving the livelihoods of small farmers is a major goal of the Indian government, which recognizes the importance of the livestock sector for the development of small farmers. For example, the Twelfth Five-year Plan (2012–2017) claims that the viability of small farming enterprises must be a special area of focus and points out that the livestock sector is an integral sector for the improvement of the livelihoods of small farmers. The National Livestock Policy 2013 also acknowledges the importance of small farmers, who own most of the livestock in the country, and lists various policies for improving the productivity of the dairy activities of small farmers.

As small farmers are likely to continue being India's dominant suppliers of milk, the cooperative model—which is based on small farmers—should be an effective model for the Indian dairy sector, at least for the next couple of decades.

4.10.6 Issues and Challenges

- Business performances of some state federations and milk unions are significantly bad due to the poor management of their business. Part of it is caused by the improper intervention of the state governments.
- The levels of the profits of the milk unions are generally low even though their management are good. This is partly caused by the fact that a large portion of union profits are reimbursed to cooperative members in the form of bonuses, various services, and welfare funds. Also, the business of milk union involves higher costs than private dairy firms as the procurement coverages and the cold chain networks are more extensive than private firms and offer stable purchase prices to the members irrespective of market demand.
- The coverage of DCSs are only 58% of potential villages. There are a significant number of dairy farmers who lack the access to the services and milk purchase practice which are favorable to farmers that dairy cooperatives would provide.
- Although many of the dairy plants of dairy cooperatives are certified by ISO and HACCP, there is large room to improve their hygiene management system.
- Although the organized sector in India has introduced scientific analyses for milk quality such as for fat and SNF content in contrast to the unorganized sector, and few violations on FSSAI standard are observed in distribution channel of the organized sector, milk quality check system is also not sufficient comparing to international standard.
- The capacity to manage a dairy business varies among dairy cooperatives. On the one hand, Amul is expanding to markets all over India and becoming a threat to local cooperatives. On the other hand, cooperatives in Uttar Pradesh are being forced to lay off staff due to their unprofitability. Some cooperatives may be run out of the business.

- There are significant differences in dairy production levels between the areas, as most of the cows and buffaloes kept in some areas are indigenous breeds. In areas where productivity is low, it is sometimes more cost-effective to supply milk from other areas where productivity is higher. If this productivity gap increases, dairy producers in some areas are likely to fail.

Chapter 5 Current Status of Dairy Production and Rural Societies

5.1 Basic Description of Socioeconomic Situation Survey

A socioeconomic situation survey was conducted to elucidate the current dairy activities and livelihoods of dairy farmers and the social and economic contributions made by cooperatives to them.

In order to ensure the accuracy of the analysis, the sample of the survey are extracted in the way that the comparison among the categories of farmers (large and medium¹⁰³, small, and marginal farmers, and landless households) can be statistically accurately conducted for each state. Table 5-1 show the sample size of each category of farmers for each state in this survey. As, shown in the table, the sample size of each category is more than 30 for each state, which secure the accuracy in comparing among these categories (Central Limit Theorem).

As surveying one village in a state is not enough to extract enough numbers of household for each category, two villages for each state are selected for the sample. The target villages are chosen by the consultation with NDDDB staffs and local milk union personnel so that the villages that can represent the region are selected as sample.

The total sample of the survey comprises 1,171 households (75 to 85 households in each village). Both DCS members and non-members are included in the sample.

Table 5-1 Sample size for each category of farmers and state

	Large and medium	Small	Marginal	Landless	Total
Gujarat	33	32	85	81	231
Bihar	30	36	90	81	237
Assam	43	56	70	63	232
Karnataka	64	49	64	56	233
Uttar Pradesh	75	30	60	73	238
Total	245	203	369	354	1,171

Table 5-2 lists the target villages examined in the survey. They were selected from among the districts where the milk unions examined in this study are located. Three villages without a DCS are included (Kanfalla Bhokatgao village in Assam, Haravala village in Karnataka, and Raipura village in Uttar Pradesh) in order to compare their socioeconomic situation with that of villages with a DCS. In the analysis, south and north Karnataka are regarded as separate, as their dairy activities differ significantly.

¹⁰³ As the number of large and medium size farmers are generally quite small for any village in India, these two categories are grouped into one for sampling design of the survey.

Table 5-2 List of target villages in the socioeconomic situation survey

State	District	Village	Union	Water source for agriculture	Characteristics
Gujarat	Anand	Mujkuva	Kaira	Canal, borewell	20 km to Anand city
	Banaskantha	Saral Vid	Banaskantha	Canal, borewell	Scheduled Castes (SCs) and Scheduled Tribes (STs) are predominant
		Thavar		Borewell, rainwater	Semi-arid area, but villagers hold a large number of livestock
Bihar	Patna	Guai	Patna	Canal, borewell	Close to Patna city (15 km)
	Samastipur	Rahmatpur	Samastipur	Borewell	Close to Samastipur city (7 km)
		Chakhaji		Borewell	Remote area
Assam	Kamrup Rural	Uzankuri	WAMUL	Borewell	Close to river and have frequent floods
		Malaybari		Canal, borewell	Remote area (50 km from Guwahati city)
	Golaghat	Kanfalla Bhokatgao	No DCS	Borewell	Close to small town
South Karnataka	Bangalore rural	Kammasandra	Bangalore	Rainwater, borewell	25 km to Bangalore city
North Karnataka	Gulbarga	Kumasi	Gulbarga	Borewell	Relatively dry area
		Haravala	No DCS	Canal	Remote area
Uttar Pradesh	Chandaulli	Nadara	Varanasi	Canal, Borewell	45 km to Varanasi city
		Raipura	No DCS	Canal, Borewell	Bad road access
	Ghaziabad	Sakoorpur	Meerut	Borewell	Close to Delhi

The analysis and discussions in this chapter are based on the results of the socioeconomic situation survey and the findings of the field surveys by the study team.

5.2 Ownership of Cattle and Buffalo and Dairy Production

5.2.1 Scale of Cattle and Buffalo Holdings

In India, small, marginal, and landless farmers play important roles in the livestock sector. Table 5-3 shows the average number of cattle and buffalo holdings per household depending on the scale of land holding and the distribution of cattle and buffalo reared for each category. The table shows that 90% of rural households have less than 2 ha (indicating small, marginal, and landless farmers) and that these farmers hold about 80% of all cattle and buffaloes.

Table 5-3 Average number of cattle and buffalo holdings per household and distribution of cattle and buffalo reared for each category of rural household

Category of farmer (Area of landholding: ha)	Large (10ha -)	Medium (2 - 10 ha)	Small (1 - 2 ha)	Marginal (0.002 - 1 ha)	Landless (- 0.002 ha)	Total
Distribution of household (%)	0.2	6.9	10.0	75.4	7.4	100
Average holding of cattle and buffalo	4.4	3.6	2.6	1.5	1.6	1.8
Distribution of cattle and buffalo holdings (%)	1.46	11.61	20.45	57.67	0.03	100

Source: MoSPI (2013) Livestock Ownership in India, 2013

Table 5-4 shows the average number of bovine (cattle and buffalo) holdings per household for each category of rural household based on the socioeconomic situation survey. One can see that the number of cattle and buffalo holdings increases as the scale of landholding expands. It also shows that the degree of increase in the number of livestock holdings is much higher in Gujarat, where dairy production is highly developed, than in other states. The number of cattle and buffalo holdings per household is relatively high in Assam, but the production volume is relatively low there, as the state's quantity of low-yield breeds is high (this will be discussed in the following sections).

Table 5-4 Average number of bovine (cattle and buffalo) holdings per household for each category of rural household and state

State	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	14.2	9.7	7.6	4.7	4.0	2.8	5.0
Bihar	-	2.7	2.3	2.0	1.8	1.8	1.9
Assam	6.7	4.3	5.1	3.8	4.1	2.9	4.3
South Karnataka	-	8.3	2.8	2.1	-	1.3	2.1
North Karnataka	2.6	2.5	2.0	2.2	1.5	3.7	2.5
Uttar Pradesh	3.6	2.5	2.8	2.5	2.2	1.8	2.5
Total	4.7	4.1	4.0	3.0	2.5	2.3	3.2

Source: Socioeconomic situation survey

Table below shows average number of cattle and buffalo per household for each category of rural household and state. It shows that the average number of cattle held is generally higher than that of buffalo. This tendency is not so much conspicuous in the northern regions of India such Uttar Pradesh, Gujarat, and Bihar where the rearing of buffalo has been traditionally popular.

**Table 5-5 Average number of cattle and buffalo per household
for each category of rural household and state**

	Large		Medium		Small		Marginal		Tenant		Non-farm		Total	
Cattle/ Buffalo	Cattle	Buffalo	Cattle	Buffalo	Cattle	Buffalo	Cattle	Buffalo	Cattle	Buffalo	Cattle	Buffalo	Cattle	Buffalo
Gujarat	7.8	6.4	6.4	3.3	5.1	2.5	2.5	2.2	1.0	3.0	1.3	1.5	2.9	2.2
Bihar	-	-	2.7	0.0	1.8	0.4	1.5	0.6	1.3	0.5	1.2	0.5	1.4	0.5
Assam	6.7	0.0	4.2	0.1	4.9	0.2	3.8	0.0	4.1	0.0	2.9	0.0	4.2	0.1
South Karnataka	-	-	7.7	0.7	2.7	0.2	2.0	0.1	-	-	1.3	0.0	2.1	0.1
North Karnataka	2.4	0.2	2.0	0.4	1.8	0.2	2.0	0.2	1.5	0.0	1.4	2.3	1.9	0.6
Uttar Pradesh	1.8	1.9	1.3	1.2	1.2	1.7	0.8	1.7	1.2	1.0	0.8	0.9	1.1	1.4
Total	3.5	1.3	3.1	1.1	3.2	0.8	2.1	0.9	2.0	0.5	1.4	0.9	2.3	0.9

Source: Socioeconomic situation survey

Table 5-6 depicts the distribution of rural households according to the number of cattle and buffalo holdings based on the socioeconomic situation survey. One can see that more than half of the households own fewer than two cattle and buffaloes. The share of households that own more than 10 cattle and buffaloes is relatively high in Gujarat and Assam but is quite low in other states.

Table 5-6 Distribution of rural households in cattle and buffalo holdings

# of cattle and buffalo reared	Gujarat	Bihar	Assam	South Karnataka	North Karnataka	Utter Pradesh	Total
0	13.4%	3.8%	9.9%	26.9%	10.3%	4.2%	9.4%
1	3.9%	32.6%	7.3%	11.5%	25.0%	21.4%	17.3%
2	13.0%	40.6%	18.9%	29.5%	32.6%	33.2%	27.6%
3	11.7%	15.9%	11.6%	14.1%	14.8%	21.8%	15.1%
4	17.3%	4.2%	13.7%	7.7%	9.0%	10.5%	10.8%
5	8.2%	1.3%	11.6%	3.8%	2.5%	3.8%	5.5%
6	7.8%	1.3%	9.4%	2.6%	3.8%	2.9%	4.9%
7	4.3%	0.4%	3.0%	1.3%	0.0%	0.8%	1.8%
8	3.0%	0.0%	1.7%	0.0%	0.6%	0.0%	1.0%
9	2.2%	0.0%	3.0%	1.3%	0.0%	0.4%	1.2%
More than 10	15.2%	0.0%	9.9%	1.3%	2.0%	0.8%	5.4%

Source: Socioeconomic situation survey

5.2.2 Volumes of Milk Production and Sales

Tables 5-7 and 5-8 show the average annual milk production and sales volumes per household,

respectively. One can see that production and sales volumes increase as the landholding scale increases. The production and sales volumes per households are much higher in the villages in Gujarat than in other states. The figures for Assam are relatively low, even though the number of livestock holdings is high, indicating the low productivity of the cows and buffaloes reared there.

Table 5-7 Average annual milk production volume per household (liter)

State	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	16,254	12,987	6,728	3,753	2,520	2,241	4,695
Bihar	-	2,850	1,680	1,574	1,169	1,249	1,441
Assam	2,388	1,283	1,370	569	1,264	650	1,058
South Karnataka	-	8,920	1,730	2,590	-	2,562	2,758
North Karnataka	732	639	432	506	135	718	597
Uttar Pradesh	3,547	2,132	3,087	1,976	1,610	1,831	2,301
Total	3,340	3,470	2,312	2,009	1,297	1,607	2,157

Source: Socioeconomic situation survey

Table 5-8 Average annual milk sales volume per household (liter)

State	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	14,913	11,718	5,899	3,188	2,210	1,871	4,088
Bihar	-	2,486	1,216	1,244	884	1,041	1,145
Assam	1,811	954	1,071	376	961	489	791
South Karnataka	-	8,198	1,580	2,290	-	2,196	2,431
North Karnataka	396	369	226	339	0	451	353
Uttar Pradesh	2,898	1,583	2,455	1,488	1,188	1,348	1,769
Total	2,749	2,927	1,889	1,637	973	1,296	1,762

Source: Socioeconomic situation survey

Table 5-9 compares livestock holdings and milk production and sales between villages with DCSs and those without. It shows that the per-household milk production volumes of Kanfalla Bhokatgao village in Assam and Haravala village in Karnataka are much lower than those of villages with DCSs, even though the number of livestock holdings is not significantly different from those of other villages. Moreover, the ratios of milk sales volumes to production volumes in these two villages are much lower than in other villages. This indicates higher productivity and more active milk sales activities among farmers in villages with DCSs, probably due to the services and other benefits provided by DCSs and milk unions.

On the other hand, the per-household production and sales volumes and ratios of milk sales volumes to production volumes in Raipura village in Uttar Pradesh do not differ markedly from those in villages with DCSs. As dairy production is highly developed in Uttar Pradesh and the state has many private dairy companies, livestock productivity and sales activities there seem not to be affected by the existence

of DCSs.

Table 5-9 Comparison of livestock holdings and milk production and sales between villages with and without DCSs

	Village	Average cattle and buffalo holding per HH	Average milk production volume per HH (liter)	Average milk sales volume per HH (liter)	% of sales volume of production volume
Villages without DCSs	Kanfalla Bhokatgao (Assam)	4.0	508	140	39%
	Haravala (North Karnataka)	2.9	358	234	46%
	Raipura (Uttar Pradesh)	2.4	2,133	1,653	77%
Villages with DCSs		3.2	2,449	2,036	83%

Source: Socioeconomic situation survey

5.3 Rearing Management and Productivity

5.3.1 Major Breeds and Their Yields

Table 5-10 depicts the average cow yield per day for major breeds reared in the target villages of the socioeconomic situation survey, and Table 5-11 shows the percentages of cows reared by farmers in the target villages by breed. One can see that there are significant differences in the composition of breeds between the states. For example, the percentages of high-yield breeds such as HF are quite high in Gujarat and South Karnataka, but the percentages of low-yield breeds such as indigenous breeds are quite high in Assam and North Karnataka.

Table 5-10 Average cow yield per day for major breeds in the target villages

	HF	Jersey	Other foreign breeds	Sahiwal	Gir	Hariana	Gaolo	Red Sindhi	Other indigenous	Indigenous non-descriptive
Average yield per day (liter)	11.3	7.0	12.8	7.5	7.3	6.2	6.0	6.5	3.9	3.5

Source: Socioeconomic situation survey

Table 5-11 Percentages of cows reared by farmers in the target villages by breed

State	HF	Jersey	Other foreign breeds	Sahiwal	Gir	Haryana	Gaolo	Red Sindhi	Other indigenous	Indigenous ND
Gujarat	63%	4%	0%	0%	4%	0%	0%	0%	0%	29%
Bihar	12%	61%	0%	10%	0%	1%	1%	1%	11%	3%
Assam	2%	28%	1%	0%	0%	0%	0%	0%	0%	68%
South Karnataka	84%	13%	0%	0%	0%	0%	0%	0%	3%	0%
North Karnataka	6%	15%	0%	0%	0%	0%	0%	0%	61%	18%
Uttar Pradesh	13%	38%	2%	18%	0%	7%	0%	0%	6%	15%
Total	25%	25%	0%	3%	1%	1%	0%	0%	9%	36%

Note: ND = “non-descriptive”

Source: Socioeconomic situation survey

Table 5-12 compares breed compositions between villages with DCSs and without. It shows that the ratios of low-yield cows are significantly higher in villages without DCSs.

Table 5-12 Percentages of cows by breed for villages with and without DCSs

	Village	HF	Jersy	Other foreign breed	Sahiwal	Gir	Haryana	Gaolo	Red Sindhi	Other indigenous	Indigenous non-descriptive
Villages without DCS	Kanfalla Bhokatgao (Assam)	0%	10%	0%	0%	0%	0%	0%	0%	0%	90%
	Haravala (Karnataka)	2%	1%	0%	0%	0%	0%	0%	0%	75%	22%
	Raipura (Uttar Pradesh)	6%	61%	0%	19%	0%	2%	0%	0%	0%	13%
Villages with DCS		30%	28%	1%	3%	1%	1%	0%	0%	6%	29%

Source: Socioeconomic situation survey

Tables 5-13 and 5-14 depict the average buffalo yields per day for major breeds reared in the target villages and the percentages of buffaloes reared by farmers in the target villages by breed, respectively. The difference in yields is not as significant among the breeds as it is for cows. The breed compositions differ across states.

Table 5-13 Average buffalo yields per day for major breeds in the target villages

	Toda	Mehsana	Jaffrabadi	Murrah	Surti	Bhadawari	Other	Indigenous non-descriptive
Average yield per day (liter)	9.0	8.4	7.1	7.0	6.0	4.9	5.1	6.4

Source: Socioeconomic situation survey

Table 5-14 Percentages of buffalos reared by farmers in the target villages by breed

State	Toda	Mehsana	Jaffrabadi	Murrah	Surti	Bhadawari	Other	Indigenous ND
Gujarat	0.4%	20.6%	0.6%	0.0%	0.8%	0.4%	1.2%	76.0%
Bihar	0.0%	6.9%	4.6%	35.4%	0.0%	15.4%	36.2%	1.5%
Assam	0.0%	0.0%	0.0%	53.8%	0.0%	0.0%	0.0%	46.2%
South Karnataka	0.0%	0.0%	1.0%	3.8%	0.0%	0.0%	38.5%	56.7%
North Karnataka	0.0%	0.0%	0.7%	1.4%	0.0%	0.0%	50.4%	47.5%
Uttar Pradesh	1.5%	1.5%	0.3%	56.9%	0.0%	4.5%	29.5%	5.7%
Total	0.6%	10.9%	1.0%	22.8%	0.4%	3.4%	17.7%	43.1%

Note: ND = "non-descriptive"

Source: Socioeconomic situation survey

5.3.2 Artificial Insemination (AI)

Table 5-15 shows the percentages of farmers who use AI services to mate their livestock for cooperative members and non-members in villages with DCSs and villages without. One can see that the ratio of farmers who use AI services is significantly higher for farmers in villages with DCSs. Moreover, AI use is relatively high in Gujarat and South Karnataka, where the AI services of dairy cooperatives are available in most areas.

Table 5-15 Percentages of farmers who use AI services to mate livestock

State	Villages with DCSs		Villages without DCSs
	DCS Members	Non-members	
Gujarat	92%	88%	-
Bihar	61%	69%	-
Assam	59%	49%	13%
South Karnataka	100%	100%	-
North Karnataka	76%	24%	23%
Uttar Pradesh	59%	57%	47%
Total	73%	65%	29%

Source: Socioeconomic situation survey

Table 5-16 shows the percentages of institution use for AI services. One can see that the percentages of farmers who use cooperative AI centers are higher in Gujarat and South Karnataka, where the AI services of dairy cooperatives are available in most areas. The percentages of farmers who use cooperative AI centers are lower for non-DCS members than for DCS members.

Table 5-16 Percentages of institution use for AI services

State	Villages with DCSs						Villages without DCSs	
	DCS members			Non-members			DCSs	
	Coop.	Private	Gov.	Coop.	Private	Gov.	Private	Gov.
Gujarat	87%	13%	0%	97%	0%	3%	-	-
Bihar	18%	73%	7%	5%	77%	18%	-	-
Assam	23%	30%	47%	9%	41%	50%	63%	38%
South Karnataka	100%	0%	0%	20%	47%	33%	-	-
North Karnataka	29%	9%	62%	0%	25%	75%	7%	93%
Uttar Pradesh	22%	72%	6%	4%	88%	8%	82%	18%
Total	52%	35%	13%	27%	53%	20%	60%	40%

Source: Socioeconomic situation survey

5.3.3 Utilization of Cattle Feed

Table 5-17 depicts the percentages of farmers who provide cattle feed to their livestock every day. One can see that the percentage is higher for DCS members than for non-members. Moreover, it is significantly lower for farmers in villages without DCSs than for those in villages with DCSs.

Table 5-17 Percentages of farmers who provide cattle feed to their livestock every day

Village	Villages with DCSs		Villages without DCSs
	DCS members	Non-members	
Gujarat	62%	33%	-
Bihar	64%	54%	-
Assam	29%	20%	6%
South Karnataka	52%	25%	-
North Karnataka	40%	43%	16%
Uttar Pradesh	40%	47%	47%
Total	54%	38%	23%

Source: Socioeconomic situation survey

Table 5-18 shows the percentages of farmers who buy cattle feed at DCS offices. One can see that these figures are higher in Gujarat and South Karnataka, where cattle feed is sold at most DCS offices.

Table 5-18 Percentages of farmers who buy cattle feed at DCS offices

Village	Villages with DCSs		Villages without DCSs
	DCS members	Non-members	
Gujarat	90%	68%	-
Bihar	76%	20%	-
Assam	14%	9%	0%
South Karnataka	91%	23%	-
North Karnataka	38%	4%	1%
Uttar Pradesh	21%	12%	7%
Total	58%	25%	3%

Source: Socioeconomic situation survey

5.3.4 Productivity of Cows and Buffaloes

Table 5-19 shows the average yields per cow and buffalo per day for various areas. One can see that the yield per livestock is higher where the ratios of high-yield breeds are higher and where AI services and cattle feed are more heavily utilized. The higher ratio of high-yield livestock may partly be caused by the high utilization of AI services. Moreover, the higher utilization of cattle feed is likely to increase the productivity of high-yield livestock.

One can see that the yields of livestock in Kanfalla Bhokatgao village (Assam) and Haravala village (North Karnataka), where there are no DCSs, are significantly lower than in villages with DCSs in the same area. The existence of DCSs and their provision of various services (such as AI services, sales of cattle feed, and the guaranteed purchase of surplus milk) probably cause this difference. On the other hand, the yields of livestock in Raipura village of Uttar Pradesh, where there are no DCSs, are not significantly different from those of villages with DCSs. As the dairy sector is highly developed in Uttar Pradesh and many private dairy companies procure milk there, the DCSs seem not to have much influence on the productivity of livestock.

Table 5-19 Average yields per cow and buffalo per day (liters)

Village, State	Cows	Buffaloes
Villages without DCSs	3.4	4.9
Kanfalla Bhokatgao (Assam)	1.8	-
Haravala (North Karnataka)	2.1	3.0
Raipura (Uttar Pradesh)	8.1	6.1
Villages with DCSs	7.6	6.9
Gujarat	11.0	7.5
Bihar	6.6	5.7
Assam	3.6	5.0
South Karnataka	12.1	3.8
North Karnataka	4.3	3.5
Uttar Pradesh	7.4	6.7
Total	7.0	6.4

Source: Socioeconomic situation survey

5.4 Household Incomes and Incomes from Livestock Activities

Tables 5-20, 5-21, and 5-22 depict the average household annual income, annual agricultural income, and livestock income, respectively, for each state and farmer category.¹⁰⁴ One can see that these income levels tend to increase as the landholding area increases. However, the difference in livestock incomes among the farmer categories is significantly lower than the difference in agricultural incomes. Moreover, the average livestock incomes of the tenants and non-farmer households in Gujarat, South Karnataka, and Uttar Pradesh are quite high. This indicates that the livelihoods of farmers can be improved through the development of livestock activities, even if they have limited landholdings.

Table 5-20 Average household annual income (Rs.)

State	Large and medium farmers	Small and marginal farmers	Tenants and non-farmers	Total
Gujarat	423,345	179,909	124,357	187,910
Bihar	371,600	122,547	160,236	278,229
Assam	311,741	115,248	78,380	141,792
South Karnataka	192,213	72,510	47,337	71,415
North Karnataka	134,348	76,419	77,564	98,479
Uttar Pradesh	202,737	115,303	82,134	132,707
Total	415,852	119,970	108,902	170,221

Source: Socioeconomic situation survey

¹⁰⁴ Livestock income includes income from dairy activities (sales and self-consumption of milk) and the sales and purchase of livestock (cattle, buffalo, and other livestock).

Table 5-21 Average household annual income from agriculture (Rs.)

State	Large and medium	Small and marginal	Tenants and non-farmers	Total
Gujarat	43,386	16,584	47	13,507
Bihar	61,467	32,175	5,378	20,561
Assam	107,769	40,459	6,147	43,630
South Karnataka	127,333	13,148	0	13,157
North Karnataka	90,099	15,980	2,088	41,741
Uttar Pradesh	116,852	46,806	12,472	58,349
Total	96,508	29,729	5,038	33,739

Source: Socioeconomic situation survey

Table 5-22 Average household annual income from livestock activities (Rs.)

State	Large and medium	Small and marginal	Tenants and non-farmers	Total
Gujarat	379,960	140,993	60,390	139,211
Bihar	58,234	27,920	21,837	25,621
Assam	25,405	16,639	19,267	18,987
South Karnataka	60,713	33,399	14,932	30,986
North Karnataka	16,589	24,325	33,899	23,119
Uttar Pradesh	71,991	49,317	48,525	56,248
Total	85,296	49,678	35,641	51,592

Source: Socioeconomic situation survey

Table 5-23 and 5-24 show the percentages of agricultural income and livestock income to the total income respectively for each category of farmers and region. Figure 5-1, 5-2, 5-3 show the proportion of each source of income to total income for each category of farmers for all the target villages of the survey. It shows that, on average, the percentages of agricultural income are higher than livestock income for large and medium farmers. However, the percentages of livestock income are higher than agricultural income for smaller and marginal farmers and tenants and non-farmers. One can see that livestock activities are thought to be more important for the livelihood of farmers with smaller land holdings than farmers with larger land holdings.

Table 5-23 Percentages of agricultural income against total income

State	Large and medium	Small and marginal	Tenants and non-farmers	Total
Gujarat	10%	9%	0%	7%
Bihar	17%	26%	3%	7%
Assam	35%	35%	8%	31%
South Karnataka	66%	18%	0%	18%
North Karnataka	67%	21%	3%	42%
Utter Pradesh	58%	41%	15%	44%
Total	23%	25%	5%	20%

Source: Socioeconomic situation survey

Table 5-24 Percentages of livestock income against total income

State	Large and medium	Small and marginal	Tenants and non-farmers	Total
Gujarat	90%	78%	49%	74%
Bihar	16%	23%	14%	9%
Assam	8%	14%	25%	13%
South Karnataka	32%	46%	32%	43%
North Karnataka	12%	32%	44%	23%
Utter Pradesh	36%	43%	59%	42%
Total	21%	41%	33%	30%

Source: Socioeconomic situation survey

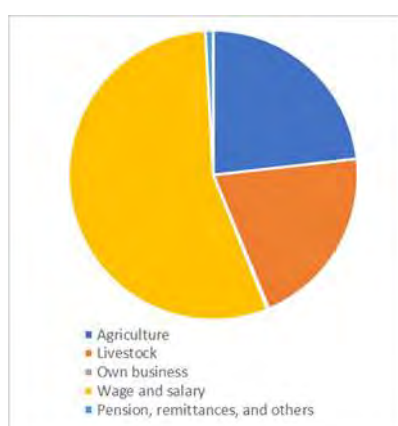


Figure 5-1 Proportion of each source of income to total income for large and medium farmers

Source: Socioeconomic situation survey

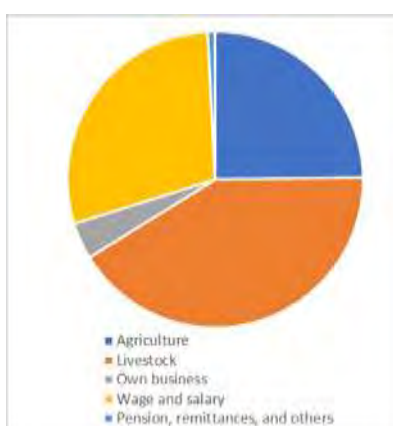


Figure 5-2 Proportion of each source of income to total income for small and marginal farmers

Source: Socioeconomic situation survey

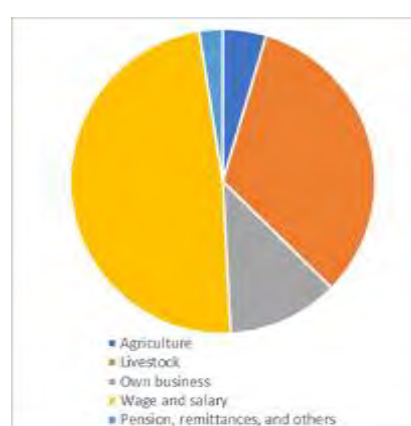


Figure 5-3 Proportion of each source of income to total income for tenants and landless

Source: Socioeconomic situation survey

Table 5-25 compares average household annual incomes from livestock activities between villages with and without DCSs. It shows that livestock incomes differ significantly between villages with and without DCSs in Assam and North Karnataka. This indicates that livestock incomes are likely to increase through the formation of DCSs, which is likely to improve the productivity of livestock (as discussed in the previous section). On the other hand, livestock incomes do not significantly differ between villages with and without DCSs in Uttar Pradesh. This indicates that the formation of DCSs had no significant effects on the livelihoods of the target villages in Uttar Pradesh, where the dairy sector is highly developed, and many private dairy companies are procuring milk.

Table 5-25 Comparison of average household annual incomes from livestock activities between villages with and without DCSs

State	Village	With/without DCS	Average household annual livestock income (Rs.)
Assam	Kanfalla Bhokatgao	without DCS	8,972
	Malaybari	with DCS	26,001
North Karnataka	Haravala	without DCS	11,650
	Kumasi	with DCS	34,587
Uttar Pradesh	Raipura	without DCS	42,340
	Nadara	with DCS	47,031

Source: Socioeconomic situation survey

5.5 Sales of Milk

5.5.1 Buyers of Milk

Table 5-26 shows the percentages of DCS members in the target villages of the socioeconomic situation survey by type of buyer. As shown, almost all DCS members sell their milk to the cooperatives' DCSs, and a very small percentage sells their milk to other buyers. It is important to note that members in some areas tend to sell their milk to other institutions when the purchase prices of other institutions are high and the procurement volume of the DCSs in these areas tend to decrease during these periods, as discussed in Section 4.7.2

Table 5-26 Percentages of dairy farmers by type of buyers for DCS members

State	Dairy Cooperative	Middleman	Private companies	Direct sales to shops/ restaurants	Other households in the village	Other households outside the village
Gujarat	100%	0%	0%	0%	0%	0%
Bihar	100%	0%	0%	0%	2%	0%
Assam	100%	3%	0%	0%	14%	0%
South Karnataka	100%	0%	0%	0%	0%	0%
North Karnataka	97%	3%	0%	0%	0%	3%
Uttar Pradesh	97%	6%	0%	0%	1%	0%
Total	99%	2%	0%	0%	2%	0%

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

Table 5-27 shows the same figures for non-DCS members. One can see that many non-members sell their milk to the cooperatives' DCSs, while some non-members sell their milk to middlemen in the unorganized sector and to private dairy companies.¹⁰⁵

Table 5-27 Percentage of dairy farmers by type of buyer for non-members

State	Dairy Cooperative	Middleman	Private companies	Direct sales to shops/ restaurants	Other households in the village	Other households outside of the village
Gujarat	97%	0%	3%	0%	0%	0%
Bihar	39%	37%	6%	8%	29%	6%
Assam	69%	17%	0%	9%	31%	0%
South Karnataka	8%	46%	46%	0%	0%	0%
North Karnataka	0%	100%	0%	0%	0%	0%
Uttar Pradesh	50%	44%	6%	0%	0%	0%
Total	58%	27%	7%	4%	15%	2%

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

Table 5-28 shows the same figures for villages without DCSs. Many of them sell their milk to middlemen in the unorganized sector. Some farmers in Raipura village in Uttar Pradesh sell their milk to private dairy companies. As no private dairy company collects milk in Kanfalla Bhokatgao village in Assam or Haravala village in North Karnataka, none of the farmers sell to private dairy companies in these villages. On the other hand, many farmers in Kanfalla Bhokatgao village bring their milk to restaurants and shops,

¹⁰⁵ Table 4-23 shows that many of the non-members in South Karnataka sell their milk to private dairy companies. This is because there are one small private dairy companies that actively collect milk in Kommasandra village. As the procurement scales of private dairy companies in Karnataka are relatively small, the case of this village seems unrepresentative of the situation in South Karnataka.

as the village is close to a town. In Haravala village in North Karnataka, a remote area outside of India's milk distribution channels, many farmers sell their milk to other households.

Table 5-28 Percentages of dairy farmers by type of buyer for villages without DCSs

State, Village	Dairy Cooperative	Middleman	Private companies	Direct sales to shops/ restaurants	Other households in the village	Other households outside the village
Kanfalla_Bhokatgao (Assam)	0%	31%	0%	38%	23%	0%
Haravala (North Karnataka)	0%	13%	0%	0%	75%	38%
Raipura (Uttar Pradesh)	0%	88%	12%	0%	0%	0%
Total	0%	72%	9%	6%	10%	3%

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

Table 5-29 shows the percentages of answers to the question "Who is your favorite buyer?" Most of the farmers in target villages with DCSs answered that the dairy cooperative is their favorite buyer. In Assam, a certain percentage of households' favor middlemen, which indicates the strong presence of the loose milk markets of the unorganized sector there. Some households in Uttar Pradesh prefer private dairy companies, reflecting the strong presence of private companies there.

Table 5-29 Percentages of favored buyers

With/without DCSs	State/village	Dairy cooperative	Middleman	Private companies	Direct sales to shops/ restaurants	Direct sales to other HHs in the village	Direct sales to other HHs outside the village	Other
Villages with DCSs	Gujarat	99%	1%	0%	0%	0%	0%	0%
	Bihar	78%	1%	10%	1%	7%	2%	1%
	Assam	73%	19%	0%	3%	6%	0%	0%
	South Karnataka	76%	10%	14%	0%	0%	0%	0%
	North Karnataka	94%	0%	3%	0%	0%	3%	0%
	Uttar Pradesh	87%	1%	12%	0%	0%	0%	0%
	Total	85%	5%	6%	1%	2%	1%	0%
Villages without DCSs	Assam	0%	29%	0%	36%	21%	0%	14%
	North Karnataka	0%	0%	13%	0%	63%	25%	0%
	Uttar Pradesh	0%	0%	100%	0%	0%	0%	0%
	Total	0%	10%	38%	12%	28%	8%	5%

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

5.5.2 Favorite Buyers and Reasons

Table 5-30 shows, among those who chose dairy cooperatives as their favorite buyer, the reasons why. The table indicates that purchase price stability is the major reason, followed by higher purchase prices. Many also indicated that services such as bonuses, veterinary services, and cattle feed sales were the reasons.

Table 5-30 Reasons why cooperative is the favorite buyer (number of farmers)

State	# of HH whose favorite buyer is cooperative	Purchasing price is stable	Purchasing price is higher	Can get some bonus	Do not refuse to buy regardless of market demand	Cooperative is near to the house	Cooperative provide veterinary services	Cooperative provide cattle insurance	Cooperative provide cattle feed	Can get some other services
Gujarat	187	138	171	68	58	13	56	9	2	1
Bihar	136	56	38	59	28	48	45	27	24	9
Assam	79	56	20	34	23	12	3	-	3	2
South Karnataka	39	12	18	27	2	16	15	15	16	9
North Karnataka	34	14	22	12	10	11	8	5	11	3
Uttar Pradesh	122	43	27	64	26	35	1	-	1	2
Total	597	319	296	264	147	135	128	56	57	26

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

Table 5-31 shows, among those who chose middlemen as their favorite buyer, the reasons why. Some farmers answered that the provision of advance payment was the major reason. Others claimed that they were obliged to sell to middlemen as they were in debt due to advance payments or loans provided by middlemen to purchase livestock.

Table 5-31 Reasons why middleman is the favorite buyer (number of farmers)

State	# of HH whose favorite buyer is middleman	Buyers provide advance payment for milk	Obliged to sell	Do not refuse to buy regardless of market demand	Purchasing price is higher	Buyer comes to house gate, so is convenient to sell	Purchasing price is stable
Assam	24	12	1	7	1	2	-
Bihar	2	1	-	1	2	2	-
Gujarat	1	-	-	-	1	-	1
North Karnataka	5	-	-	3	3	-	1
Uttar Pradesh	2	-	12	1	2	1	-
Total	34	13	13	12	9	5	2

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

Table 5-32 shows, among those who chose private dairy companies as their favorite buyer, the

reasons why. Many selected the closeness of milk collection points to their houses as the reason. Others cited the stable purchase price and higher purchase price as the reasons.

Table 5-32 Reasons why private dairy company is the favorite buyer (number of farmers)

State	# of HH whose favorite buyer is private company	Collection point is near the house	Purchase price is higher	Purchase price is stable	Do not refuse to buy regardless of market demand	Buyer is friend	Buyer is relative
Bihar	18	12	9	2	3	-	1
South Karnataka	7	2	7	2	1	-	2
North Karnataka	2	1	1	1	0	0	0
Uttar Pradesh	72	45	12	16	9	5	1
Total	97	59	28	20	13	5	4

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

5.6 Reasons for Becoming Dairy Cooperative Member or Not

Table 5-33 shows the percentages of reasons cited for becoming dairy cooperative members (multiple answers are allowed). Most cite access to veterinary services. Stable and higher purchase prices are also major reasons.¹⁰⁶

Table 5-33 Reasons for becoming cooperative member

State	Can get veterinary service	Purchasing price is stable	Purchasing price is higher	Do not refuse to buy regardless of market demand	Can get bonus	Can get AI service	Can buy cattle feed at low cost	There is no other buyer	Can get trainings	Can get some other services
Gujarat	95%	75%	89%	41%	31%	23%	10%	5%	13%	33%
Bihar	83%	51%	48%	40%	44%	34%	32%	11%	4%	49%
Assam	80%	58%	23%	41%	27%	6%	6%	27%	5%	27%
South Karnataka	86%	36%	43%	48%	60%	29%	38%	10%	7%	60%
North Karnataka	91%	55%	53%	51%	21%	34%	30%	11%	6%	45%
UP	65%	46%	21%	24%	43%	11%	12%	1%	12%	49%
Total	83%	57%	51%	39%	37%	22%	19%	10%	8%	42%

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

Table 5-34 shows the percentages of reasons cited for not becoming dairy cooperative members (multiple answers are allowed) in villages with DCSs. The major reasons are “Not having enough milk production to sell” and “Not having a milking animal.” Others cite the poor management of cooperatives as a reason; this response is relatively frequent in Bihar, South Karnataka, and Uttar Pradesh.

¹⁰⁶ Though milk unions do not provide services to members in Uttar Pradesh at present, members in the state’s sample villages had been provided various services until a few years ago.

Table 5-34 Reasons for not being a member of dairy cooperative

State	Not enough milk to sell	Do not have milking cow or buffalo	Management of cooperatives is poor	Purchase price of cooperatives is low	Prefer to sell milk to other institution	Cannot trust the quality test	Obligated to sell to other buyers
Gujarat	19%	33%	6%	1%	1%	1%	0%
Bihar	51%	7%	29%	30%	16%	15%	1%
Assam	44%	26%	5%	2%	5%	0%	2%
South Karnataka	8%	56%	25%	17%	19%	14%	8%
North Karnataka	58%	42%	0%	0%	4%	0%	0%
Uttar Pradesh	43%	7%	26%	20%	13%	0%	2%
Total	37%	25%	16%	13%	10%	6%	2%

Note: Multiple answers are allowed.

Source: Socioeconomic situation survey

5.7 Utilization of Loans and Insurance for Livestock Activities

Table 5-35 shows the percentages of farmers who have used loans to purchase livestock. One can see that only a limited number of farmers have used loans to purchase livestock. The study team found that a number of government schemes are designed to help farmers utilize bank loans to purchase livestock, by providing a guarantor for loans or subsidies, but the utilization of loans to purchase livestock seems not to be popular.¹⁰⁷

Table 5-35 Percentages of farmers who have used loans to purchase livestock

State, village	Total	Villages with DCSs		Villages without DCSs
		Member	Non-member	
Gujarat	2.2%	1.3%	4.3%	-
Bihar	1.3%	1.5%	1.4%	-
Assam	1.7%	2.4%	1.6%	1.1%
South Karnataka	17.9%	19.0%	16.7%	-
North Karnataka	1.3%	1.9%	4.2%	0.0%
Uttar Pradesh	2.1%	4.5%	0.0%	0.0%
Total	2.8%	3.4%	3.9%	0.4%

Source: Socioeconomic situation survey

Table 5-36 shows the percentages of cows and female adult buffaloes that are insured. One can see that the figures are quite high in Karnataka. This is likely due to the 50% subsidy for insurance fees

¹⁰⁷ In Table 4-30, the percentage of farmers who use loans to purchase livestock is quite high in South Karnataka. This is because many of the South Karnataka farmers surveyed by the study team applied for the government-supported loan scheme as a group. Thus, this figure is likely to be much higher than in other villages in South Karnataka. However, the utilization of loans to purchase livestock seems to be relatively high in Karnataka, as many government schemes are designed to promote the utilization of loans for livestock purchases.

offered by milk unions in Karnataka (which was discussed in Section 4.8). One can see that insurance for livestock is not very common in other states.

Table 5-36 Percentages of insured cows and female adult buffaloes

State, village	Total	Villages with DCSs		Villages without DCSs
		Member	Non-member	
Gujarat	1%	1%	0%	-
Bihar	0%	0%	0%	-
Assam	1%	0%	1%	2%
South Karnataka	38%	47%	16%	-
North Karnataka	3%	8%	0%	0%
Uttar Pradesh	1%	-	0%	0%
Total	3%	4%	1%	1%

Source: Socioeconomic situation survey

5.8 Summary

5.8.1 Major Findings

The following are the major findings of the discussion in this chapter:

- Most of the dairy farmers are small and own a couple of cattle and buffaloes or fewer. Large-scale dairy farmers who own more than 10 livestock are quite rare.
- The number of livestock reared by each household tends to increase as the landholding area increases.
- However, the difference in incomes gained from livestock activities between large and small/marginal/landless farmers is significantly less than the difference in agricultural incomes. Developing the livestock sector will be more effective in improving the livelihoods of smaller-scale and landless farmers than developing the agriculture sector would be.
- There is a significant difference in milking livestock productivity levels between villages with DCSs and those without. This seems to be due to the activities and services of dairy cooperatives, such as AI services and sales of cattle feed at lower prices. Support designed to expand milk collection networks to areas where livestock productivity is low is likely to improve the livelihoods of farmers there.
- Though a number of government schemes are available to support the utilization of loans for purchasing livestock, most farmers do not have access to such loans.
- Livestock insurance is rarely utilized, except in Karnataka, where milk unions provide a 50% subsidy for insurance.

5.8.2 Issues and Challenges

- The productivities of those dairy farmers who do not have access to the supports on dairy production such as AI and cattle feed and market access to the formal sector are typically low.
- There are significant differences in dairy production levels across regions. If this regional gap expands

further, it will become more economical in low-productivity areas to bring milk from other areas than to supply milk locally. This might cause farmers in low-productivity areas to be unable to continue dairy production.

Chapter 6 Current Food Safety Situation and Issues

6.1 FSSAI and Regulatory Framework

The Food Safety and Standards Authority of India (FSSAI) was established in 2006 under the Food Safety and Standards Act, 2006. The objectives of FSSAI are to establish science-based standards for articles of food and to regulate Food Business Operators (FBOs), storage, distribution, sales, and imports to ensure the availability of safe and wholesome food for human consumption.

The FSSAI consolidated various government acts and orders¹⁰⁸ concerning food-related issues in various ministries and departments into one law in 2011, the Food Safety and Standards Rules and Regulations, 2011. The standards, rules, and regulations regarding milk and dairy products are included in this law. This regulatory framework has been amended since its establishment according to internal needs and relevant international standards, such as the Codex/FAO and WHO.

A recent amendment regarding cow milk standards concerns its fat and solid non-fat (SNF) content. The standard for minimum fat and SNF percentages for milk used to be classified into three types based on the climate and geographical condition of each state. This was unified into one standard in October 2017. The national standard is now 3.2% fat and 8.3% SNF content for all states. An inter-state trade of milk is one of the reasons for this amendment.

Buffalo milk still has two standards (5.0% or 6.0% of fat and 9.0% of SNF content), as before, but this will also be unified for all states, according to the FSSAI.

Table 6-1 Amendment of milk standard in October 2017

State	Fat	SNF		States	Fat	SNF
Chandigarh, Haryana, Punjab	4.0	8.5				
Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Dadra and Nagar haveli, Delhi, Goa, Daman and Diu, Gujarat, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Lakshadweep, Minicoy and Admonitive Islands, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Puducherry, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand, West Bengal	3.5	8.5	⇒	All	3.2	8.3
Mizoram, Orissa	3.0	8.5				

Source: FSSAI

The FSSAI is administered by two bodies: the FSSAI at the national level and the state food safety commissioner's office at the state government level. The central office of the FSSAI in Delhi frames regulations reflecting the standards and guidelines for food safety, provides advice to the state governments and governmental agencies, and creates information networks across India. The state food safety commissioners enforce those regulations, such as by monitoring and inspecting FBOs, collecting data on

¹⁰⁸ Prevention of Food Adulteration Act, 1954, Fruit Products Order, 1955, Meat Food Products Order, 1973, Vegetable Oil Products (Control) Order, 1947, Edible Oils Packaging (Regulation) Order 1988, Solvent Extracted Oil, De- Oiled Meal and Edible Flour (Control) Order, 1967, Milk and Milk Products Order, 1992 etc.

food product contaminants, providing education and training in food safety, and issuing registrations and licenses at the state level. The FSSAI has five regional offices, which act as liaisons between the central and state offices. The organizational structures of the central and regional FSSAI offices and the state food safety commissioners are summarized in Annex 8.

Table 6-2 FSSAI administration

Administration	Office	Location	Role
FSSAI (Government of India)	Central	New Delhi	Framing regulations reflecting standards and guidelines, providing advice to governmental agencies, creating information networks across India, providing state level license, etc.
	Regional	New Delhi (North), Mumbai (West), Chennai (South), Kolkata (East), and Guwahati (North East)	Liaison between central and state offices, regulating import and export matters, consolidating data regarding food safety, etc.
State food safety commissioner's office (state governments)	Each state	Head office and other offices in each state	Enforcement of regulations, registration of FBOs, providing states level license, monitoring and inspecting FBOs and food products, collecting data on contaminants, providing education and training to FBOs etc.

Source: The study team

The FSSAI also implements awareness-raising activities for consumers. One of the activities is publishing a guide book called “The Pink Book” which explains how to have safe and nutritious food at home. In this book, it is recommended to buy not loose milk but packed milk. The book is provided to the consumers by the state food safety commissioner’s offices of each state and available online as well¹⁰⁹.



Figure 6-1 “Pink Book” Do and don’t buy of milk and milk products

Source: The Pink Book “Your guide for safe and nutritious food at home (page 2)” (FSSAI, 2017)

Some of the state food safety commissioner's offices the study team visited claimed that they lacked human resources and laboratories amid the large number of FBOs. The office in Bihar state has only 14 workers, while there were 24,336 registered FBOs in 2015-16. In the office in Madhya Pradesh state, more than a hundred required posts are vacant. Those offices are concerned that the inspection and monitoring activities required to ensure the food safety of consumers are insufficient. The numbers of issued licenses and registrations in 2015-16, FSSAI staffs, vacancies, and laboratories in the six visited states are summarized in Table 6-3.

Table 6-3 Number of issued licenses and registrations (2015-16), FSSAI staff, and laboratories

State	No. of licenses	No. of registrations	No. of FSSAI staff	No. of post vacancies	No. of laboratories
Assam	4,266	2,344	59	NA	1
Bihar	9,353	24,336	14	NA	1
Gujarat	52,522	144,222	1,407	NA	3
Karnataka	74,776	202,977	251	NA	5
Madhya Pradesh	38,549	389,885	53	115	1
Uttar Pradesh	50,284	400,777	758	56	6

Source: FSSAI Annual Report 2015-16 and interview with the food safety commissioner offices in each state

To manage the large number of FBOs, the FSSAI is currently developing and expanding its own online system, which enables it to register, license, and handle customer complaints on its website as well as on Social Network Service (SNS).



Figure 6-2 FSSAI's online systems and SNS

Source: FSSAI

6.2 Current Food Safety Management Situation and Issues for Dairy Products

6.2.1 Results of FSSAI's Survey (Milk Quality Survey)

The result of a milk quality survey conducted in 2011 by the FSSAI shows that 68% of the liquid milk sold in the market do not conform to the FSSAI's standards. According to an FSSAI official, the results of the survey do not reflect the actual situation because they were caused by counting milk samples that were mixed with skim milk power (SMP) as non-conforming milk¹¹⁰ even though milk with SMP does not

¹¹⁰ <http://foodsmart.fssai.gov.in/PinkBook.pdf>

¹¹⁰ 44.7% of the non-conformity samples (http://admin.indiaenvironmentportal.org.in/files/file/Flow_Chart%2802-01-

violate the rules, and it is a common practice in the dairy industry to adjust fat and SNF contents with SMP.

However, the study team observed that a certain percent of milk in the market, especially in unorganized sector, doesn't meet the FSSAI's standard. At the state level, the food safety commissioner's office regularly takes samples at markets for inspection. In addition, they sometimes conduct surveys on specific food items once a problem is suspected. Table 6-4 summarizes the results of those survey in three states. It shows that 87 samples among 493 samples (17.6%) were found as adulterated or substandard, and most of the violations were detected in the unorganized sector. It implies that the more the organized sector expand, the less violations of FSSAI's standard are detected. As the result, consumers can ensure safety and quality of milk and dairy products more.

Table 6-4 Results of sample survey in three states

State	Adulteration/Substandard		Samples	Year
	Organized sector	Unorganized sector		
Bihar	0	27	124	2017
Gujarat	0	50	324	2017
Madhya Pradesh	1	9	45	2016
Total	1	86	493	

Source: Based on the information collected from State Food Safety Commissioners

The FSSAI intends to conduct the milk survey regularly. The survey carried out in 2016 has not been published yet. According to FSSAI officials, they found that the survey result seemed not to reflect actual situation because of inappropriate sampling methods, and they have been still receiving feedback from the states. Since 2011, the FSSAI has been struggling to conduct the surveys properly. The FSSAI is expected to produce more precise report.

6.2.2 Food Safety Management of Different Food Business Operators

(1) Milk Unions

Milk unions are generally working hard to maintain quality and ensure the safety of their dairy products by taking practical measures. They educate farmers on how to collect quality milk and obtain certification under international standards such as the ISO for their plants to ensure quality and food safety. The general observations of the study team about the food safety management of the dairy unions are as follows:

1) At Village Level

- To educate farmers, milk unions provide training to them on several topics, such as basic dairy knowledge, breeding, and hygiene management. Hence, the trained farmers are knowledgeable about them and follow a certain hygienic standard. For example, most farmers use stainless steel milk cans,

as is recommended. These are sometimes provided by unions, as they are more hygienic than plastic ones. Some farmers are still using plastic cans or lidless buckets as well.

- At DCSs where milk unions collect raw milk, fat and SNF are mainly checked to determine the milk purchase price. At the same time, experienced DCS staff check the milk organoleptically. If there is any doubt about milk quality, they use a simple test kit to check for adulteration. This test kit is usually provided by the milk unions.

2) At Plant Level

- All the plants the study team visited have a FSSAI license and passed inspection for renewal. Many of them also follow international standards for food quality and safety management, such as ISO9001, ISO14000, HACCP, ISO22000, and FSSC22000. According to the NDDB, 170 out of the 250 milk union plants have ISO certification. Among 14 milk unions visited by the study team, ten milk unions have ISO22000 certificate.
- When dairy plants receive raw milk, all types of tests, such as organoleptic tests, detailed component/chemical tests, and micro-biological examinations, are conducted. In India, the HTST method is widely applied to pasteurize milk, and the shelf life of the pasteurized milk is about two days when stored below 8°C. Their products are also sampled and tested to confirm that they meet the FSSAI standards before dispatch from the plants. Table 6-5 summarizes the quality check system of the milk unions.

Table 6-5 Quality check of milk by milk unions

Particular	Kinds of tests and methods	Responsibility
Farmers to DCS (BMC)	<ul style="list-style-type: none"> • Fat & SNF by manual/automated machine • Adulteration by adulteration kit (in case of suspect) 	DCS staff
DCS (BMC) to Milk tanker	<ul style="list-style-type: none"> • Fat & SNF by lactometer • Temperature by thermometer • Adulteration by adulteration kit (in case of suspect) 	Driver of tanker (third party)
Milk tanker to Dairy plant	<ul style="list-style-type: none"> • Organoleptic tests by experienced staff • Temperature, fat, protein, moisture, brix, pH, salt, heavy metals, mycotoxin, antibiotics, pesticides, food additives, radionuclide etc. by chemical inspection equipment • E. coli, coliform, s. Aureus, yeast, listeria, salmonella, somatic cell, etc. By microbiological testing equipment 	Department of quality control
Dairy plant to retailers (Dispatch at plant)	<ul style="list-style-type: none"> • Same tests as above 	Department of quality control

Source: The study team

- The study team found that the Bangalore milk union and Saahaj Producer Company paid higher prices for raw milk with low bacteria counts. It has been rare to see a low bacteria count recognized as higher quality. In addition, the study team couldn't find any milk unions who examines contamination of antibiotics which is strictly controlled in developed countries.
- A department of quality control ensures their product quality at milk union. The department is

positioned under the milk union's top management such as the managing director and CEO and separated from the department of a plant operation (See Figure 6-3, organizational chart of Bhopal milk union as an example). Quality control managers at the plants are in a position to report directly to the managing director or CEO. This is important for securing and maintaining quality. If there is a problem regarding quality, they can report to their top management without interference from the person in charge of the plant.

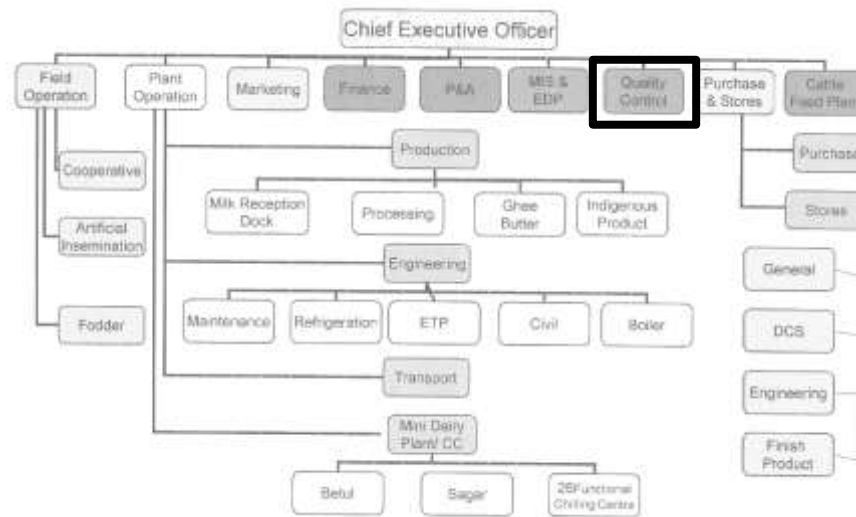


Figure 6-3 Organizational chart of Bhopal milk union

Source: Bhopal milk union

- According to the milk unions visited by the study team, there is no urgent need to renew the processing equipment in the plants from the viewpoint of food safety. Some dairy plants lack automated processing and cleaning systems, so that the milk unions must meet the hygiene and sanitization requirements manually. However, it is better to install automated processing and cleaning systems to ensure quality and a hygienic environment and to reduce accidents caused by human error in near future.
- Most of the plant buildings are old since they were mainly built in the 1970s to 1980s using old designs. Their usage of water, electricity, and fuel are thus inefficient according to the plant engineers. Hence, plant reconstruction is recommended to improve the efficiency of those resources.
- All milk unions have installed hygiene management systems, but they are not implemented at many dairy plants as strictly as they are in Japanese dairy plants. The study team observed the need for the following improvements:
 - Most of the plant workers wear masks, caps, gloves, and aprons, but not all do.
 - Most of the workers wear accessories such as bracelets and rings, which can cause contamination.
 - For insect deterrence, the dairy plant should be shielded from the outside, but few dairy plants were insect-free. The study team observed many plants with flies, and some had a gecko or cat,

not only at the milk reception area but also in the processing section.

- Only a few plants had full handwashing facilities with soap, dryers/paper towels, and disinfectant. In addition, few plants had soap for washing hands in the toilet.
- In Section 4.5.3, the study team pointed out improvement needs of plant management by applying 5S. From hygiene point of view, the study team recommends Japanese 7S method. This 7S has two more ‘S’, “Senjou (cleaning)” and “Sakkin (disinfection)”, in addition to the 5S. This method is widely implemented in Japan and applicable especially for the food related industry such as the dairy plant.

(2) Private Dairy Company

In terms of food safety management, the study team did not identify fundamental differences between milk unions and private dairy companies¹¹¹; Some have a sophisticated management system, and some don't. The private dairy companies which the study team visited also have FSSAI licenses and international standards such as ISO 22000 and FSSC 22000. The quality check system and tools are also the same with the unions (detailed information is summarized in Annex 10). They have a department of quality control as well to ensure the quality of products. Additionally, some private dairy companies provide different types of trainings to the farmers and the food safety is one of the topics.

(3) Unorganized Sector

In unorganized sector, the study team did not find any activities to ensure food safety. So-called milk-man or middleman who trade raw milk from farmers to consumers do not confirm the milk quality with scientific method, as far as the study team observed. They collect raw milk from farmers, mostly by themselves, and check the quality with its taste, smell and touching. They transport it with milk cans (stainless or plastic) at ambient temperature. The buyers (individual consumers, sweets producers, hotels and restaurants etc.) trust the middleman and check the quality only by organoleptic method¹¹².

(4) Comparisons of Food Safety Management

The differences in food safety management among the different actors in dairy sector are summarized in Table 6-6. While the organized sector (dairy cooperatives and private dairy companies) implement the different types of food safety measurements to secure the quality and follow the FSSAI standards, the unorganized sector (milk man/middleman) just transport the milk without any food safety measures. Hence, the more organized sector expands its milk collection network and volume, the more quality milk will be. Sole common aspect of all actors is that both stainless and plastic milk cans are used by the farmers although the stainless milk can is recommended from view point of hygiene management.

¹¹¹ The study team visited small and large private dairy companies including “Paras Dairy (Annual turn over 2,000 crore)”, “Namaste India (Annual turnover 1,000 crore)”, “Gyan (Annual turnover 650 crore)” etc.

¹¹² Based on the information collected by the study team. Further research is needed to confirm the detailed situation.

Table 6-6 Differences of food safety management of milk between organized and unorganized sector

	Organized sector		Unorganized sector
	Dairy unions	Private dairy companies	Milk man/Middle man
Material of milk can of farmers	Stainless or plastic	Stainless or plastic	Stainless or plastic
Milk temperature from village to plant/buyer	4-5 degrees (by insulated tanker)	4-5 degrees (by insulated tanker)	Ambient temperature
Quality test	Organoleptic tests, Chemical inspection, and Microbiological tests	Organoleptic tests, Chemical inspection, and Microbiological tests	Taste, smell & touching
Product	Pasteurized and packaged	Pasteurized and packaged	Loose milk
FSSAI license/registration	Obtained	Obtained	Not confirmed
ISO/HACCP	Partially certified (Plant)	Partially certified (Plant)	N/A
Training to farmers	Being implemented*	Being implemented**	Not confirmed

Note: * There are some exception (e.g. dairy cooperatives in Uttar Pradesh)

** Some provide while some don't

Source: Based on the information collected by the study team. It does not show the whole situation of India.

6.2.3 Cleaning Practice of Farmers

The NDDB is providing trainings to milk unions and farmers, along with educational material, in order to improve milk quality. The training concerns how to manage dairy animals properly, and the educational booklet shows how to treat and milk cows effectively, using easy-to-understand pictures (Figure 6-4).

Some farmers showed the study team their cleaning procedure for milking. The cleaning steps are as follows: 1) wash farmer's hands with water; 2) wash animal's udder with water; 3) dry the udder with a piece of cloth; 4) milk by hand; 5) and wash udder with water. The farmers did not exactly follow the instructions in the booklet. For example, sterilizing the teats with disinfectant after milking is also recommended, but this was rarely practiced.



Figure 6-4 Educational material of the NDDB

Source: NDDB

Table 6-7 shows the result of the socioeconomic situation survey on cleaning practices of DCS members, non-DCS members, and farmers in villages without DCS about how they follow milking

practices recommended by the NDDDB. The results show that about 90% of farmers said that they wash udders with clean water before milking, but about half or more than half of farmers said that they don't practice other cleaning practices recommended by the NDDDB, such as washing hands with soap before milking, wiping udders with a piece of clean cloth before milking, discarding the first one or two streams of milk, and sterilizing teats after milking.

Table 6-7 Cleaning practices of farmers

Q1. Do you usually wash your hands with soap before milking?	Yes	No
DCS Members	57%	43%
Non- DCS Members	51%	49%
Farmers in no-DCS villages	51%	49%
Q2. Do you usually wash udders with clean water before milking?	Yes	No
DCS Members	92%	8%
Non-DCS Members	89%	11%
Farmers in no-DCS villages	88%	12%
Q3. Do you usually wipe udder with a piece of clean cloth before milking?	Yes	No
DCS Members	51%	49%
Non-DCS Members	41%	59%
Farmers in no-DCS villages	29%	71%
Q4. Do you usually discard the first one or two streams of milk?	Yes	No
DCS Members	50%	50%
Non-DCS Members	52%	48%
Farmers in no-DCS villages	41%	59%
Q5. Do you sterilize teats after milking?	Yes	No
DCS Members	40%	60%
Non-DCS Members	40%	60%
Farmers in no-DCS villages	35%	65%

Source: The study team

The above results also show that farmers in the village with DCS practice hygienic milk procedures more than farmers in the village without DCS. Table 6-8 shows comparison between farmers in the village with DCS and without DCS. It indicates that farmers in the village with DCS practice wiping udders with a piece of clean cloth before milking and discarding the first one or two streams of milk more than farmers in the village without DCS.

However, practicing ratios for clean milk in the village with DCS is still about half except washing udders with clean water before milking, and there is not much difference between farmers in the village with DCS and without DCS. Therefore, more training in clean milk should be implemented to improve milk quality.

Table 6-8 Comparison on cleaning practices between village with DCS and without DCS

	% of farmer who answered “yes” in village with DCS	% of farmer who answered “yes” in village without DCS
Q1. Do you usually wash your hands with soap before milking?	55%	51%
Q2. Do you usually wash udders with clean water before milking?	91%	88%
Q3. Do you usually wipe udder with a piece of clean cloth before milking?	48%	29% *
Q4. Do you usually discard the first one or two streams of milk?	50%	41% *
Q5. Do you sterilize teats after milking?	40%	35%

Note: * shows statistical significance at 5% level

Source: The study team

6.3 Future Prospects

Because milk prices are mainly decided by fat and SNF content, both farmers and milk buyers pay little attention to other factors of milk quality, such as bacterium quantity. Farmers milk manually and keep the milk at ambient temperatures, which increases the number of bacteria. In addition, as mentioned above, farmers are not fully aware of the importance of hygienic milking.

The more farmers who join milk unions, the more farmers who will be educated regarding hygiene management. This would improve milk quality, including the number of bacteria. Realizing the significance of the bacteria count for the quality of milk and dairy products, the NDDB encourages cooling milk at village level. The NDDB and DoAHDF have been providing funds through the perspective plan and NDP to install BMCs at village level.

Moreover, if buyers focus on more than just fat and SNF, such as bacteria count, and are willing to pay higher prices for better quality, farmers will pay much more attention to milk quality as well. In Japan and Australia, for example, the buyers of raw milk generally pay premier price on the milk with low bacteria count or penalty price on high bacteria count¹¹³. The study team found that the Bangalore milk union and Saahaj producer company paid higher prices for raw milk with low bacteria counts. It has been rare to see a low bacteria count recognized as higher quality.

In addition, the study team couldn't find any milk processors who strictly check contamination of antibiotic in milk in India. In Japan, milk contaminated with antibiotics is rejected at the reception of plants. If the milk contaminated with antibiotics is already mixed with other milk, the farmers who provide the contaminated milk have to compensate all the milk. Antibiotics are commonly used for treatment of mastitis and other diseases. Therefore, farmers strictly record the provision of antibiotics and segregate milk produced by the treated animals. Those pricing and rejection mechanism needs to be installed to improve hygiene management in India in addition to training.

¹¹³ JICA Hokkaido International Center (Obihiro) presentation to Department of Animal Husbandry, Ministry of Agriculture, India and website of Agriculture & Livestock Industries Corporation (<http://lin.alic.go.jp/alic/month/fore/1996/nov/top-sd03.htm>)

6.4 Summary

- The FSSAI is the main body regulating food security in India, but it faces a lack of human resources. Their activities, such as sample surveys and inspections, are not being sufficiently conducted.
- Milk unions are managing quality and hygienic control at their plants, but this is not implemented strictly enough in most cases. There is still room for improvement using Japanese methodologies, such as 5S, 7S or Kaizen.
- Farmers and milk buyers are little aware of milk hygiene factors such as bacteria counts. This is probably because raw milk prices are mainly determined by fat and SNF content. To improve milk quality, a mechanism for checking bacteria counts for price determination needs to be introduced.
- The milk middlemen in the unorganized sector rarely implement hygiene management. Expanding milk unions would help improve hygiene management and milk quality.

Chapter 7 Issues and Countermeasures in the Dairy Sector

Based on the findings confirmed and acquired through the study, this chapter intends to summarize the current situation in India's dairy sector, role of dairy cooperatives, issues of dairy cooperatives, its countermeasures, and consideration of Japanese technologies and experience which may contribute to India's dairy sector.

7.1 Current Situation of Dairy Sector

As mentioned in Chapter 2, India needs to fulfill increasing domestic demand. However, since the majority of milk producers are small, marginal, and landless farmers who are scattered here and there. In order to fulfil the demand, milk production needs to be increased and milk distribution channel for surplus of milk needs to be expanded. Dairy cooperatives are expected to bring a comprehensive solution. In this section, the current situation of dairy sector including dairy cooperatives are summarized.

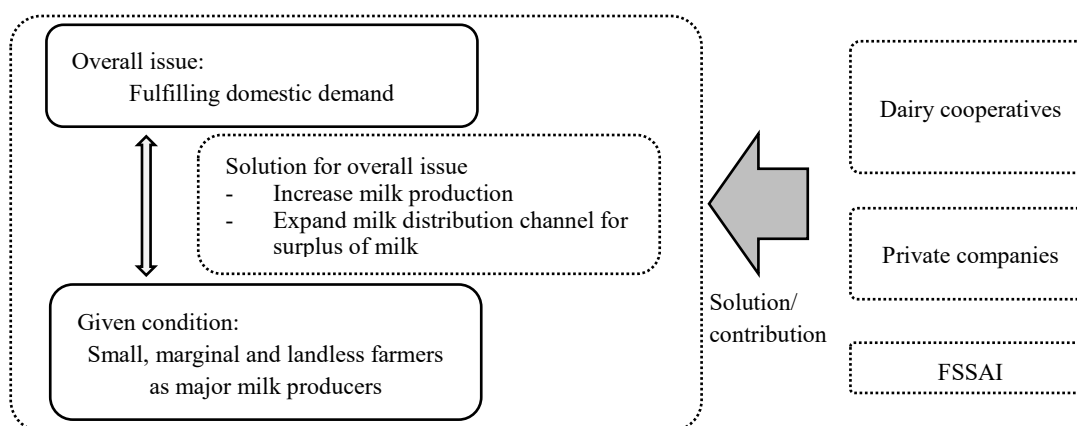


Figure 7-1 Outline of this section

7.1.1 Importance of Fulfilling Domestic Demand

As mentioned in Chapter 2, India is the world largest milk producing country and became an exporting country of dairy products in 2000s. However, the demand for milk and dairy products in India will increase dramatically because of increase in population and increase in per capita consumption led by urbanization and increasing income. To meet the increased demand, milk production in India has to be increased and marketing channel to distribute marketable surplus of milk to consumers need to be expand. Otherwise India may become an importing country of dairy products. It would destabilize the Indian domestic market and the social and economic stability of India's rural society, and would affect other dairy-importing countries that rely on international markets.

7.1.2 Small, Marginal, and Landless Farmers as Major Milk Producers

As mentioned Chapter 2, about 80% of milk is produced by small, marginal, and landless farmers, many of whom are under poverty line or vulnerable. The Government of India has clarified their vision such as “enabling sustainable growth of dairy sector by doubling of farmers’ income engaged in dairying,

thereby paving way for nutritional security, economic prosperity and livelihood support” as aiming doubling milk production by 2023-24¹¹⁵.

Balancing between the modernization and the protection of small-scale farmers’ socioeconomic welfare is important for stability of rural society. Dairy can contribute poverty alleviation as mentioned in Section 2.2.3. In addition, according to the socioeconomic situation survey, one can see that the livelihoods of farmers can be improved through the development of livestock activities, even if they have limited landholdings. The result of the socioeconomic situation survey was in line with the existing studies which concluded that dairy can contribute poverty alleviation.

Dairy development in India faces several challenges, such as i) low productivity, ii) low production volume per farmer, iii) limited market access, vi) the exclusion of landless farmers from dairy farming, and v) demand for quality improvement, as mentioned in Section 2.2.4. Small, marginal, and landless farmers tend to face higher transaction costs than large scale farmers¹¹⁶ so that solving those issues with small, marginal, and landless farmers is more difficult than one with large scale farmers.

To solve these problems, the public sector has been providing many kinds of support, including the projects and financial support mentioned in Section 2.3.4. To reach scattered large numbers of the farmers, dairy cooperative development is expected to bring comprehensive solutions that will help disseminate technologies and necessary services to farmers and secure milk farmers’ sales channels in India, where small-scale mixed farmers play a major role. The role of dairy cooperative is summarized in the next section.

7.1.3 Role of Dairy Cooperatives

The Government of India has been putting efforts on organizing the farmers into cooperatives at village, district, and state level duly supported by the NDDDB through program like the Operation Flood. According to the Government of India, it has resulted in increased productivity of milch animals and income of farmers in addition to making available quality milk to consumers at a reasonable price¹¹⁷.

GCMMF became the Indian largest dairy manufacturer with Rs. 38,000 crores of annual turnover and 3.6 million farmers as their members. The Anand model with three layers structure has been applied to almost all states in India. The positive impacts of dairy cooperatives could be observed through the field survey and the socioeconomic situation survey as summarized below.

(1) Positive Impacts of Dairy Cooperatives at Village Level

The positive impacts of dairy cooperatives at village level were confirmed through the field survey and the socioeconomic situation survey as mentioned in Chapter 5:

- The ratio of farmers who use AI services is significantly higher for farmers in villages with DCSs than farmers in villages without DCS; The percentages of farmers who use AI services in villages with DCS

¹¹⁵ DoAHDF (2017) NAP

¹¹⁶ FAO (2009) The state of food and agriculture

¹¹⁷ DoAHDF (2013) The national livestock policy 2013

are 73% for DCS members and 65% for non-members, while the percentage of farmers who use AI services in villages without DCSs is only 29%.

- There are significant differences in the composition of breeds between the states. For example, the percentages of high-yield breeds such as HF are quite high in Gujarat (63%) and South Karnataka (84%), but the percentages of low-yield breeds such as other indigenous breeds and indigenous non-descriptive are quite high in Assam (indigenous non-descriptive 68%) and North Karnataka (indigenous 61%).
- The percentage of farmers who provide cattle feed to their livestock every day is higher for DCS members (54%) than for non-members (38%). Moreover, it is significantly lower for farmers in villages without DCSs (6%) than for those in villages with DCSs.
- Except Uttar Pradesh where many private dairy companies work, the yield per livestock is higher where the ratios of high-yield breeds are higher and where AI services and cattle feed are more heavily utilized (for example, average yields per cow are 11.0 liters in Gujarat and 12.1 liters in South Karnataka while 3.6 liters in Assam and 4.3 liters in North Karnataka). The higher ratio of high-yield livestock may partly be caused by the high utilization of AI services. Moreover, the higher utilization of cattle feed is likely to increase the productivity of high-yield livestock.

Table 7-1 Average yield per cow per day, ratio of high-yield breed, AI usage, and cattle feed provision

Village, State	Average yields per cow per day (liters)	Ratio of high-yield breeds	AI usage	Cattle feed every day
Villages without DCSs	3.4	17%	29%	23%
Kanfalla Bhokatgao (Assam)	1.8	10%	13%	6%
Haravala (North Karnataka)	2.1	3%	23%	16%
Raipura (Uttar Pradesh)	8.1	87%	47%	47%
Villages with DCSs	7.6	65%	70%	45%
Gujarat	11.0	71%	91%	36%
Bihar	6.6	86%	64%	57%
Assam	3.6	43%	55%	24%
South Karnataka	12.1	97%	100%	37%
North Karnataka	4.3	39%	61%	41%
Uttar Pradesh	7.4	75%	58%	43%
Total	7.0	55%	62%	37%

Note: Ratio of high-yield breeds is a summary of all breeds except "other indigenous" and "indigenous ND" in Table 5-11.

Lowest three categories are highlighted by blue while highest three categories are highlighted by pink.

Source: Socioeconomic situation survey

- The per-household milk production volumes of villages without DCSs (508 liters per household in Assam and 358 liters per household in North Karnataka), except villages in Uttar Pradesh (2,133 liters per household), are much lower than those of villages with DCSs (2,449 liters per household), even though the number of livestock holdings is not significantly different from those of other villages.
- The ratios of milk sales volumes to production volumes in villages with DCSs (83%) are much higher than in other villages (39% in Assam and 46% in North Karnataka). This indicates higher productivity

and more active milk sales activities among farmers in villages with DCSs, probably due to the services and other benefits provided by DCSs and milk unions.

In the area where dairy cooperatives are functional, the dairy cooperatives are expected to purchase all milk brought from members at stable price. In the situation, the farmers can have incentive to invest on dairy activities. The dairy cooperatives are also expected to provide necessary technical assistants and inputs such as AI services, cattle feed with affordable price and others, so that farmers can increase milk productivity and milk production volume as resulting that farmers can increase income through dairy activities.

Regarding the stability of purchasing price, the study team observed that the purchasing prices and volumes of the dairy cooperatives is more stable than one of private dairy companies in general. In addition, the study team observed that the dairy cooperatives generate upward pressure on milk purchasing price and downward pressure on milk retail price in the particular area where the dairy cooperative is dominant. Through the field survey, the study team confirmed that after Amul entered to Uttar Pradesh, Amul increased purchasing price of milk and other milk processors followed it. In case of Assam, Amul determined milk retail price lower than existing products. The lower retail pricing became downward pressure on milk retail price there.

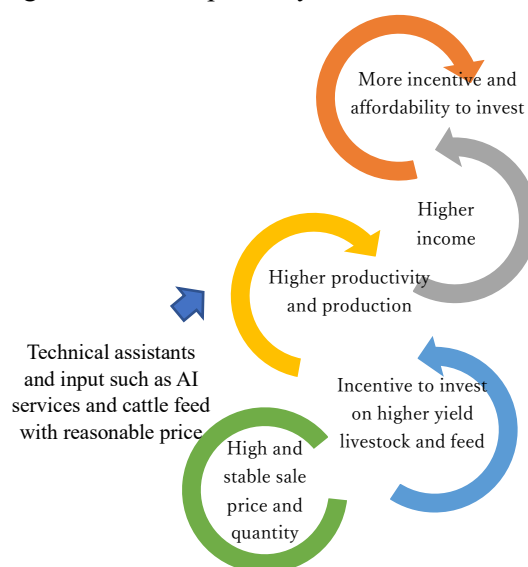


Figure 7-2 Virtuous cycle at village level

(2) Virtuous Cycle at Dairy Cooperative Level

As mentioned in Section 4.3.2, the scale of procurement and production volume influence the financial condition of the milk unions: milk unions which have smaller procurement volumes tend to fall into accumulated loss. Therefore, it is important for dairy cooperatives to increase procurement and production volume at certain level. According to the result of the socioeconomic situation survey, the reason why the farmers sell their milk to cooperatives are stable and high purchasing prices, provision of bonus, followed by all amount purchases, near collection points, and provision of veterinary services. To increase milk procurement volume, dairy cooperatives need to provide attractive condition to farmers, especially if there are competition with middlemen of unorganized sector and private dairy companies. Once the dairy cooperatives can get benefit, the large portion of the profits of milk unions are reimbursed to cooperative members in the form of bonus and various services and welfare funds which can attract cooperative members. So that the virtuous cycle at dairy cooperative level can also be observed.

The dairy cooperatives are expected to procure milk from all farmers in their coverage area. The private dairy companies usually focus on their profitability and efficiency to procure milk so that they tend

to procure milk only near cities where they set up their plant¹¹⁸. Inclusion of dairy farmers in remote area is one of the social significance of the dairy cooperatives. Once the dairy cooperative can expand their business, they can extend milk procurement area.

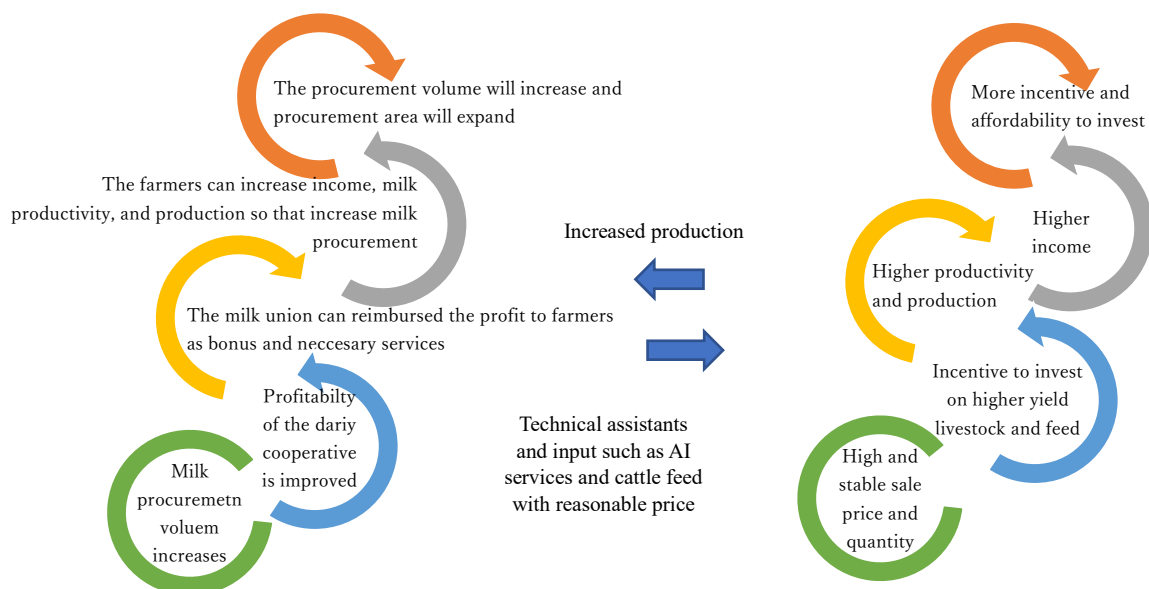


Figure 7-3 Virtuous cycle at dairy cooperative and village level

The dairy cooperatives have established milk processing facility and have been expanding cold chain from farmers to consumers. According to the FSSAI, violation of milk samples from organized sector have been rarely detected.

7.1.4 Private Dairy Companies

Some say that supporting dairy cooperative can hinder business of private dairy companies while others say that supporting dairy cooperatives will not hinder business of private dairy companies because the coverage of organized sector is limited so that private companies can expand their business to the area without competing with subsidized cooperatives. The answer can be both yes and no. In Gujarat where the market share of organized sector is 90% and market share of dairy cooperatives in the organized sector is 90%, none of major private dairy companies can survive or enter the market. However, private dairy companies whom the study team had interviews in Bihar where the market share of organized sector is 50 to 60% and the market share of cooperatives in the organized sector is 40 to 75%, the private dairy companies said that they can find areas where the dairy cooperatives don't exist and easily expand their business. In such case, supporting dairy cooperative doesn't hinder the business of the private dairy companies much. However, it is observed that some private companies complained that governments also

¹¹⁸ The study team confirmed that some villages such as Sajahapur village located 50km away from Patna city, Bihar and Chakhaji village located 10km away from Samastipur city, Bihar, none of private dairy companies and even middlemen come to buy milk because the location is not close to city or milk production volume in the village is low according to villagers. On the other hand, private dairy companies mentioned that they identify potential villages and install chillers. Similar situation was confirmed during discussion with Lucknow milk union, Uttar Pradesh.

need to provide any support to not only dairy cooperatives but private dairy companies.

In case of Karnataka where the state government provide Rs. 5/L of subsidy to farmers who sell their milk to dairy cooperatives, such support heavily affects to private dairy companies. According to the member of the Karnataka Dairy Association, many private dairy companies went out of business because of this distorted intervention by the state government. It is said that healthy competition can bring benefit to both producers and consumers, and healthy competition can improve dairy cooperative themselves. The government needs to try to establish such market environment.

In summary, under certain conditions where dairy farmers have less options except unorganized entities, supporting cooperatives can be justified as a measure to improve market access of dairy farmers as well as make market function by generating competition. Once the market functions, as seen in the field study in Uttar Pradesh, it is observed that private dairy companies are also able to play the same role for modernization of dairy production and provision of welfare services as cooperatives. However, direct subsidies for supporting procurement price distort market and exclude private dairy companies. This side effect should be avoided in order to achieve NAP, which requires large investment in the private sector.

7.2 Issues of Dairy Cooperatives

As mentioned in the previous section, the farmers can get benefit through dairy activities and increase milk production in the areas where dairy cooperatives are functional. However, the study team find the virtuous cycle doesn't appear in some areas. The issues identified by the study team are summarized below.

7.2.1 Poor Management and Financial Situation of Some Dairy Cooperatives

Although the NDDDB has been providing financial and technical assistance and the DoAHDF has been providing financial support to struggling dairy cooperatives that have accumulated cash losses, some cooperatives are still struggling. Among six states which the study team visited, the study team could observe the virtuous cycle at dairy cooperatives in Gujarat and Karnataka, but not at dairy cooperatives in Uttar Pradesh and Assam. The below table summarizes the overall performance and potential factors which may affect their overall performance of dairy cooperatives in the six states. "Overall performances" are ranked based on the market share of dairy cooperatives in all marketed milk; "◎", "○", "△" and "×" means more than half, 25 to 50%, 10 to 25 %, and less than 10% of milk are sold by dairy cooperatives respectively. In the column of "milk productivity", "○" means that cow's or buffalo's milk yield per animal is more than India's average while "×" means milk yield per animal of both cow and buffalo are less than India's average. "Market competitiveness" are ranked based on the mark share of cooperative in the organized sector in each state; "◎", "○", "△" and "×" means more than half, 25 to 50%, 10 to 25 %, and less than 10% of milk are sold by dairy cooperatives in organized sector. Consumer preference and state government intervention are described based on the interviews with dairy cooperatives and other stakeholders. As pointed out in Section 4.10.3, milk productivity, consumer preference, market

competitiveness, state government support intervention may affect dairy cooperative's overall performance.

Table 7-2 Overall performance and factors of dairy cooperatives in the studied six states.

	Overall performance	Milk productivity	Consumer preference	Market competitiveness	State government intervention
Gujarat	⊙	○	Consumers are familiar with pouch milk	⊙ Less competitors	
Bihar	○	○		○	The state government has been supporting necessary investment for dairy cooperatives
Assam	× Under restructuring	×	Consumers don't consume milk much and prefer loose milk rather than pouch milk	⊙ Less competitors	Dairy cooperatives in Assam used to be influenced by the state government and political situation (But now the NDDB took a charge of management and has been restructuring the cooperatives)
Karnataka	○	○	Consumers are familiar with pouch milk	○	The state government has been supporting dairy cooperatives. The state government provides Rs.5/L incentive when farmers sell their milk to dairy cooperatives.
Madhya Pradesh	△	○	Consumers prefer loose milk rather than pouch milk in some areas in Madhya Pradesh	△	There is a tendency of being influenced by political situation
Uttar Pradesh	× Under restructuring	×	Consumers are familiar with pouch milk	× High competition	There is a tendency of being influenced by political situation

Note: Negative factors are highlighted by blue.

Source: The study team

The reasons why the performance of the dairy cooperatives in Uttar Pradesh is not good can be explained by the negative impact of high market competitiveness, neglected state government support for long time, and state government disruption. On the other hand, the low performance of dairy cooperatives in Assam can be explained by the negative impact of low milk productivity, low consumer preference on milk, and state government disruption. The detail situation of Uttar Pradesh and Assam are described in later part of this section. The observation of the study team is summarized in this section.

(1) Nature of Dairy Cooperatives: High Cost of Management

As a nature of dairy cooperatives, it is more difficult for dairy cooperatives to get profit through dairy business as compared with private dairy companies because the dairy cooperatives are expected

- to collect milk from all farmers in their area,
- to procure all milk brought by their member,
- to purchase milk at stable and higher price,
- to reimburse their profit to cooperative members in the form of bonuses, various services, and welfare funds, and

- to provide necessary services such as AI services, veterinary services, and cattle feed and supplement at affordable price.

The nature of dairy cooperatives is different from many private dairy companies who procure milk in the area where they can efficiently procure milk at fluctuated prices and amount reflecting to market demand. Actually about 25% (26 out of 102) of cooperative made loss in 2015-16.

(2) Vicious Cycle of Dairy Cooperatives

As mentioned in Section 4.3.1, PCF (Uttar Pradesh state federation) is restructuring its operations; 700 employees (about one-third of the staff) chose early retirement. In the situation, the dairy cooperatives can neither pay stable and higher price nor provide necessary services to the farmers. As the result, the farmers sell their milk to other buyers who pay more or have collection points nearby the farmers, and the dairy cooperatives have been decreasing the procurement volume. In those area, the study team observed a vicious cycle. PCF had been received financial assistant to install cold chain such as BMCs and milk analyzers. However, the study team observed that those facility is not utilized as the capacity: only small amount of milk is procured and chilled in BMC in some villages. It implies that just investing facility doesn't bring the virtuous cycle if competition in the market is already intense, and the good business management would be crucial for success of dairy cooperative system.



Figure 7-4 Vicious cycle at dairy cooperative level

(3) Rehabilitation of Dairy Cooperatives

As mentioned Chapter 3, WAMUL (dairy cooperative in Assam) are being revitalized with the support of the NDDB since 2008. According to WAMUL, the milk procurement volume was only 4,000 L/day in 2008 when the NDDB took over the management. The NDDB team had successfully made positive profit in 2013 and the milk procurement volume was increased to 26 lakh L/day in 2017. In a similar way, the NDDB has been supporting the East Assam Milk Producers' Cooperative Union (EAMUL), the Cachar and Karimganj District Milk Producers Cooperative Society Limited (CAMUL) and the Jharkhand Milk Federation (JMF).

7.2.2 Low Coverage Area

The areas where the dairy cooperatives are functional well, the market share of organized institutions as well as market share of cooperatives in the organized sector are high: 90% and 80% in Gujarat, and 65% and 50% in South Karnataka respectively. On the other hand, market share of organized sector in

Assam, Madhya Pradesh, and Uttar Pradesh are still low: 4%, 25%, and 25% to 35% respectively as summarized in Table 4-17. The share of cooperatives in the organized sector differ from state to state. One in Assam is 100% while ones in Madhya Pradesh and Uttar Pradesh are 30% and 1 to 10% respectively.

7.2.3 Increasing Competition

Competition in the market seems to increase as more private dairy companies enter the market. In addition, competition among dairy cooperatives has been increasing. Amul has become a threat to local dairy cooperatives in some states, such as Uttar Pradesh and Assam. Generally speaking, proper competition does good for efficient allocation of resources. However, some milk unions may fail and dairy farmers in the states may lose market access as a result of competition.

7.2.4 Poor Plant Management

Although many of the dairy plants of dairy cooperatives are certified by ISO and HACCP, the study team observed large room to improve their hygiene management system. For example, their hygiene management system at their plant is not thorough, as mentioned in Section 6.2.2: some plant workers don't properly wear masks, caps, gloves, and aprons; few dairy plants were insect-free, and the study team observed many plants with flies, and some had a gecko or cat, not only at the milk reception area but also in the processing section.

In addition, according to Japanese dairy machinery companies interviewed in this survey, the major kinds of dairy machinery can be used for more than 20 years if properly maintained. However, according to the NDDDB, it is assumed that major dairy machineries can be used only ten to 15 years in India. Those management practices also need to be improved.

7.2.5 Weak Milk Quality Check System

Although the organized sector in India has introduced scientific analyses for milk quality such as for fat and SNF content in contrast to the unorganized sector, and few violations on FSSAI standard are observed in distribution channel of the organized sector, milk quality check system is also not sufficient comparing to international standard such as Japan. For example, contamination of antibiotic in milk is prohibited and controlled in Japan. However, the study team could not find any dairy cooperatives which inspect contamination of antibiotics at any level of milk value chain in India. The bacteria count which affects shelf life of milk is rarely measured at village level. The bacteria counts are generally not reflected in milk prices in India. As a result, awareness of milk hygiene, such as bacteria counts, is low among farmers. To increase the shelf life of milk, decreasing the bacteria counts of raw milk is very important. That can be done by reducing the bacteria count during milking and transport, as well as minimizing the time before the milk is cooled. To that end, the DoAHDF has been implementing SIQ-CMP, and the NDDDB has been raising awareness among farmers, such as by recommending the sterilization of udders, but few farmers are complying. The NAP claims that the Government of India aims to export dairy products, but there is room

for improvement in meeting international standards in many milk unions.

7.3 Countermeasures

The dairy sector in India has mainly two roles and mandates; to fulfill increasing domestic demand, and to sustain livelihood of small scale farmers. The issues that the dairy sector faces include i) low productivity, ii) low production volume per farmer, iii) limited market access, vi) the exclusion of landless farmers from dairy farming, and v) demand for quality improvement. It is observed in the study that the dairy cooperatives can provide solutions for those issues in the dairy sector if they can function well. Once the virtuous cycle at dairy cooperative and village level can be established as illustrated in Figure 7-3, the dairy cooperative can:

- Increase productivity/production volume per farmer by providing various services
- Expand their procurement area and provide market access to small farmers
- Improve competitiveness in markets
- Enhance food safety in the country by improving milk quality check systems

However, as stated in the previous sections, there are also challenges for dairy cooperatives to play their important roles in the sector, namely, i) poor management and financial status, ii) low coverage area, iii) increasing competition, vi) poor plant management, and v) weak milk quality check system.

As countermeasures to these challenges, comprehensive and strategical establishment of supply chains is required and proposed in this section. The issues, challenges of the dairy sector and dairy cooperatives in India, and countermeasures are summarized in Figure 7-5.

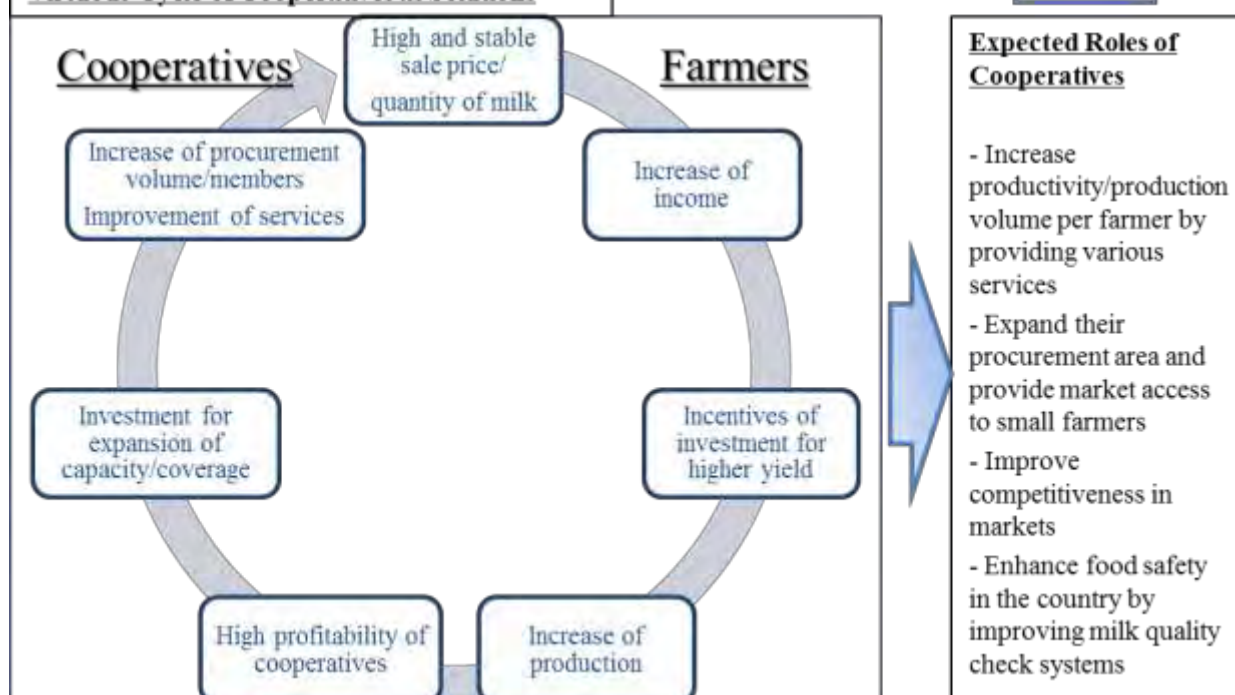
Overall roles and Mandates of Dairy Sector in India

Fulfill increasing domestic demand
Sustain livelihood of small scale farmers

Issues of Dairy Sector in India

- i) Low productivity
- ii) Low production volume per farmer
- iii) Limited market access
- vi) The exclusion of landless farmers from dairy farming
- v) Demand for quality improvement

Virtuous Cycle of Cooperatives as Solutions



Challenges of Dairy Cooperatives in India

- i) Poor Management and Financial Status
- ii) Low Coverage Area
- iii) Increasing Competition
- vi) Poor Plant Management
- v) Weak Milk Quality Check System

Countermeasures: Comprehensive and Strategic Establishment of Supply Chains

- (1) Comprehensive Investment for Seamless Supply Chains (i, ii)
- (2) Capacity Development for Strategic Business Management (iii, vi)
- (3) Capacity Development for Hygiene Management (v)

Figure 7-5 Summary of challenges and countermeasures

7.3.1 Comprehensive and Strategic Establishment of Supply Chains through Dairy Cooperatives

(1) Comprehensive Investment for Establishment of Seamless Supply Chain

As explained in section 4.5.2, expansion of capacity of plant, expansion of procurement volume, and expansion of market should proceed hand in hand, since these factors are interrelated to one another. Expansion of procurement requires increase of productivity and/or expansion of procurement network. Expansion of market needs diversification of products. Therefore, comprehensive and strategic investment is required for seamless supply chains from farmers to consumers.

Establishment of seamless supply chains facilitates cooperatives to shift from vicious circle to virtuous circle and realizes better profitability as well as larger coverage area. “Seamless” means that cooperatives need to be prepared for large amount of investment rather than small and gradual investment. However, reality is that only top ten dairy cooperative can afford to receive loan from commercial banks. Concessional loan available for cooperatives is indispensable for establishment of seamless supply chains.

(2) Capacity Development for Strategic Business Management

It is proved that only providing financial supports could not bring the virtuous cycle to cooperatives. According to the NDDDB, the NDDDB’s repayment rate in dairy cooperative sector is almost 100%. But there was a case that Madhya Pradesh state government agreed for lump sum repayment for bad loans of dairy cooperatives in the state. Management skills and human resource development are also required at the same time. Furthermore, as mentioned in the case of Uttar Pradesh in section 4.7.5, installment of equipment does not necessarily bring improvement of profitability of a cooperative. Strategic approach should be considered in order to materialize viable investment.

As mentioned above, about 25% of cooperative made loss in 2015-16. Those cooperatives may need capacity development for management skills prior to or in time of investment. Capacity development for strategic business management includes basic business management such as proper documentation, basic finance skill, proper decision-making system, effective and efficient production system, market analysis and strategic thinking. In case that there are competitors, the dairy cooperatives need to have analytical skill to consider their market strategy to establish better procurement and marketing system. In order to procure enough milk, confidence between dairy cooperatives and farmers need to be strengthened. For the purpose, for example, stable and high procurement price, accurate and on-time payment to farmers, provision of necessary services need to be provided to farmers. Once the dairy cooperatives procure enough milk, they need to process and sell their products. To obtain certain market share, marketing skill is required. Necessity of the technical training depends on the management level of the dairy cooperatives as well as market situation. The dairy cooperatives with low management skills as well as the dairy cooperatives in competitive market are in more need of capacity development in these fields.

(3) Capacity Development for Hygiene Management

Considering increasing demand for safe food in India, dairy cooperatives are in a good position

to contribute to supplying more hygienic milk and have much potential to enhance of food safety in the country. The NDDDB has been providing training on hygiene management and plant management including 5S and Kaizen, but some dairy cooperatives mentioned they need profound training. Moreover, as mentioned in Section 6.2.2, training on 7S is recommended for hygiene management.

In addition to training, there should be a system which facilitates production of hygienic milk. For the purpose, introducing the pricing system for incentivizing of producing hygienic milk based on the bacteria count can be encouraged. Exposure visits to developed countries will also bring good learning opportunity to dairy cooperatives and farmers.

7.3.2 Acceleration of Investment through Private Sector

Roles of private dairy companies also should be considered for the issues in the dairy sector. Private dairy companies are profit-oriented more than dairy cooperatives, but private dairy companies have about half share of organized sector and are able to play an important role for improvement of livelihood of farmers under appropriate competitive environment. The study team observed that some private dairy companies provide similar services to dairy farmers. In this regard, public sector can encourage private dairy companies to provide necessary services to farmers or expand their procurement area to remote area.

In addition, although private dairy companies have been expanding, their growth rate has been decreasing, as mentioned in Section 2.4.2. To achieve the NAP, their growth rate needs to increase. In this regard, the public sector may be required to create enabling environment to foster and accelerate their dairy business, in addition to supporting dairy cooperatives.

7.4 Consideration of Japanese Technologies and Experience

7.4.1 Japanese Experience in Dairy Development

The situation of Japan's dairy sector in the 1960s was similar to the current situation in India's dairy sector in terms of its i) large percentage of small holders, ii) lack of cold chains, iii) family-centered dairy activities, and iv) intensive rearing system. Details on the similarities are summarized below.

(1) Large Percentage of Small Holders

In the 1960s, Japanese dairy farmers had an average of 3.4 heads of cattle, and they usually worked in both the dairy and agriculture sectors. As Figure 7-6 shows, within the past five decades, Japan's major dairy producers went from being small holders to medium holders.

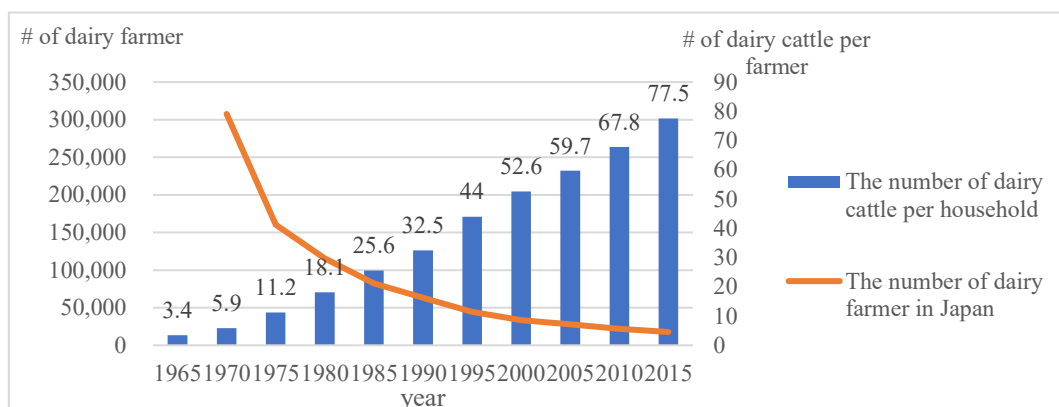


Figure 7-6 Number of dairy animals per household and number of dairy farmers in Japan

Source: Japan Dairy Council (2015) Japan Dairy Farming

(2) Lack of Cold Chains¹¹⁹

In the 1960s, cold chains had not yet been developed in Japan, and high bacteria content was an issue. Quality testing and the regulation of bacteria levels were introduced to improve milk quality by reducing bacteria content. At the same time, the government provided support for BMC installation. As a result, the number of BMCs increased from 55 in 1969 to 7,880 by 1974.

As of now, Japan has developed sophisticated cold chain from farmers to consumers as well as quality check system to ensure the quality of milk.

(3) Dairy Activities as Family Business

Although Japanese dairy farmers increased the number of dairy animals per household, they still rely on family members for their dairy activities. About 80% of dairy farmers in Japan manage their dairy business using only family members as a workforce.

(4) Intensive Rearing System

Japanese dairy farmers usually rear their dairy animals on small land areas and provide intensive care to the animals. By contrast, dairy farmers in the United States and New Zealand usually use a grazing system on large tracts of land. The intensive care applied in Japan includes careful reproductive activities with pregnancy tests instead of just giving hormones to synchronize estrous cycles, as is typically done on dairy farms in the United States and New Zealand. Because of this intensive rearing system, Japan has more well-developed techniques for pregnancy tests and related tasks than other developed countries have.

¹¹⁹ Milk Science Vol. 55, No. 4, 2007 “Historical review of the quality control of raw milk in Japan” by Mr. Ikichi Arai.

7.4.2 Well-established Dairy Sector in Japan

As mentioned above, Japan has developed their dairy sector since 1960s. The yield of dairy animals is now top level in the world, and quality check and hygiene management system and technologies for environment protection have been developed.

(1) High Yield of Dairy Animals

The milk productivity (milk per animal per year) in Japan is one of the highest among major milk producing countries and areas as summarized in Table 7-3. Because of genetic improvement system, feed production, and animal health, the productivity in Japan has been improved.

Table 7-3 Comparison among India, Japan and other major milk producing countries and areas

	India	Japan	Tokachi area in Japan	Europe	United State	New Zealand
Dairy farmers (thousand)	80,000	16.3	1.2	1,480	64	12
Milk production (thousand L)	145,680	7,410	1,161	158,870	93,130	20,900
Milking animal (thousand)	136,010	850	125	23,510	9,760	5,000
Milk per animal per year (kg)	1,446	8,209	9,321	6,776	10,150	4,119

Note: Tokachi is located in Hokkaido region, the northern area in Japan, and is famous for dairy and other agriculture.

Source: JICA Obihiro mission

(2) Well-developed Quality Check and Hygiene Management System from Farmers to Consumers

To ensure milk quality, Japan has been developed quality check and hygiene management system from farmers to consumers. The quality control and tracing are started at farmer level. Cows are usually all tagged and recorded health and treatment records. Farmers apply hygiene management such as cleaning of udders before milking and cooling milk at farmer level after milking. The milk quality checks are continued at loading to tankers, reception at plants, processing, storage, and dispatching to retailers. The below figure summarizes the milk quality test and checks at various stage in Japan.

In case of Japan, the basic milk price is determined by the negotiation between regional dairy cooperatives and private processors. Based on the basic milk price, the actual price to farmers are adjusted by based on the fat and SNF contents. If milk doesn't fulfill the standard set by the Japanese government, such as appropriate color, no irregular characteristics of organoleptic test, appropriate gravity, negative of alcohol test with 70% alcohol, appropriate fat contents (more than 2.8%), and less than 0.16% of lactic acid, the milk is graded as the second grade and the price becomes about half of the first graded milk¹²⁰. The result of alcohol test is affected by the number of bacteria caused by poor temperature management, insufficient cleaning of milk containers, and infection of mastitis. Therefore, Japanese dairy farmers put a lot of effort to improve those hygiene management.

Regarding contaminations of antibiotics, contaminated milk with antibiotics is rejected at the reception of plants. If the contaminated milk with antibiotics is already mixed with other milk, the farmers

¹²⁰ Okayama prefecture livestock association (web) <http://okayama.lin.gr.jp/tikusandayori/s3607/tks04.pdf>

who provide the contaminated milk have to compensate all the milk. Antibiotics are commonly used for treatment of mastitis and other diseases. Therefore, farmers strictly record the provision of antibiotics and segregate milk produced by the treated animals. Those pricing and rejection mechanism needs to be installed to improve hygiene management.

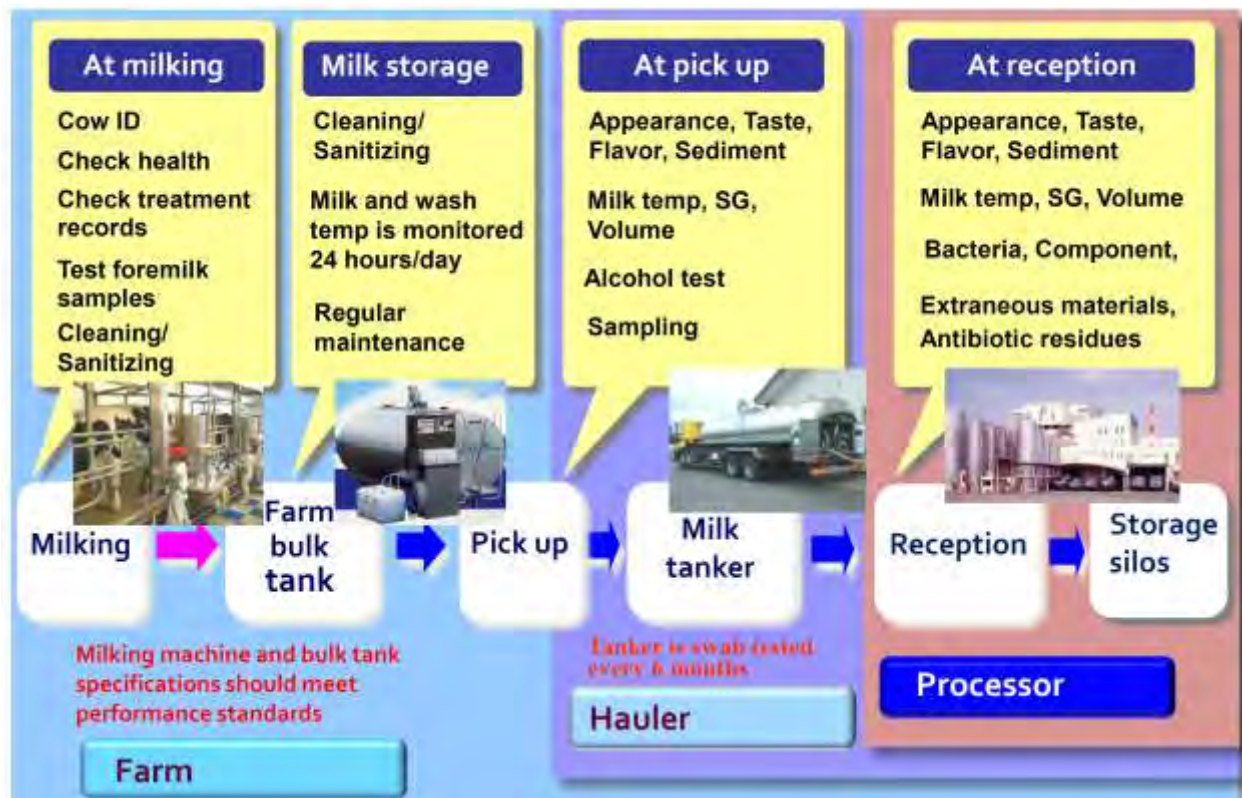


Figure 7-7 The milk quality test and checks at various stage

Source: JICA Obihiro mission

(3) 5S, 7S and Kaizen Methods

“5S” and “Kaizen” are one of the Japanese management tools originally used in industrial sector like Toyota and other companies with aims of organizing a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order. The method is used by wide range of manufacturers to improve efficiency of their productions or services as well as cost and quality management. Moreover, even medical institutes such as hospitals and clinics also apply the method to reduce medical mishaps and human error as well as improve efficiency by reducing searching time and dead stocks. 5S and Kaizen approach can contribute to dairy cooperatives for their effective and safety plant management.

In addition to 5S, as mentioned in Section 6.2.2, 7S which is widely applied by food processors in Japan can be also introduced to dairy cooperatives in India to improve their food safety management. 7S includes two more “S”, “Senjou (cleaning)” and “Sakkin (disinfection)” in addition to 5S.

(4) Technologies for Environment Protection

Sometimes smell and excrementitious matter caused by livestock rearing have become issues between livestock farmers and other residence in Japan. The environment requirement is generally strict in Japan so that Japanese livestock sector has been developed technologies for environment protection. Biogas plants is one of those technologies. For example, Tokachi city in Hokkaido, northern part of Japan where dairy sector is well established, has been promoting Biomass industrial city initiative, and currently more than 29 biogas plants are operating.

7.4.3 Japanese Manufacturers

There are many Japanese companies which supply necessary machineries and equipment of dairy sector in Japan. Those Japanese machineries and equipment can contribute cost efficiency, hygiene improvement, and value addition in India's dairy sector. IDMC, a subsidiary of the NDDB, has been seeking to collaborate with those Japanese companies. In addition, following Japanese companies have potentials to contribute for India's dairy sector as summarized in Table 7-4.

Table 7-4 Major manufacturers and importers of dairy sector in Japan

Equipment	Name of company	Solution	Market opportunities	Major competitors in India
BMC	Orion Machinery Co., Ltd.	Cleaning technology and recording thermometer system	Competition in India's BMC market has been intensified, but the market seems to keep expanding. Therefore, if Japanese companies can provide quality and affordable products, they may have market opportunity.	IDMC (60-70% share)
Ice battery system	Innovation thru Energy Co., Ltd.	Establishment of cold chain with ice battery	Establishment of cold chain with low cost in India's dairy sector is needed. The competitors of ice battery in India's dairy sector have not been identified during the field study. Therefore, if the system is economically viable, they would have huge market opportunity ¹²¹ .	-
Milk analyzer	Miyachi Corporation	Technology to distinguish between cow and buffalo milk	Detail needs to be confirmed	
Homogenizer	Sanwa Engineering Ltd.	Quality material, energy saving technology, automated adjustable piston, aseptic with steam barrier	Tetra Pak and GEA, as foreign manufacturers, have been providing quality and affordable products. In addition, they can provide a series of machineries for milk processing plan and have dominant share in India	GEA Tetra Pak India IDMC
Pasteurizer	Iwai Kikai Kogyo Co., Ltd.	High standard technology (energy efficiency, plates with less burn flow pas), easy change gasket	Tetra Pak and GEA, as foreign manufacturers, have been providing quality and affordable products. In addition, they can provide a series of machineries for milk processing plant and have dominant share in India	IDMC GEA Tetra Pak India
Packing machine	Shikoku Kakoki Co., Ltd.	Aseptic carton box packaging	Tetra Pak has dominant share of UHT milk. But UHT milk market is expected to expand. Therefore, if affordable and quality aseptic packing machineries can be provided, it may have market opportunities.	Tetra Pak India (90% share of UHT milk) R.M.C. Packaging System Pvt. Ltd (60% share of pouch milk)
Refrigeration system with Ice Silo	Mayekawa Manufacturing Co., Ltd.	Energy saving and good maintenance system	The needs for chilling facility in India are large, and Japanese technologies on the area are admired.	

Source: The study team

Most of the major machines used at dairy plants in India, such as pasteurizers and homogenizers, are made by Indian or European companies such as IDMC, Tetra Pak, and GEA as summarized in Section 4.5. Although Japanese manufacturer don't have much presence in those machineries in India, exception is Japan's Mayekawa Manufacturing Company, which has a 60% share of the sales of large-scale screw compressors in India. A large scale screw compressor made by Mayekawa Manufacturing Company has

¹²¹ The company completed a feasibility study in Uttar Pradesh during 2014 to 2015 supported by JICA

been installed at the plant of Banaskantha milk union in Gujarat. The product is popular because of good quality with price competitiveness, high durability and good maintenance services. Orion Machinery Co., Ltd. has about 80% share of BMC in Japan, and has good auto cleaning technology for BMC and recording thermometer system which is not yet installed in India. According to the principal secretary of Uttar Pradesh, Miyachi Corporation developed a milk analyzer which can differentiate between cow and buffalo milk. Those Japanese technologies may contribute cost efficiency, hygiene improvement, and value addition in India's dairy sector, if introduced.

7.4.3 Proposed Application of Japanese Technologies and Systems in India's Dairy Sector

As mentioned above, there are many areas where Japan can contribute to India's dairy sector. Among them, the following technologies and systems seem relevant to the challenges of the sector and dairy cooperatives.

(1) Introduction of Quality Check and Hygiene Management System

In order to improve hygiene of milk and dairy products, it is important to provide farmers with incentives to produce hygienic milk. For that purpose, the quality check and hygiene management system from farmers to consumers as well as pricing and rejection system based on bacteria count and contamination of antibiotics can be considered to introduce to India. Various measures and equipment for quality inspection at different stage of supply chains can be also utilized for improvement of hygiene of milk.

(2) Introduction of 5S, 7S and Kaizen Approach

As mentioned in Section 4.5.3, not only installing machineries but also improvement of plant management seems necessary. The NDDDB has provided training to the milk unions in Japanese management methods such as 5S and Kaizen since the 1990s. The study team found that these methods are used by the unions. However, they are not implemented properly in some of the visited plants, and there is still room for improvement. Moreover, some milk unions asked the study team for direct training in 5S and Kaizen. Japan can contribute in this area as well.

In addition to 5S and Kaizen, as mentioned above, 7S also can be introduced to dairy cooperatives in India to improve their food safety management. The 7S concept seems not to be introduced to dairy cooperatives in India yet. Therefore, training for 7S as well as further 5S/Kaizen training can benefit dairy cooperatives as well as NDDDB.

(3) Japanese Manufacturers

There are many Japanese companies which supply necessary machineries and equipment in Japan's dairy sector. Those Japanese machineries and equipment can contribute to cost efficiency, hygiene improvement, and value addition in India's dairy sector. Among others, Japanese small and medium

enterprises, such as Innovation thru Energy Co., Ltd. with ice battery system and Orion Machinery Co., Ltd. with BMC and milking machine, which have developed their own technologies in specific areas may have large opportunity in India's dairy sector.

IDMC, a subsidiary of the NDDB, has been seeking to collaborate with those Japanese companies. The study team, however, could not identify many Japanese manufactures which have started their business in India's dairy sector or have intentions to enter India's dairy market. Although there are a lot of opportunities for Japanese manufacturers and Indian dairy producers establish win-win relationships, lack of information hampers materialization of these opportunities. If there are platforms where Indian stakeholders and Japanese stakeholders can exchange information and discuss with their technologies and products, those opportunities can help both Indian and Japanese stakeholders.

Annex

Table of Contents

Annex 1 Member of the study team.....	A-2
Annex 2 Study schedule.....	A-3
Annex 3 List of interviewees	A-8
Annex 4 List of collected documents and data	A-19
Annex 5 Basic information of milk unions	A-31
Annex 6 Basic data of states	A-46
Annex 7 Results of socioeconomic situation survey.....	A-59
Annex 8 FSSAI organization chart	A-86
Annex 9 FSSAI standard of milk and dairy products and its processing.....	A-88
Annex 10 List of dairy plants of unions and private dairy companies visited by the study team.....	A-92
Annex 11 List of machineries of dairy plants.....	A-99
Annex 12 NDDB eligibility criteria and terms and conditions of lending	A-105

Annex 1**Member of the study team**

Name	Area in charge
Fumiko Ikegaya (Ms)	Team Leader/Value Chain and Marketing
Yukio Ikeda (Mr)	Dairy and Institutional Analysis
Desai Prakash Pralhadarao (Mr)	Food Processing Equipment and Cold Chain
Tomoyuki Tajitsu (Mr)	Food Hygiene and Food Processing

Annex 2

Study Schedule

*I:Ikegaya, II:Ikeda, III:Desai, IV:Tajitsu

N.	Date/Time		City	Place visited	I	II	III	IV
1.	9/18	10:15-11:30	Delhi	National Cold Chain Development, NCCD	✓	✓	✓	✓
2.		16:30-18:00		Food Safety Standard Authority India, FSSAI	✓	✓	✓	✓
3.	9/19	9:30-10:20		JICA India Branch	✓	✓	✓	✓
4.		17:00-17:40		World Bank	✓	✓	✓	✓
5.	9/20	11:00-12:00		Department of Animal Husbandry Dairying and Fisheries	✓	✓	✓	✓
6.		13:15-14:00		Ministry of Food Processing Industry	✓	✓	✓	✓
7.		15:10-16:40		Param Dairy Limited	✓	✓	✓	✓
8.	9/21	14:30-18:30	Anand	NDDDB 1 st	✓	✓	✓	✓
9.	9/22	7:00-8:00		DCS (Anand) : Mujkuva Milk Producers' Cooperative Society	✓	✓	✓	✓
10.		11:20-14:00		NDDDB 2 nd	✓	✓	✓	✓
11.		16:00-17:00		IDMC	✓	✓	✓	✓
12.		17:00-18:00		Kaira District Cooperative Milk Union (Discussion, Plant)	✓	✓	✓	✓
13.	9/23	10:30-16:00	Gandhinagar	Gandhinagar District Cooperative Milk Union	✓	✓	✓	✓
14.		13:30-13:50		Gandhinagar District Cooperative Milk Union (Parlor)	✓	✓	✓	✓
15.		15:00-16:00		Gandhinagar District Cooperative Milk Union (Plant)	✓	✓	✓	✓
16.	9/24	18:00-19:00	Anand	Anand District, Mujkuva, Village (Farmers)		✓		
17.	9/25	11:00-12:40	Gandhinagar	Gujarat District, Directorate of Animal Husbandry	✓		✓	✓
18.		11:00-12:00		DCS (Gandhinagar) : Mahadevpora Milk Producers' Cooperative Society		✓		
19.		12:50-14:20		Gujarat Livestock Development Board	✓		✓	✓
20.		15:00-17:00		Gujarat States, Food and Drugs Control Administration	✓		✓	✓
21.		16:00-16:30		DCS (Gandhinagar) : Adalas Women Cooperative Society		✓		
22.	9/26	10:30-12:00	Banaskantha	Banaskantha District Cooperative Milk Producer' Union (HQ)	✓	✓	✓	✓
23.		16:00-17:00		Banaskantha District Cooperative Milk Producer' Union (Plant)	✓	✓	✓	✓
24.		17:29-18:50		DCS (Banaskantha) : Jalotra Milk Producers' Cooperative Society	✓	✓	✓	✓
25.	9/27	10:30-11:30		Banaskantha District Cooperative Milk Producer' Union (MD)	✓	✓	✓	✓
26.		11:45-12:40		Banaskantha District, NDDDB officer (NDP Nutrition)	✓			
27.		14:45-16:15		Banas Dairy Cattle Feed Mill Factory	✓		✓	✓
28.		15:30-16:00		DCS (Banaskantha) : Thavar Milk Producers' Cooperative Society		✓		
29.	9/28	10:15-13:30	Anand	NDDDB 3 rd	✓	✓	✓	✓

30.		15:15-16:00		GCMMF	✓	✓	✓	✓
31.	9/29	9:00-10:00		DCS (Anand) Sarsa Milk Producers' Cooperative Society		✓		
32.		10:30-11:30		NDDDB 4 th	✓		✓	✓
33.		11:30-13:30		NDDDB Engineering Team	✓		✓	✓
34.		14:30-15:45		NDDDB Quality Assurance	✓		✓	✓
35.	10/3	10:00-13:00	Patna	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna Dairy)	✓	✓	✓	✓
36.		13:30-15:00		Patna Dairy (Plant)	✓	✓	✓	✓
37.		18:15-19:45		Patna Dairy, DCS (Parsa Ibrahimpur Society)	✓	✓	✓	✓
38.	10/4	10:20-11:30		Asian Development Research Institute (ADRI)	✓	✓	✓	✓
39.		12:00-14:00		Bihar State Milk Cooperative Federation Ltd (CONFED)	✓	✓	✓	✓
40.	10/5	6:30-7:30		Patna Dairy (DCS) : Guai Milk Producers' Cooperative Society		✓		
41.		10:00-11:00		Patna Dairy (DCS) : Nisirpura Women's Milk Producers' Cooperative Society		✓		
42.		10:20-11:35		Bihar State Milk Cooperative Federation Ltd (CONFED) 2 nd	✓		✓	✓
43.		11:30-12:30		Patna Dairy (DCS) : Bhadashara Milk Producers' Cooperative Society		✓		
44.		12:00-13:45		Bihar State, Secretary, Department of Animal Husbandry	✓		✓	✓
45.		14:30-15:00		Paliganj Milk Chilling Center (Patna District)		✓		
46.		15:30-16:30		Patna Dairy (DCS) : Cheeriyator Milk Producers' Cooperative Society		✓		
47.		16:00-17:10		Food Safety Officer	✓		✓	✓
48.		17:50-18:30		Bihar Livestock Development Agency	✓		✓	✓
49.	10/6	10:00-11:40 13:00-15:00	Samastipur	Samastipur Dairy (Mithila Dugdh Utpadak Sahkari Sangh Ltd)	✓	✓	✓	✓
50.		11:30-12:30		Samastipur Dairy (DCS) : Salkhanni Milk Producers' Cooperative Society		✓		
51.		13:30-15:30		Samastipur Dairy (Plant)	✓	✓	✓	✓
52.		13:30-14:30		Samastipur Dairy (DCS) : Firozpur Pataili Women's Milk Producers' Cooperative Society		✓		
53.		15:30-16:00		Samastipur Dairy (DCS) : Sarairanjan Mahila Women's Milk Producers' Cooperative Society		✓		
54.	10/7	9:30-9:50	Patna	Patna City, Milk market near Patna station (Unorganized sector)	✓		✓	✓
55.		10:30-10:50		Sudha outlet 2 nd	✓		✓	✓
56.		10:50-12:40		Naturals Dairy (Meeting)	✓		✓	✓
57.		11:30-13:30	Samastipur	Samastipur Dairy (DCS) : Rahmatpur Milk Producers' Cooperative Society		✓		
58.		13:15-16:00		Anuj Dairy (Meeting)	✓		✓	✓
59.		14:00-15:00		Samastipur Dairy (DCS) : Chakhaji Women's Milk Producers' Cooperative Society		✓		
60.		16:00-16:30		Middleman of Ganga Dairy		✓		
61.	10/12	7:00-7:30	Agra	Basdaslatram Village in Agra (MPP of Saahaj Milk Producer Company)		✓		

62.		7:30-8:00		Milk Collection Point of Private firm (Ananda) in Basdaslatram Village		✓		
63.		10:00-10:30		Nagariya MPP (Nagariya Village in Agra)		✓		
64.	10/13	10:00-12:00		Saahaj (Milk Producer Company in Agra)		✓		
65.	10/30	10:30-15:00	Merrut	Meerut Milk Union		✓		
66.	10/31	10:00-12:00		Ganeshpur Milk Producers Society (Ganeshpur village)		✓		
67.		14:00-15:00		Chemrod Milk Producers Society (Chemrod village)		✓		
68.	11/4	10:00-11:00	Ghaziabad	Sakoorpur Milk Producers Society (Sakoorpur village, Ghaziabad Distict)		✓		
69.	11/6	12:45-17:00	Guwahati	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	✓	✓	✓	✓
70.	11/7	10:00-11:00		Commissionerate of Food Safety, Assam	✓		✓	✓
71.		10:00-11:00		Uma Women's DCS (Uzankuri Village in Kamrup Rural District)		✓		
72.		11:30-13:30		Directorate of Animal Husbandry	✓		✓	✓
73.		11:30-12:00		Seguli DCS (Uzankuri Village in Kamrup Rural District)		✓		
74.		15:30-16:30		Kandhenu DCS (Nityananda Village in Barpeta District)		✓		
75.		15:00-16:30		Directorate of Dairy Development	✓			✓
76.		18:00-19:00		Blueberry Industry (Private Dairy)	✓		✓	
77.	11/8	7:00-8:30		Ganesh Mandir Kali Mandir Milk Products Co-Op. Society Ltd	✓		✓	✓
78.		11:15-12:30		Progress Society (Sitajakala Dugadha Utpadak Samaba Samiti Ltd.)	✓		✓	✓
79.		11:00-12:00		Kandhenu DCS (Nityananda Village in Morigaon District)		✓		
80.		12:00-12:30		Dordoloni Womens DCS (Dordononi Village in Morigaon District)		✓		
81.		13:00-13:30		Maalaxmi DCS (Khanajan Village in Morigaon)		✓		
82.		13:30-15:30		Directorate of Dairy Development, Assam, Naogaon Plant	✓		✓	✓
83.		14:40-15:00		Nagaon District Milk Producer Cooperation Union Ltd	✓		✓	✓
84.		15:00-15:30		Malaybari Durga DCS (Sumulutari Hamlet, Malaybari village in Kumrup)		✓		
85.	11/9	11:15-12:15		Assam Livestock Development Agency	✓		✓	
86.		13:30-15:30		Kamrupa Dairy (Private Dairy)	✓		✓	
87.		17:00-17:30	Jorhat	The East Assam Milk Producers' Cooperative Union Ltd. (EAMUR)		✓		✓
88.	11/10	10:00-11:00		Surabishi DCS (Parbatia village in Jorhat)		✓		✓
89.		11:00-11:30		Joraguri DCS (Joraguri village in Jorhat)		✓		✓
90.		14:10-14:40		Department of Dairy Development, Assam, Bokakhat Plant		✓		✓
91.	11/11	10:00-11:00		Former Dhankhuli DCS (Dhankuli village in Jorhat)		✓		
92.		10:00-11:25		Large farmer (M.D. Group of Industry)	✓		✓	✓
93.		13:45-16:00		Sundar Pukhuri Milk Cooperative Society	✓		✓	✓

94.	11/13	10:30-12:20	Bangalore	Karnataka Cooperative Milk Producers' Federation (KMF)	✓	✓	✓	✓
95.		13:00-18:00		Bangalore Cooperative Milk Union Ltd	✓	✓	✓	✓
96.	11/14	10:30-12:00		Sadahalli DCS (Sadahalli Village in Bangalore Rural)		✓		
97.		10:30-12:00		Harohalli DCS (Harohalli Village in Bangalore Rural)		✓		
98.		13:00-14:00		Department of Animal Husbandry and Veterinary Services	✓		✓	✓
99.		15:30-17:00		Food Safety Commissioner, Karnataka	✓		✓	✓
100.		15:30-16:00		Kammasandra DCS (Kammasandra Village in Bangalore Rural)		✓		
101.	11/15	10:30-12:30		NDDDB regional office	✓		✓	
102.		10:30-12:00		Sadahalli DCS (Sadahalli Village in Bangalore Rural)		✓		
103.		15:00-16:00		Jalige DCS (Devanahalli Taluk in Bangalore Rural District)		✓		
104.	11/16	12:30-16:30	Gulbarga	Gulbarga Milk Producers Societies Union		✓		✓
105.		16:00-18:30	Bangalore	Karnataka State Dairy Association	✓		✓	
106.		17:30-18:30	Bidar	Ghatbora DCS (Ghatbora Village in Bidar District)		✓		
107.	11/17	7:30-8:30	Gulbarga	Herapur DCS (Herapur Village in Gulbarga District)		✓		
108.		10:45-13:00	Bangalore	Heritage (Private company)	✓		✓	
109.		11:00-13:00	Gulbarga	Kalaburagi-Bihar and Yadgir Coop Milk Producers Union		✓		✓
110.		16:30-18:30	Bangalore	Gokul Dairy Products (Private company)	✓		✓	
111.		16:30-17:00	Gulbarga	Kaillaahanga Village Gulbarga District		✓		
112.		17:30-18:30		Kumasi DCS (Kumasi Village in Gulbarga District)		✓		
113.		19:30-20:30		Haravala Village in Gulbarga District		✓		
114.	11/19	11:00-11:30		Nandini Parlor		✓		✓
115.	11/18-19	-	Bangalore	Retail shop in Bangalore	✓			
116.	11/20	10:40-15:30	Bhopal	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	✓		✓	✓
117.		14:45-18:00		Bhopal Sahakari Dugdha Sangh Maryadit (Bhopal Cooperative Milk Union Limited)	✓		✓	✓
118.	11/21	10:45-12:40		Department of Animal Husbandry, Madhya Pradesh State	✓		✓	✓
119.		13:00-14:30		Madhya Pradesh Poultry and Livestock Development Cooperation	✓		✓	
120.		16:30-17:30		Food Safety Commissioner, MP	✓		✓	✓
121.	11/22	7:30-9:00	Indore	Loose milk market	✓		✓	
122.	11/23	11:15-17:30		Indore Sahakari Dugdha Sangh Maryadit (Indore Milk Union)	✓		✓	
123.	11/23	10:30-16:30	Varanasi	Varanasi Milk Union		✓		✓
124.		18:30-19:00	Indore	Dr. Sudhir Bobde (Principal Secretary)	✓		✓	
125.	11/24	12:10-14:30		Shubham Foods Pvt. Ltd. (Private company)	✓		✓	

126.	11/25	11:10-13:00		Mahindra Agri Solution Ltd. (Private company)	✓		✓	
127.		15:30-17:30		Anik Milk Products Pvt Limited (Private company)	✓		✓	
128.	11/30	14:30-17:00	Jabalpur	Jabalpur Milk Union		✓		
129.	11/24	12:00-13:00	Chandauli	Padaya DCS (Padaya Village in Chandauli District)		✓		✓
130.		14:00-15:00		Nadara DCS (Nadara Village in Chandauli District)		✓		✓
131.		15:00-16:00		Feswoda Village in Chandauli District		✓		✓
132.		16:00-17:00		Raipura Village in Chandauli District		✓		✓
133.		17:00-17:30		Shyam Dairy Product Ltd. Collection Centre		✓		✓
134.	11/27	10:10-11:00	Lucknow	Video conference with Principal Secretary	✓	✓	✓	✓
135.		11:25-16:30		Predesh Cooperative Dairy Federation (PCDF)	✓	✓	✓	✓
136.		16:30-19:30		Lucknow Milk Union	✓	✓	✓	✓
137.	11/28	10:30-12:55		Department of Animal Husbandry, UP Livestock Development Board	✓		✓	✓
138.		13:30-14:30		Department of Dairy Development	✓		✓	
139.		10:50-15:00	Kanpur	Kanpur Milk Union		✓		✓
140.		18:00-19:00		Jignis DCS (Jignis Village in Kanpur District)		✓		✓
141.		20:00-20:30		Amul collection point in Jignis village		✓		✓
142.	11/29	9:40-10:10	Lucknow	Loose milk market in Lucknow	✓		✓	✓
143.		10:45-11:45		Food Safety and Drug Administration (FSDA)	✓		✓	✓
144.		11:00-12:00		Rahamatenager DCS (Rahamatenagar village in Lucknow District)		✓		
145.		12:00-12:30		Bastauly DCS (Bastauly village in Lucknow District)		✓		
146.		12:30-13:00		Mamta Milk (Namaste India)		✓		
147.		12:40-16:30		Gyan : CP Milk and Food Products Pvt. Ltd (Private company)	✓		✓	✓
148.	11/30	11:20-13:20	Kanpur	Namaste India (NIF Private Limited) (Private company)	✓		✓	✓
149.	12/1	9:00-10:30	Delhi	Maekawa India Pvt. Ltd	✓			✓
150.		11:00-12:00	Jabalpur	Private farm in Jabalpur		✓		
151.		12:45-13:45	Delhi	Department of Animal Husbandry, Dairying, and Fisheries	✓		✓	
152.		14:50-15:40		National Cooperative Development Cooperation	✓		✓	
153.		16:00-17:30		India Dairy Association	✓		✓	
154.	12/2	11:00-12:45		Gopaljee Dairy Foods Pvt. Ltd. (Ananda) (Private company)	✓		✓	✓
155.		12:55-13:15		Kisan Vikas Milk Producer Company Limited (Producer Company)	✓		✓	✓
156.		14:10-15:10		VRS Foods Ltd. (Paras) (Private company)	✓		✓	✓

Annex 3

List of Interviewees

N.	Date	Organization	Name	Title
1.	18-Sep	National Centre for Cold-chain Development	Mr Pawanexh Kohli	CEO and Chief Advisor
2.	18-Sep	Food Safety and Standards Authority of India (FSSAI)	Sunil Bakshi	Advisor, Regulation/ Coordination division)
3.	18-Sep	Food Safety and Standards Authority of India (FSSAI)	Satish Patil	Technical officer)
4.	19-Sep	World Bank (WB)	Dr. Edward Bresnyan	Senior Agriculture Economist
5.	20-Sep	Department of Animal Husbandry Dairying& Fisheries (AH&D)	Dr. Suresh S. Honnappagol	Animal Husbandry Commissioner
6.	20-Sep	Department of Animal Husbandry Dairying& Fisheries (AH&D)	Mr. Goutam Kr-Deb	Assistant Commissioner (Dairy Department)
7.	20-Sep	Ministry of Food Processing Industry (MoFPI)	Mr. Sanjai Bajpai	Under Secretary, MoFPI
8.	20-Sep	Param Dairy Limited	Mr Amit Singh	Manager – Export
9.	21-Sep	National Dairy Development Board (NDDB)	Mr. Pramod N Menon	Senior Manage, Financial & Planning Services
10.	21-Sep	National Dairy Development Board (NDDB)	Mr. G. Chokkalingam	Deputy General Manager, Sectoral Analysis and Studies
11.	21-Sep	National Dairy Development Board (NDDB)	Mr. Subir Mitas	Senior Manager, Sectoral Analysis & Studies
12.	21-Sep	National Dairy Development Board (NDDB)	Ms. Reeti	Deputy Manager, Financial & Planning Services
13.	21-Sep	National Dairy Development Board (NDDB)	Ms. Chandani Putei	Deputy Manager, Financial & Planning Services
14.	22-Sep	DCS (Anand): Mujkuva Milk Producers' Cooperative Society	Mr. Labhuhai Patel	Secretary
15.	22-Sep	National Dairy Development Board (NDDB)	Sangram Chaudhr	Executive Director
16.	22-Sep	National Dairy Development Board (NDDB)	G Chokkalingam	Deputy General Manager, Sectoral Analysis and Studies
17.	22-Sep	Indian Dairy Machinery Company (IDMC)	Mr. Neeraj Puranik	Head-Electrical, Instrumentation & Automation
18.	22-Sep	Indian Dairy Machinery Company (IDMC)	Mr. Raj Kumar Malik	Vice President, Sales & Marketing Projects
19.	22-Sep	Indian Dairy Machinery Company (IDMC)	Mr. Prakash Maheshwari	Vice President, Project
20.	22-Sep	Indian Dairy Machinery Company (IDMC)	Mr. Anil Sheno	Senior Advisor
21.	22-Sep	Kaira District Cooperative Milk Producers' Union	Mr. S. S. Sundaran	Officer on Special Duty (Public Relation)
22.	23-Sep	Gandhinagar District Cooperate Milk Producers' Union	Rohit Mehta	Managing Director
23.	23-Sep	Gandhinagar District Cooperate Milk Producers' Union	Nitim Macwan	General Manager, Branding
24.	23-Sep	Gandhinagar District Cooperate Milk Producers' Union	Mr. Nihm Macasan	GM, Business Management
25.	24-Sep	Anand District Mujkuva village	Mr. Poonambheri H, Phadhiz	Farmer
26.	25-Sep	Directorate of Animal Husbandry	Dr. A. J. Kachhiaatel	Director of Animal Husbandry
27.	25-Sep	Directorate of Animal Husbandry	Dr. K. A. Vasava	Joint Director of Animal Husbandry
28.	25-Sep	Food and Drugs Control Administration	Mr. H.G. Koshia	Commissioner, Food and Drugs Control Administration Government of Gujarat

29.	25-Sep	Food and Drugs Control Administration	Mrs. Dipika Chauhan	Deputy Commissioner, Food and Drugs Control Administration Government of Gujarat
30.	25-Sep	Gujarat Livestock Development Board	Dr. Hita Patel	Chief Executive Officer
31.	25-Sep	Gujarat Livestock Development Board	Dr. Raxit Patel	Veterinary Officer
32.	25-Sep	DCS (Gandhinagar) : Mahadevpura Milk Producers' Cooperative Society	Vinodbhai Chaudhary	Chairman
33.	25-Sep	DCS (Gandhinagar) : Mahadevpura Milk Producers' Cooperative Society	Haribhai Chaudhary	Secretary
34.	25-Sep	DCS (Gandhinagar) : Adalas Women Cooperative Society	Ms. Patel Shardaben	Chairman
35.	26-Sep	Banaskantha District Cooperate Milk Producers' Union	Mr. Rajendra Saigal	Assistant General Manager, Plant Operation
36.	26-Sep	Banaskantha District Cooperate Milk Producers' Union	Mr. Mausinh Chaudhary	Manager, Admin
37.	26-Sep	Banaskantha District Cooperate Milk Producers' Union	Dr. Deshmuleh	Senior Manager, Dairy Husbandry
38.	26-Sep	Banaskantha District Cooperate Milk Producers' Union	Mr. Sandip Nayable	Deputy Manager, Plant Operation
39.	27-Sep	Banaskantha District Cooperate Milk Producers' Union	Mr. Pravin Patel	Senior Manager, Engineering
40.	27-Sep	Banaskantha District Cooperate Milk Producers' Union	Mr. D.T. Patel	Senior Manager, Quality Assurance
41.	27-Sep	Banaskantha District Cooperate Milk Producers' Union	Dr. Prahlad Vaghela	Manager, Quality Management System
42.	26-Sep	DCS (Banaskantha) : Jalotra Milk Producers' Cooperative Society	Mr. Hari	Secretary
43.	27-Sep	Banaskantha District Cooperate Milk Producers' Union	Mr. Sanjay Karmchandani	Managing Director
44.	27-Sep	NDDDB Animal Nutrition Group / NDP monitoring Officer	Mr. N. R. Gosh	Manager of Animal Nutrition Group
45.	27-Sep	Banaskantha Milk Union (Cattle Feed Plant)	Mr P Piliyatar	Executive Manager of the Plant
46.	27-Sep	DCS (Banaskantha) : Thavar Milk Producers' Cooperative Society	Umabhai Patel	Secretary
47.	28-Sep	National Dairy Development Board (NDDDB)	Mr. Y. Y. Patil	Executive Director
48.	28-Sep	Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF)	R.S. Sodhi	General Manager
49.	28-Sep	Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF)	Mr. CA Atul Kumar Agrawal	General Manager (Finance)
50.	29-Sep	DCS (Anand) Sarsa Milk Producers' Cooperative Society	Amit N Rothod	Secretary
51.	29-Sep	NDDDB Engineering Services	Mr. J S Gandhi	Group Head, Engineering Services
52.	29-Sep	NDDDB Engineering Services	Mr. S K Goswami	Deputy General Manager, Engineering Services
53.	29-Sep	NDDDB Engineering Services	Mr. Jasbir Singh	Engineering Services
54.	29-Sep	NDDDB Engineering Services	Mr. S K Gosham	Engineering Services
55.	29-Sep	NDDDB Engineering Services	Mr. V E E Sundel	Engineering Services
56.	29-Sep	NDDDB Engineering Services	Mr. Chandra Shekas	Engineering Services
57.	29-Sep	NDDDB Engineering Services	Mr. U B Das	Engineering Services
58.	29-Sep	NDDDB Engineering Services	Mr. V Srinivas	Engineering Services

59.	29-Sep	NDDDB Quality Assurance and Product & Process Development	Dr. D K Sharma	General Manager, Quality Assurance and Product & Process Development
60.	29-Sep	NDDDB Quality Assurance and Product & Process Development	Mr. Naveenkumara A C	Deputy Manager, Quality Assurance, Quality Assurance and Product & Process Development
61.	3-Oct	Patna District Cooperate Milk Producers' Union	Mr. Sudhir K. Singh	Managing Director
62.	4-Oct	Patna District Cooperate Milk Producers' Union	Mr. Rupesh Raj	In charge product
63.	4-Oct	Patna District Cooperate Milk Producers' Union	Mr. S N Thakur	Manager
64.	4-Oct	Asian Development Research Institute (ADRI)	Mr. Prabhat P Ghosh	Director
65.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Ms. Seema Tripathi	Managing Director
66.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. Rayen Verma	General Manager
67.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. R.K.Mishra	Assistant General Manager
68.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. Kumar Amarandr	Manager, Marketing
69.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. Amit Suman	Assistant Manager, Marketing
70.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. Amarnadh	Assistant Manager, Engineering
71.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. R.K. Jha	Manager, Admin
72.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. B.N. Prasced	Training in charge
73.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. V.K. Pandry	Assistant Manager, MIS
74.	4-Oct	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Mr. Vishad Mishara	Manager of NDDDB
75.	5-Oct	Dep. Of Animal Husbandry, Bihar state	Mrs. Vijay Laxmi	Secretary, Animal Husbandry and Fishery Department
76.	5-Oct	Dep. Of Animal Husbandry, Bihar state	Mr. Gautam Deb	Assistant Commissioner, Dairy Development, Ministry of Agriculture, GoI
77.	5-Oct	Food Safety Office in Bihar state	Mukesh Kashyap	Designated Food Safety Officer, Tirhut
78.	5-Oct	Food Safety Office in Bihar state	Sudhama Chowdy	Designated Food Safety Officer, Patna
79.	5-Oct	Food Safety Office in Bihar state	Tapeshwari Singh	Designated Food Safety Officer, Saran
80.	5-Oct	Bihar Livestock Development Agency	Mr. Amitabh	Former Project Director of Bihar Livestock Development Agency
81.	5-Oct	Patna Dairy (DCS) : Guai Milk Producers' Cooperative Society	Kundhan Kuman	Secretary
82.	5-Oct	Patna Dairy (DCS) : Nisirpura Women's Milk Producers' Cooperative Society (Women's Society)	Ms. Chanchallideni	Original Member of DCS
83.	5-Oct	Patna Dairy (DCS) : Bhadashara Milk Producers' Cooperative Society	Mr. Satyandur Singh	Secretary
84.	5-Oct	Paliganj Milk Chilling Center (Patna District)	Mr. Cramdruks P. Singh	Assistant Milk Procurement Officer

85.	6-Oct	Patna Dairy (DCS) : Cheeriyator Milk Producers' Cooperative Society	Ms. Satyandur Singh	Secretary
86.	6-Oct	Samastipur Dairy (Mithila Milk Union)	D.K. Srivastava	Managing Director
87.	6-Oct	Samastipur Dairy (Mithila Milk Union)	Mr. Sunil Kumal	In charge Engineering
88.	6-Oct	Samastipur Dairy (Mithila Milk Union)	Mr. Om Prakash Rai	Deputy Manager, Quality Control
89.	6-Oct	Samastipur Dairy (DCS) : Salkhanni Milk Producers' Cooperative Society	Mr. M. Moinuddin	Secretary
90.	6-Oct	Samastipur Dairy (DCS) : Firozpur Pataili Women's Milk Producers' Cooperative Society	Ms. Vinodkumar	Menber
91.	6-Oct	Samastipur Dairy (DCS) : Sarairanjan Mahila Women's Milk Producers' Cooperative Society	Ms. Sitasimha	Secretary
92.	7-Oct	Natural Dairy	Mr. Hamant	Managing Director
93.	7-Oct	Natural Dairy	Mr. R.K. Singh	Staff
94.	7-Oct	Natural Dairy	Mr. Vijay Pata	Staff
95.	7-Oct	Anuj Dairy	Mr. Sarendra Kumar	Managing Director
96.	7-Oct	Anuj Dairy	Mr. Shrikant Kumar	Staff
97.	7-Oct	Samastipur Dairy (DCS) : Rahmatpur Milk Producers' Cooperative Society	Mr. Rajesh	Secretary
98.	7-Oct	Samastipur Dairy (DCS) : Chakhaji Women's Milk Producers' Cooperative Society	Ms. Kamini Singha	Board member
99.	7-Oct	Ganga Dairy (Middleman)	Mr. Manaj Kumairay	Middleman
100	12-Oct	Nagariya MPP (Nagariya Village in Agra)	Mr. Tahir Shagai	Secretary
101	12-Oct	Saahaj (Milk Producer Company in Agra)	Dr. R.R. Singh	CEO
102	12-Oct	Saahaj (Milk Producer Company in Agra)	Mr. Basant Choudhary	Deputy Chief Executive
103	30-Oct	Meerut Milk Union	Mr. Shri SC Verma	General Manager
104	31-Oct	Ganeshpur Milk Producers Society (Ganeshpur village)	Mr. Surendra Kumar	Secretary
105	4-Nov	Ganeshpur Milk Producers Society (Ganeshpur village)	Mr. Prevash Tyegi	Staff
106	4-Nov	Chemrod Milk Producers Society (Chemrod village)	Mr. Sangineer Teshar	Secretary
107	4-Nov	Sakoorpur Milk Producers Society (Sakoorpur village, Ghaziabad Distict)	Mr. Tahir Khadish	Secretary
108	6-Nov	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Mr. S. B. Bose	Managing Director
109	7-Nov	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Mr. Saveer Kumar Parida	Senior Manager, from NDDB
110	7-Nov	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Mr. Dipak Saikia	Plant Manager
111	7-Nov	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Mr. Pranjal pratim Kalita	Marketing Officer
112	7-Nov	Commissionerate of Food Safety, Assam	Mr. Smt. Varnali Deka	Commissioner, Food Safety

113	7-Nov	Commissionerate of Food Safety, Assam	Mr. Sri Barenya Das	Joint Secretary & OSD (Food Safety)
114	7-Nov	Commissionerate of Food Safety, Assam	Mr. Anupam Googi	(Food Analysis
115	7-Nov	Commissionerate of Food Safety, Assam	Mr. Lsi L.R.Narupui	Designated officer, Food Safety
116	7-Nov	Commissionerate of Food Safety, Assam	Mr. Smaminar Baruah	Food Safety officer
117	7-Nov	Directorate of Animal Husbandry	Dr. A. Das	Director
118	7-Nov	Directorate of Animal Husbandry	Dr. R. Saikia	Joint Director
119	7-Nov	Directorate of Animal Husbandry	Dr. B. Choudlury	S.O
120	7-Nov	Directorate of Animal Husbandry	Mr. H. Kalita	Department of Dairy Development
121	7-Nov	Directorate of Animal Husbandry	Mr. P. Borihakur	Department of Dairy Development
122	7-Nov	Directorate of Animal Husbandry	Dr. Nayasjit Daxa	Project Coordinator, APART
123	7-Nov	Directorate of Dairy Development	Mr. Ghanashyam Malakar	(Director)
124	7-Nov	Directorate of Dairy Development	Mr. Utpal Kumar Sharma	(Assistant Director)
125	7-Nov	Directorate of Dairy Development	Mr. Hemauta Kr. Kalcts	(Quality Control Officer and Nodal Officer (RKVY))
126	7-Nov	Directorate of Dairy Development	Mr. Nilimer Borah	(Dairy Development Officer, Nagaon
127	7-Nov	Directorate of Dairy Development	Mr. P.P Boroona	(Plant Manager)
128	7-Nov	Directorate of Dairy Development	Mr., Hewanta Kumar Chetia	(Plant Manager, Khanapara)
129	7-Nov	Directorate of Dairy Development	Mr. Jogen Eh. Thakusis	(Sub Inspector of Skhishies and Coordinator of APART
130	7-Nov	Blueberry Industry (Private Dairy)	Mr. Kamal Deka	Owner
131	7-Nov	Blueberry Industry (Private Dairy)	Eg. N. G. Das	(Consultant of Civil Work)
132	7-Nov	Uma Women's DCS (Uzankuri Village in Kamrup Rural District)	Ms. Sasi	Secretary
133	7-Nov	Seguli DCS (Uzankuri Village in Kamrup Rural District)	Mr. S. Singh	Secretary
134	7-Nov	Kandhenu DCS (Nityananda Village in Barpeta District)	Mr. Tihar	Secretary
135	8-Nov	Ganesh Mandir Kali Mandir Milk Products Co-Op. Society Ltd.	Mr. Krishna Prasad	President
136	8-Nov	Sitajakala Dugadha Utpadak Samaba Samiti Ltd.	Mr. Ranjib Sharma	(Chairman)
137	8-Nov	Sitajakala Dugadha Utpadak Samaba Samiti Ltd.	Mr. Puspadhar Das	(Vision Director)
138	8-Nov	Sitajakala Dugadha Utpadak Samaba Samiti Ltd.	Mr. Bikash Bharali	(Dairy Consultant)
139	8-Nov	Sitajakala Dugadha Utpadak Samaba Samiti Ltd.	Mr. Biman Sharma	(Secretary)
140	8-Nov	Ganesh Mandir Kali Mandir Milk Products Co-Op. Society Ltd.	Mr. Krishna Prasad	President
141	8-Nov	Sitajakala Dugadha Utpadak Samaba Samiti Ltd.	Mr. Ranjib Sharma	(Chairman)
142	8-Nov	Sitajakala Dugadha Utpadak Samaba Samiti Ltd.	Mr. Puspadhar Das	(Vision Director)
143	8-Nov	Sitajakala Dugadha Utpadak Samaba Samiti Ltd.	Mr. Bikash Bharali	(Dairy Consultant)
144	8-Nov	Sitajakala Dugadha Utpadak Samaba Samiti Ltd.	Mr. Biman Sharma	(Secretary)
145	8-Nov	Directorate of Dairy Development, Assam, Naogaon Plant	Mr. Nilim Borah	District Dairy Development Office, Nagaon

146	8-Nov	Nagaon District Milk Producer Cooperation Union Ltd	Mr. Biri Nchi Kashyap JabialChairman	
147	8-Nov	Kandhenu DCS (Nityananda Village in Morigaon District)	Mr. Deepu Neupani	Mobile AI technician
148	8-Nov	Dordoloni Womens DCS (Dordononi Village in Morigaon District)	Mr. Bhabani Mallik	Secretary
149	8-Nov	Maalaxmi DCS (Khanajan Village in Morigaon)	Mr. Ambaajdur Chtry	Village head
150	8-Nov	Malaybari Durga DCS (Sumulutari Hamlet, Malaybari village in Kumrup)	Mr. Sukleswar Das	Secretary
151	9-Nov	The East Assam Milk Producers' Cooperative Union Ltd. (EAMUR)	Mr. Anish Nair	Chief Operating Officer (NDDDB)
152	9-Nov	Assam Livestock Development Agency	Dr. Pubin Ch. Das	(CEO)
153	9-Nov	Assam Livestock Development Agency	Dr. Mouideep Das	(Manager, A&M)
154	9-Nov	Assam Livestock Development Agency	Dr. Jiten Bhuyan	(Joint Director of ICDP)
155	9-Nov	Assam Livestock Development Agency	Dr. Motiur Ralmar	(Manager, T&C)
156	9-Nov	Kamrupa Dairy (Private Dairy)	Mr. Nandini Barua	(Director)
157	9-Nov	Kamrupa Dairy (Private Dairy)	Ms. Ayan Barua	Staff
158	9-Nov	Kamrupa Dairy (Private Dairy)	Mr. Saibal Thakur	Staff
159	10-Nov	Surabishi DCS (Parbatia village in Jorhat)	Mr. Pabitra Bora	Secretary of DCS and vice president of Jorhat Union
160	10-Nov	Joraguri DCS (Joraguri village in Jorhat)	Mr. Pabitra Bora	Secretary of DCS and vice president of Jorhat Union
161	10-Nov	Department of Dairy Development, Assam, Bokakhat Plant	Mr. Anish Nair	(Chief Operating Officer)
162	11-Nov	Former Dhankhuli DCS (Dhankuli village in Jorhat)	Mr. Parkaj	Former Chairman of the DCS
163	11-Nov	M.D. Group of Industry	Mr. Murlidhar Gattani	Owner
164	11-Nov	Sundar Pukhuri Milk Cooperative Society	Mr. Barman	Board member
165	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Dr. Koramacmandra Bmat	Director, Nandini Spam Station, Purchase, and Training
166	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Mr. Ramesh B. Kconnur	Director Finance
167	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Mr. B. Natoraj	Director, Quality Assurance
168	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Mr. M.T. Kolkarni	Director, Marketing
169	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Mr. Prahladd S	Additional Director, Marketing
170	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Dr. Baeararaja K. S.	Joint Director, Marketing
171	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Mr. B. M. Suresh Kurear	Director, Engineering
172	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Mr. Saahash M. N.	Sub Manager, Sectural Analysis Study (NDDDB)
173	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Mr. T.T. Vinayogam	Sub Manager, FPS (NDDDB)

174	13-Nov	Karnataka Cooperative Milk Producers' Federation (KMF)	Mr. Mahash.H	Additional Director, Engineering
175	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Mr. D.C. Nagarajaiah	Managing Director (KCS))
176	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Dr. B.P. Suresa	Manager, Marketing
177	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Dr. S.T. Suresh	General Manager, Admin
178	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Mr. N. Mohan Kumar	Deputy Manager, Finance
179	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Mr. N. Muni Rodly	General Manager, Technical
180	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Mr. Manjuatha H.K. (Manager, Engineering
181	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Mr. E. Jayamma	(Manager
182	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Dr. B.K.Jagadeem	Manager
183	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Mr. Kahoku Guwela	Deputy Manager
184	13-Nov	Bangalore Cooperative Milk Union (BAMUL)	Mr. S.A. Pradash	Manager. QA
185	13-Nov	Department of Animal Husbandry and Veterinary Services	Dr. M.T. Manjunath	Director of Department / Project Director of Karnataka Livestock Development Agency
186	13-Nov	Food Safety Commissioner, Karnataka	Dr. Harshavardan. B	Deputy Commissioner Food Safety (Squad
187	13-Nov	Food Safety Commissioner, Karnataka	Mr. Vallas	Food safety officer
188	14-Nov	Sadahalli DCS (Sadahalli Village in Bangalore Rural)	Mr. Radha Krishna	Chairman)
189	14-Nov	Sadahalli DCS (Sadahalli Village in Bangalore Rural)	Mr. S. N. Murthy	Secretary
190	14-Nov	Harohalli DCS (Harohalli Village in Bangalore Rural)	Mr. Munegowda	Secretary
191	14-Nov	Kammasandra DCS (Kammasandra Village in Bangalore Rural)	Mr. Kempagowda	Chairman)
192	14-Nov	Kammasandra DCS (Kammasandra Village in Bangalore Rural)	Mr. Jayaramaiah	Secretary
193	15-Nov	NDDB Regional Office	Mr. Pankaj Singh	Manager of Animal Husbandry
194	15-Nov	NDDB Regional Office	Dr. D.G. Raghupaths	Deputy General Manager of Animal Breeding
195	15-Nov	NDDB Regional Office	Mr. Saltish M.N. (Senior Manager of Sectoral Analysis
196	15-Nov	Sadahalli DCS (Sadahalli Village in Bangalore Rural)	Mr. Radha Krishna	Chairman)
197	15-Nov	Sadahalli DCS (Sadahalli Village in Bangalore Rural)	Mr. S. N. Murthy	Secretary
198	16-Nov	Srikrishana Milks Private Limited	Mr. Dinesh R. Pai	Chairman
199	16-Nov	Heritage Foods Limited	Mr. G. Hari Babu	Deputy General Manager, Operations
200	16-Nov	The Nilgiri Dairy Farm Pvt. Ltd	Mr. Srinivas G	Dairy Head, Karnataka
201	16-Nov	The Nilgiri Dairy Farm Pvt. Ltd	Mr. Prashantha M.S	Senior Manager, Dairy
202	16-Nov	The Nilgiri Dairy Farm Pvt. Ltd	Ms. Ashalatha,	Senior Manager Merchandising of Future Consumer
203	16-Nov	Creamline Dairy Products Ltd.	Mr. Girish Dixit	General manager
204	16-Nov	Gokul Dairy Products	Mr. K.N. Krishnamurthy	Managing Director

205	16-Nov	Gokul Dairy Products	Mr. R. Bache Gowda	Staff
206	16-Nov	Gulburga Milk Producers Societie's Union	Dr. C. H. Kamkeri	Managing Director
207	16-Nov	Ghatbora DCS (Ghatbora Village in Bidar District)	Mr. Mahadev	Secretary
208	16-Nov	Ghatbora DCS (Ghatbora Village in Bidar District)	Mr. Banwbandeppa	Union staff
209	17-Nov	Heritage Foods Limited	Mr. G. Hari Babu	Deputy General Manager of Operation
210	17-Nov	Heritage Foods Limited	Mr. G. Nandakumar Chowdary	Assistant Manager of Operation
211	17-Nov	Herapur DCS (Herapur Village in Gulbarga District)	Mr. Sontoshhkumar	Secretary
212	17-Nov	Kumasi DCS (Kumasi Village in Gulbarga District)	Mr. Mahadev Kabatagi	Secretary
213	20-Nov	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Mr. Jitendra Singh Raje	Managing Director (IAS))
214	20-Nov	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Dr. R.K. Doorwar	General Manager
215	20-Nov	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Mr. R.P.S. Tiwari	General Manger, Finance and Admin
216	20-Nov	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Mr. Soku Rao	Assistant General Manager
217	20-Nov	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Mr. Aseem Negam	Assistant General Manager
218	20-Nov	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Mr. Sht Sharda Jowri	Manager)
219	20-Nov	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Ms. Sharda Johni	Manager, QC
220	20-Nov	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Mr. Asimi Nigam	Assistant General Manager, Monitoring & Planning
221	20-Nov	Bhopal Cooperative Milk Union Limited	Mr. Subhash Misher	Deputy General Manager of Marketing
222	20-Nov	Bhopal Cooperative Milk Union Limited	Mr. Pramod Shawal	Assistant General Manager
223	20-Nov	Bhopal Cooperative Milk Union Limited	Mr. Manoj Shedhani	Assistant General Manger of MIS/EDD
224	20-Nov	Bhopal Cooperative Milk Union Limited	Mr. Subodh Agraud	Manager
225	20-Nov	Bhopal Cooperative Milk Union Limited	Mr. Rayesh Vigeyveyys	Assistant General Manager
226	20-Nov	Bhopal Cooperative Milk Union Limited	Mr. Ashok Khare	Incharge of purchase
227	20-Nov	Bhopal Cooperative Milk Union Limited	Ms. Uma Maluiya	Manager of Finance
228	20-Nov	Bhopal Cooperative Milk Union Limited	Mr. Amit Sacena	Manager of Engineering
229	20-Nov	Indore Cooperative Milk Union Limited	Mr. A.N.Dwivedi	CEO
230	20-Nov	Indore Cooperative Milk Union Limited	Mr. S.S. Ali	Assistant General Manager of Marketing
231	20-Nov	Indore Cooperative Milk Union Limited	Ms. Divya Singh Parihar	Assistant General Manager (Finance
232	20-Nov	Gwalior Cooperative Milk Union Limited	Mr. Ahurag Ling Lagar Cagu	Assistant General Manager of Marketing
233	20-Nov	Ujjan Cooperative Milk Union Limited	Dr. N.L. Tyogi	CEO
234	20-Nov	National Dairy Development Board (NDDB)	Dr. Subhankar Nanda	Deputy Manager

235	21-Nov	Department of Animal Husbandry, Madhya Pradesh State	Dr. Arun Kumar Sharma	Deputy Director
236	21-Nov	Department of Animal Husbandry, Madhya Pradesh State	Dr. Anupara Agoaul	Additional Deputy Director
237	21-Nov	Department of Animal Husbandry, Madhya Pradesh State	Dr. Priyakant Pathak	Additional Deputy Director
238	21-Nov	Department of Animal Husbandry, Madhya Pradesh State	Dr. Manish Singh	Additional Deputy Director
239	21-Nov	Department of Animal Husbandry, Madhya Pradesh State	Dr. S.D.Shrivastara	Additional Deputy Director
240	21-Nov	Department of Animal Husbandry, Madhya Pradesh State	Dr. Pravean Shiude	Additional Deputy Director
241	21-Nov	Department of Animal Husbandry, Madhya Pradesh State	Dr. Bhagan Manghnani	Additional Deputy Director
242	21-Nov	Madhya Pradesh Poultry and Livestock Development Cooperation	Dr. K.S. Tomar	Executive Director
243	22-Nov	Food Safety Commissioner, M.P	Mr.Arbind Kumar Patror	Senior Inspection Officer
244	23-Nov	Varanasi Milk Union	Mr. R.P. Singh	General Manager
245	23-Nov	Varanasi Milk Union	Mr. Ram Briksh	In charge Engineering
246	23-Nov	Varanasi Milk Union	Mr. C.S.S. Yadar	In charge Chemist
247	23-Nov	Varanasi Milk Union	Mr. Chuni Lal	Senior Executive, Engineering (IDMC)
248	23-Nov	Varanasi Milk Union	Mr. Manish Kumar	Educative Engineer (IDMC)
249	23-Nov	Department of Dairy Development, UP)	Mr. Sudhir Bobde	Principal Secretary, Department of Dairy Development, UP)
250	24-Nov	Shubham Foods Pvt. Ltd	Mr. Mukesh Goyal	Owner
251	25-Nov	Shubham Foods Pvt. Ltd	Mr. Naresh Goyal	Owner
252	24-Nov	Padaya DCS (PadayaVillage in Chandaulli District)	Mr. Ramashish Maurya	Secretary
253	24-Nov	Padaya DCS (PadayaVillage in Chandaulli District)	Mr. Pancham Mauya	Chairman
254	24-Nov	Nadara DCS (NadaraVillage in Chandaulli District)	Mr. Dhanshyam Tatil	Chairman
255	24-Nov	Shyam Dairy Product Ltd. Collection Centre	Mr. Rant Chand	Operator)
256	25-Nov	Mahindra Agri Solution Ltd	Mr. Job Prakash	Head of dairy
257	25-Nov	Anik Milk Products Ptv Limited	Mr. S.K.Singh	Senior Manager, Quality Control
258	25-Nov	Anik Milk Products Ptv Limited	Mr. Amaresh Naraya Dubey	Manager, Production
259	27-Nov	Predesh Cooperative Dairy Federation (PCDF)	Mr. B.B.Bera	General Manager Operation
260	27-Nov	Predesh Cooperative Dairy Federation (PCDF)	Mr. R.S. Kushwara	In charge Engineering
261	27-Nov	Predesh Cooperative Dairy Federation (PCDF)	Ms. Shabram Chopra	Quality Assurance
262	27-Nov	Lucknow Milk Union	Dr Rajeev Varshney	Manager P&I
263	27-Nov	Lucknow Milk Union	Mr. Amit Yadav	Manager, Engineering
264	27-Nov	Lucknow Milk Union	Ms. Sushma Reni Singh	(Manager, Quality Assurance
265	27-Nov	Lucknow Milk Union	Dr. Rajeer Varshney	Manager, P&I)
266	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Dr. C.S. Yadar	Director, Admin and Development
267	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Dr. S.C. Gupta	Join Director

268	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Dr. Keshan Kumar	in charge reproduction cell and MIS cell UPLDB
269	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Dr. Veemu Pande	in charge training and extension cell, UPLDB
270	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Mr. Durgish Mishea	NA
271	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Mr. Pramod Kumar Pandey	Accisstant, UPLDB
272	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Dr. Satish Chardri	Deputy Director
273	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Dr. Rajara	TE Animal Hub
274	28-Nov	Department of Animal Husbandry, UP Livestock Development Board	Dr. Alok Yadane	VO UPLDB
275	28-Nov	Department of Dairy Development	Mr. Raj Kumar Srivastava	Additional Milk Commissioner, PCS
276	28-Nov	Kanpur Milk Union	Dr. Ram Sagar	(Regional Dairy Development Officer, Kanpur
277	28-Nov	Kanpur Milk Union	Mr. Thumu Tirumal Reddy	Unit Head
278	28-Nov	Kanpur Milk Union	Mr. Neeraj Gupta	(Manager, Finance/ In charge Marketing
279	28-Nov	Kanpur Milk Union	Ms. Ratna Singh	In charge Procurement
280	28-Nov	Kanpur Milk Union	Mr. R.P. Gupta	Quality Assurance
281	28-Nov	Jignis DCS (Jignis Village in Kanpur District)	Mr. Sanjay Shukla	Secretary
282	28-Nov	Amul collection point in Jignis village	Mr. Rohit	Secretary
283	29-Nov	Food Safety and Drug Administration (FSDA)	Mr. D.K. Tiwari	Designated Assistant Commissioner, HQ
284	29-Nov	Food Safety and Drug Administration (FSDA)	Mr. A.P. Varma	Chief Safety Officer, HQ
285	29-Nov	Gyan : CP Milk and Food Products Pvt. Ltd	Mr. Jai Kumar Agarwal	Managing Director
286	29-Nov	Gyan : CP Milk and Food Products Pvt. Ltd	Mr. Anuj Kumar Agarwal	Managing Director
287	29-Nov	Gyan : CP Milk and Food Products Pvt. Ltd	Mr. M.K.Gupta	GM, Quality Assurance
288	29-Nov	Rahamatenager DCS (Rahamatenagar village in Lucknow District)	Mr. Promod Kumar	Secretary
289	29-Nov	Bastauly DCS (Bastauly village in Lucknow District)	Mr. Mayaraw	Secretary
290	29-Nov	Mamta Milk	Mr. Tasil	Staff
291	30-Nov	Jabalpur Cooperative Milk Union Limited	Mr. Deepa Shodima	CEO
292	30-Nov	Namaste India (NIF Private Limited)	Mr. Sashi Kanta Samal	General Manager
293	1-Dec	Private Farm in Jabalpur	Mr. Sonali	Owner
294	1-Dec	Maekawa India	Mr. Takeo Fujimoto	Director
295	1-Dec	Department of Animal Husbandry, Dairying, and Fisheries	Mr. S. S. Kandpal	Director
296	1-Dec	Department of Animal Husbandry, Dairying, and Fisheries	Mr. S. K. Dalal	Consultant, Dairy Development
297	1-Dec	Department of Animal Husbandry, Dairying, and Fisheries	Mr. C. Ser	Assistant, Dairy Development
298	1-Dec	Department of Animal Husbandry, Dairying, and Fisheries	Mr. S. Shebhar	Technical Officer, Dairy Development

299	1-Dec	National Cooperative Development Cooperation	Mr. Ashok Dalwai	Managing Director, IAS
300	1-Dec	National Cooperative Development Cooperation	Mr. D. N. Thakur	Deputy Managing Director
301	1-Dec	Indian Dairy Association	Dr. R. S. Khanna	Director
302	1-Dec	Indian Dairy Association	Mr. Manod	(Secretary
303	2-Dec	Gopaljee Dairy Foods Ptv. Ltd. (Ananda)	Mr. R. S. Dixit	CMD
304	2-Dec	Gopaljee Dairy Foods Ptv. Ltd. (Ananda)	Mr. Mahesh Chand Tiwari	General Manager, Finance and Account
305	2-Dec	Gopaljee Dairy Foods Ptv. Ltd. (Ananda)	Mr. Nikhl Mishra	Director, MPD
306	2-Dec	Gopaljee Dairy Foods Ptv. Ltd. (Ananda)	Mr. Ravindra Pandey	Business Head
307	2-Dec	Kisan Vikas Milk Producer Company Limited	Mr. S. M. Tripathi	CEO
308	2-Dec	VRS Foods Ltd. (Paras)	Mr. Lalit Kumar Huria	CFO

Annex 4

List of Collected Documents and Data

Government of India

S/N	Issued by	Name of document or data	Language	Year	Type
GI-01	Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture & Farmers Welfare (DACFW)	Report of Committee on Doubling Farmers' Income vol. 1	English	2017	PDF
GI-02	Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture & Farmers Welfare (DACFW)	Report of Committee on Doubling Farmers' Income vol. 2	English	2017	PDF
GI-03	Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture & Farmers Welfare (DACFW)	Report of Committee on Doubling Farmers' Income vol. 3	English	2017	PDF
GI-04	Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture & Farmers Welfare (DACFW)	Report of Committee on Doubling Farmers' Income vol. 4	English	2017	PDF
GI-05	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare (DAHDF)	19th Livestock Census	English	2012	PDF
GI-06	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare (DAHDF)	Basic Animal Husbandry & Fisheries Statistics 2015	English	2015	PDF
GI-07	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare (DAHDF)	Basic Animal Husbandry & Fisheries Statistics 2017	English	2017	PDF
GI-08	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare (DAHDF)	Rashtriya Gokul Mission National Action Plan 2016-2020-2024	English	2017	PDF
GI-09	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare (DAHDF)	Vision - 2024 Doubling Farmeres Income by 2022	English	2017	PDF
GI-10	National Centre for Cold-chain Development (NCCD)	Analysing NDDDB Cluster model for marketing of Vegetables	English	2017	PDF
GI-11	National Cooperative Development Corporation (NCDC)	Annual Report 2015-2016	English	2016	PDF
GI-12	National Cooperative Development Corporation (NCDC)	Annual Report 2016-2017	English	2017	PDF
GI-13	National Sample Survey Office, Ministry of Statistics and Programme Implementation (NSSO)	Income, expenditure, asset of agri households in India	English	2013	PDF
GI-14	National Sample Survey Office, Ministry of Statistics and Programme Implementation (NSSO)	Key Indicators of Household Consumer Expenditure in India 2011-2012	English	2012	PDF
GI-15	National Sample Survey Office, Ministry of Statistics and Programme Implementation (NSSO)	Livestock Ownership in India	English	2013	PDF

NDDDB

S/N	Issued by	Name of document or data	Language	Year	Type
ND-01	National Dairy Development Board (NDDDB)	a. Justification of supporting Dairy Cooperatives	English	2017	PDF
ND-02	National Dairy Development Board (NDDDB)	b. Impact of project components under proposal	English	2017	PDF
ND-03	National Dairy Development Board (NDDDB)	c. Role of Government in development of Dairy sector in India	English	2017	PDF
ND-04	National Dairy Development Board (NDDDB)	Agro climatic zone	English	2017	PDF
ND-05	National Dairy Development Board (NDDDB)	Annex I Eligibility Criteria and Terms and conditions of lending	English	2017	PDF
ND-06	National Dairy Development Board (NDDDB)	Annex II Eligibility Criteria	English	2017	PDF
ND-07	National Dairy Development Board (NDDDB)	Annual Report 2010-2011	English	2011	PDF
ND-08	National Dairy Development Board (NDDDB)	Annual Report 2011-2012	English	2012	PDF
ND-09	National Dairy Development Board (NDDDB)	Annual Report 2012-2013	English	2013	PDF
ND-10	National Dairy Development Board (NDDDB)	Annual Report 2013-2014	English	2014	PDF
ND-11	National Dairy Development Board (NDDDB)	Annual Report 2014-2015	English	2015	PDF
ND-12	National Dairy Development Board (NDDDB)	Annual Report 2015-2016	English	2016	PDF
ND-13	National Dairy Development Board (NDDDB)	Cost of BMC, CC in different capacities	English	2017	Excel
ND-14	National Dairy Development Board (NDDDB)	Dairying in India	English	2017	PPT
ND-15	National Dairy Development Board (NDDDB)	Dairying through Cooperative	English	2017	PDF
ND-16	National Dairy Development Board (NDDDB)	Development of model village	English	NA	PDF
ND-17	National Dairy Development Board (NDDDB)	Draft DPR Infrastructure Project 11 Jan 2017	English	2017	PDF
ND-18	National Dairy Development Board (NDDDB)	Draft note on demand and supply forecast for milk	English	2017	Word
ND-19	National Dairy Development Board (NDDDB)	Executive summary of project porposal 12 June 2015	English	2017	PDF
ND-20	National Dairy Development Board (NDDDB)	Impact of JICA project - b. Impact of project componenter proposal	English	2017	Excel
ND-21	National Dairy Development Board (NDDDB)	Impact of JICA project - Revised Financial Economic analysis	English	2017	PDF
ND-22	National Dairy Development Board (NDDDB)	Impact of JICA project - Savings due to refurbishment of dairy plnant	English	2017	Excel
ND-23	National Dairy Development Board (NDDDB)	India Map Coverage of Cooperatives	English	2017	PDF
ND-24	National Dairy Development Board (NDDDB)	Information of Dairy Plant Equipment	English	2017	PDF
ND-25	National Dairy Development Board (NDDDB)	Information-JICA Study Team	English	2017	PDF
ND-26	National Dairy Development Board (NDDDB)	List of Producer Company	English	2017	Excel
ND-27	National Dairy Development Board (NDDDB)	List of Unions proposed for setting up of new & expansion of dairy plants	English	2017	Excel
ND-28	National Dairy Development Board (NDDDB)	Milk Price Chart at DCS which JICA study team visited on September 22	English	2017	Word
ND-29	National Dairy Development Board (NDDDB)	National Dairy Plan 2009-2022	English	2008	PDF
ND-30	National Dairy Development Board (NDDDB)	NDDDB act	English	1987	PDF
ND-31	National Dairy Development Board (NDDDB)	Need for new technology in dairy sector and opportunities for technology transfer with key Japanese partners	English	2017	PDF
ND-32	National Dairy Development Board (NDDDB)	Note on use of Japanese Technology in dairy sector	English	2017	Word

ND-33	National Dairy Development Board (NDDDB)	Organogram & Group wise manpower	English	2017	Excel
ND-34	National Dairy Development Board (NDDDB)	Poverty alleviation through dairying	English	2017	PPT
ND-35	National Dairy Development Board (NDDDB)	Presentation on National Dairy Plan Phase I	English	2017	PDF
ND-36	National Dairy Development Board (NDDDB)	Presentation on NDDDB	English	2017	PDF
ND-37	National Dairy Development Board (NDDDB)	Question & Answer NDDDB Project 3 June 2016 Section 1	English	2017	Word
ND-38	National Dairy Development Board (NDDDB)	Question & Answer NDDDB Project 3 June 2016 Section 2	English	2017	Word
ND-39	National Dairy Development Board (NDDDB)	Question & Answer NDDDB Project 3 June 2016 Section 3	English	2017	Word
ND-40	National Dairy Development Board (NDDDB)	Question & Answer NDDDB Project 3 June 2016 Section 4	English	2017	Word
ND-41	National Dairy Development Board (NDDDB)	Question & Answer NDDDB Project 3 June 2016 Section 5	English	2017	Word
ND-42	National Dairy Development Board (NDDDB)	Question & Answer NDDDB Project 3 June 2016 Section 6	English	2017	Word
ND-43	National Dairy Development Board (NDDDB)	Question & Answer NDDDB Project 3 June 2016 Section 7	English	2017	Word
ND-44	National Dairy Development Board (NDDDB)	RBP impact assessment by IRMA	English	2017	PDF
ND-45	National Dairy Development Board (NDDDB)	RBP impact assessment by NDRI	English	2017	PDF
ND-46	National Dairy Development Board (NDDDB)	Reply on Questionnaire for JICA Contact Mission_27 Feb 2017	English	2017	PDF
ND-47	National Dairy Development Board (NDDDB)	Reply on Questionnaire for JICA Contact Mission_Feasibility Analysis	English	2017	Word
ND-48	National Dairy Development Board (NDDDB)	Reply to Query 2016-09-27	English	2017	PDF
ND-49	National Dairy Development Board (NDDDB)	Reply to Query 2017-12-27	English	2017	Word
ND-50	National Dairy Development Board (NDDDB)	Reply to Query 2018-02-06&12(1)	English	2017	Word
ND-51	National Dairy Development Board (NDDDB)	Reply to Query 2018-02-06&12(2)	English	2017	Word
ND-52	National Dairy Development Board (NDDDB)	State wise breakup_Impact of project components	English	2017	Excel
ND-53	National Dairy Development Board (NDDDB)	Strengthening of Milk Processing Infrastructure	English	2017	PPT
ND-54	National Dairy Development Board (NDDDB)	Suggested list of states for data collection survey	English	2017	Word
ND-55	National Dairy Development Board (NDDDB)	Training Planner 2017-2018	English	2017	PDF
ND-56	National Dairy Development Board (NDDDB)	Union, PC, Procurement, DCS member, milk sale	English	2017	PDF
ND-57	National Dairy Development Board (NDDDB)	Unionwise Financial Outlay	English	2017	Excel
ND-58	National Dairy Development Board (NDDDB)	Unionwise Information_5 States	English	2017	Excel
ND-59	National Dairy Development Board (NDDDB)	Unionwise Information_All States	English	2017	Excel
ND-60	National Dairy Development Board (NDDDB)	Unionwise Information_Gujarat States	English	2017	Excel
ND-61	National Dairy Development Board (NDDDB)	Unionwise information_Projected physical performance	English	2017	Excel
ND-62	National Dairy Development Board (NDDDB)	Vision 2024-National Action Plan on Dairy Development	English	2017	Excel
ND-63	National Dairy Development Board (NDDDB)	Working capital scheme guidelines	English	2017	PDF
ND-64	National Dairy Development Board, Bangarole (NDDBB)	Bypass Fat Supplement	English	2017	PDF
ND-65	National Dairy Development Board, Bangarole (NDDBB)	Bypass protein supplement	English	2017	PDF
ND-66	National Dairy Development Board, Bangarole (NDDBB)	Compound cattle feed	English	2017	PDF
ND-67	National Dairy Development Board, Bangarole (NDDBB)	Mineral Mixture	English	2017	PDF
ND-68	National Dairy Development Board, Engineering Service (NDDBES)	Infrastructure upgradation	English	2017	PPT
ND-69	National Dairy Development Board, Engineering Service (NDDBES)	Japanese Technology	English	2017	PPT
ND-70	National Dairy Development Board, Quality Assurance (NDDBQA)	Quality Assurance	English	2017	PPT

Assam state

S/N	Issued by	Name of document or data	Language	Year	Type
AS-01	Assam Livestock Development Agency (ALDA)	Abstract of the Cattle Breeding Program of the state	English	2017	PDF
AS-02	Assam Livestock Development Agency (ALDA)	Breeding Policy for Cattle and Buffalo in the state of Assam	English	2002	PDF
AS-03	Assam Livestock Development Agency (ALDA)	Frozen Semen Bull Station	English	2017	PDF
AS-04	Assam Livestock Development Agency (ALDA)	Letter for fund release under NMBP, 2016-17	English	2017	PDF
AS-05	Assam Livestock Development Agency (ALDA)	Physical progress and financial status of ALDA	English	2017	PDF
AS-06	Assam Livestock Development Agency (ALDA)	Revised Microplan, NPBB	English	2017	PDF
AS-07	Commissionerate of Food Safety, Assam (CFSA)	Answers for questioners	English	2017	PDF
AS-08	Directorate of Animal Husbandry (DAH)	Animal Husbandry and Veterinary Component under APART	English	NA	PDF
AS-09	Directorate of Animal Husbandry (DAH)	At a glance of Animal Husbandry and Veterinary Department, Assam	English	NA	PDF
AS-10	Directorate of Animal Husbandry (DAH)	District-wise Livestock and Poultry Population in Assam (copy of 1th Livestock Census)	English	NA	PDF
AS-11	Directorate of Animal Husbandry (DAH)	Integrated Sample Survey Report 2015-16	English	2016	PDF
AS-12	Directorate of Animal Husbandry (DAH)	Milk Production SPAP	English	NA	PDF
AS-13	DCS Sundar Pukhuri Milk Cooperative Society (DCS)	Booklet	English	NA	PDF
AS-14	DCS Sundar Pukhuri Milk Cooperative Society (DCS)	Visit report	English	2014	PDF
AS-15	Directorate of Dairy Development (DDD)	Annual Report of Dairy Development 2016-17	English	2017	PDF
AS-16	Directorate of Dairy Development (DDD)	APART (Assam Project on Agribusiness and Rural Transformation)	English	NA	PPT
AS-17	Directorate of Dairy Development (DDD)	Presentation	English	2017	PDF
AS-18	Directorate of Dairy Development (DDD)	Procurement & sale price of milk & milk products, Cost of production	English	2016	PDF
AS-19	Directorate of Dairy Development (DDD)	Progress report of Town milk supply scheme	English	2017	PDF
AS-20	International Livestock Research Institute (ILRI)	Comprehensive study of Assam dairy sector - Action plan for pro-poor dairy development	English	2007	PDF
AS-21	International Livestock Research Institute (ILRI)	Comprehensive study of Assam dairy sector - Assesment of success and failures of dairy plants	English	2010	PDF
AS-22	International Livestock Research Institute (ILRI)	Comprehensive study of Assam dairy sector - Milk and milk products consumption	English	2009	PDF
AS-23	International Livestock Research Institute (ILRI)	Comprehensive study of Assam dairy sector - Milk and milk products marketing	English	2008	PDF
AS-24	International Livestock Research Institute (ILRI)	Comprehensive study of Assam dairy sector - Milk quality, pathdays and perceptions	English	2011	PDF
AS-25	International Livestock Research Institute (ILRI)	Comprehensive study of Assam dairy sector - Rural Households and Milk Production	English	2007	PDF
AS-26	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Financial information	English	NA	PDF
AS-27	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	List of machineries	English	2017	PDF
AS-28	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Milk retail price & Procurement price	English	2017	PDF
AS-29	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Presentation file	English	2017	PPT
AS-30	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Result of market research	English	2016	PDF

Bihar state

S/N	Issued by	Name of document or data	Language	Year	Type
BH-01	Bihar Livestock Development Agency (BLDA)	General Information	Hindhi	2017	PDF
BH-02	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Annual Report 2014	Hindhi	2014	PDF
BH-03	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Annual Report 2015	Hindhi	2015	PDF
BH-04	Bihar State Milk Cooperative Federation Ltd. (COMFED)	Financial performance of COMFED and Union	English	2017	Excel
BH-05	DCS Chakhaji (DCS)	General Information	English	2017	PDF
BH-06	DCS Rahmatpur (DCS)	General Information	English	2017	PDF
BH-07	Department of Dairy Dvelopment (DDD)	General information	English	2017	PDF
BH-08	Food Safety Officer (FSO) of Bihar	Fact sheet on enforcement related issues for the state	English	2017	PDF
BH-09	Government of Bihar Finance Department (GBFD)	Economic Survey 2016-17	English	2017	PDF
BH-10	Samastipur Dairy (Mithila Milk Union: MMU)	Annual Report 2013-14	Hindhi	2014	PDF
BH-11	Samastipur Dairy (Mithila Milk Union: MMU)	Internal documents about investment with JICA	English	2017	PDF
BH-12	Samastipur Dairy (Mithila Milk Union: MMU)	Milk Union Provide Services to DCS Milk Producers	English	2017	PDF
BH-13	Samastipur Dairy (Mithila Milk Union: MMU)	Presentation	English	2017	PDF
BH-14	Naturals Dairy (ND)	General Information	English	NA	PDF
BH-15	NDDB Dairy Service (NDS)	Presentation	English	2017	PPT
BH-16	Patna District Cooperate Milk Producers' Union (PDCMPU)	General & financial information	English	NA	PDF

Gujarat state

S/N	Issued by	Name of document or data	Language	Year	Type
GJ-01	Banaskantha District Cooperative Milk Producer' Union (BDCMPU)	48th Annual Report 2015-16	English	2016	PDF
GJ-02	Banaskantha District Cooperative Milk Producer' Union (BDCMPU)	DCS F/S rank	Hindhi	2016	PDF
GJ-03	Banaskantha District Cooperative Milk Producer' Union (BDCMPU)	Presentation document (1000 MTPF Cattle Feed Plant, Katarva)	English	NA	PDF
GJ-04	Directorate of Animal Husbandry (DAH))	Bulletin of animal husbandry and dairying statistics 2015-2016	English	2016	PDF
GJ-05	Directorate of Animal Husbandry (DAH))	Presentation file	English	2017	PPT
GJ-06	DCS Adalaj (DCS)	General information	English	2017	PDF
GJ-07	Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF)	41st Annual Report 2014/2015	English	2015	PDF
GJ-08	Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF)	43rd Annual Report 2016/2017	English	2017	PDF
GJ-09	Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF)	Corporate Presentation	English	2017	PDF
GJ-10	Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF)	General information	English	2017	PDF
GJ-11	Gandhinagar District Cooperate Milk Producers' Union (GDCMPU)	46th Annual Report & Accounts 2015-2016	English	2016	PDF
GJ-12	Gandhinagar state Food and Drugs Control Administration (GFDCA)	Manual for Food Adultration kit	English	NA	PDF
GJ-13	Gandhinagar state Food and Drugs Control Administration (GFDCA)	Presentation file	English	2017	PPT
GJ-14	Gujarat Livestock Dvelopment Board (GLDB)	Annual Report 2015-16	English	2016	PDF
GJ-15	Kaira District Cooperative Milk Producers' Union (KDCMPU)	71st Annual Report 2016-2017	English	2017	PDF
GJ-16	Kaira District Cooperative Milk Producers' Union (KDCMPU)	Amul the inspiration behind a revolution	English	NA	PDF
GJ-17	Kaira District Cooperative Milk Producers' Union (KDCMPU)	General information	English	NA	PDF

Karnataka state

S/N	Issued by	Name of document or data	Language	Year	Type
KT-01	Bangalore Cooperative Milk Union (BAMUL)	A brief progress report	English	2016	PDF
KT-02	Bangalore Cooperative Milk Union (BAMUL)	Data submission for JICA study	English	2017	PDF
KT-03	Bangalore Cooperative Milk Union (BAMUL)	Documents for study JICA	English	2017	PDF
KT-04	Bangalore Cooperative Milk Union (BAMUL)	List of machineries	English	2018	PDF
KT-05	Bangalore Cooperative Milk Union (BAMUL)	Presentation	English	2017	PDF
KT-06	DCS Bedwa	General information	English	2017	PDF
KT-07	DCS Devanahalli	General information	English	2017	PDF
KT-08	DCS Ghatboral	Financial information	English	2017	PDF
KT-09	DCS Ghatboral	General information	English	2017	PDF
KT-10	DCS Jalige	General information	English	2017	PDF
KT-11	DCS Mujkuva	General information	English	2017	PDF
KT-12	DCS Sandesar	General information	English	2017	PDF
KT-13	DCS Sarsa	General information	English	2017	PDF
KT-14	Food Safety Commissioner, Karnataka (FSC)	DART, Detect Adulteration with Rapid Test	English	2017	PDF
KT-15	Food Safety Commissioner, Karnataka (FSC)	Organogram	English	2016	PDF
KT-16	Food Safety Commissioner, Karnataka (FSC)	The Pink Book, Your Guide for Safe and Nutritious Food at Home	English	2017	PDF
KT-17	Government of Karnataka, Department of Animal Husbandry and Veterinary Services (GKDAHVS)	Annual Administration Report 2016-17	English	2017	PDF
KT-18	Government of Karnataka, Department of Animal Husbandry and Veterinary Services (GKDAHVS)	Report on 19 th Livestock Census 2012	English	2012	PDF
KT-19	Government of Karnataka, Department of Animal Husbandry and Veterinary Services (GKDAHVS)	Report on Integrated Sample Survey for Estimation of Production of Milk, Egg, Wool and Meat for the year 2015-16	English	2016	PDF
KT-20	Ghatboral Milk Producers' Cooperative Society (GMPCS)	General information	English	2017	PDF
KT-21	Gulbarga Milk Producers Societie's Union (GMPSU)	Answers for questioners	English	2017	PDF
KT-22	Gulbarga Milk Producers Societie's Union (GMPSU)	Financial information	English	2018	PDF
KT-23	Gulbarga Milk Producers Societie's Union (GMPSU)	Financial report 2016	English	2016	PDF
KT-24	Gulbarga Milk Producers Societie's Union (GMPSU)	Presentation file	English	2017	PPT
KT-25	Gokul Dairy Products (Gokul)	General Information	English	2017	PDF
KT-26	Gokul Dairy Products (Gokul)	Other information	English	2017	PDF
KT-27	Hangyo Ice Creams Pvt. Ltd (Hangyo)	General informaiotn	English	NA	PDF
KT-28	Heritage Ltd.	Presentation	English	2017	PDF
KT-29	Cleamline Dairy Products Limited (CDPL: Jersey)	General information	English	2017	PDF
KT-30	Karnataka Cooperative Milk Producers' Federation (KMF)	Annual Report 2016-2017	English	2017	PDF
KT-31	Karnataka Cooperative Milk Producers' Federation (KMF)	Financial Statement for 2016/17	Hindhi/English	2017	PDF
KT-32	Karnataka Cooperative Milk Producers' Federation (KMF)	Presentation	English	2017	PPT
KT-33	Karnataka State Dairy Association (Srikrishna)	General information	English	NA	PDF

Madhya Pradesh state

S/N	Issued by	Name of document or data	Language	Year	Type
MP-01	Bhopal Sahakari Dugdha Sangah Maryadit (Bhopal Cooperative Milk Union: BCMU)	Annual Report 2017	Hindhi	2017	PDF
MP-02	Bhopal Sahakari Dugdha Sangah Maryadit (Bhopal Cooperative Milk Union: BCMU)	Financial statement 2012 & 2015	English	NA	PDF
MP-03	Bhopal Sahakari Dugdha Sangah Maryadit (Bhopal Cooperative Milk Union: BCMU)	General & Financial information	English	NA	PDF
MP-04	Bhopal Sahakari Dugdha Sangah Maryadit (Bhopal Cooperative Milk Union: BCMU)	List of machinery	English	2017	PDF
MP-05	Bhopal Sahakari Dugdha Sangah Maryadit (Bhopal Cooperative Milk Union: BCMU)	NDDB loan and investment	English	2017	PDF
MP-06	Department of Animal Husbandry (DAH) in MP	Annual Report 2016/17	Hindhi	2017	PDF
MP-07	Department of Animal Husbandry (DAH) in MP	Breeding Policy 2006	English	2006	PDF
MP-08	Department of Animal Husbandry (DAH) in MP	Livestock Development Policy 2011	English	2011	PDF
MP-09	Food Safety Commissioner, M.P (FSC)	Number of registration to FSSAI	English	2017	PDF
MP-10	Food Safety Commissioner, M.P (FSC)	Number of staffs	English	2017	PDF
MP-11	Indore Sahakari Dugdha Sangh Mryadit (Indore Milk Union: IMU)	Annual report 2014-15	Hindhi	2015	PDF
MP-12	Indore Sahakari Dugdha Sangh Mryadit (Indore Milk Union: IMU)	Annual report 2015-16	Hindhi	2016	PDF
MP-13	Indore Sahakari Dugdha Sangh Mryadit (Indore Milk Union: IMU)	Annual report 2016-17	Hindhi	2017	PDF
MP-14	Indore Sahakari Dugdha Sangh Mryadit (Indore Milk Union: IMU)	Answers for questioners	English	2017	PDF
MP-15	Indore Sahakari Dugdha Sangh Mryadit (Indore Milk Union: IMU)	Fiancial information	Hindhi/English	NA	PDF
MP-16	Indore Sahakari Dugdha Sangh Mryadit (Indore Milk Union: IMU)	Presentation file	English	2017	PDF
MP-17	Jabalpur Milk Union (JMU)	Answers for questioners	English	2017	PDF
MP-18	Jabalpur Milk Union (JMU)	Answers for questioners	English	2017	PDF
MP-19	Jabalpur Milk Union (JMU)	Answers for questioners2	English	2017	PDF
MP-20	Jabalpur Milk Union (JMU)	Balance sheet 2013-14	English	2014	PDF
MP-21	Jabalpur Milk Union (JMU)	Balance sheet 2014-15	English	2015	PDF
MP-22	Jabalpur Milk Union (JMU)	Balance sheet 2015-16	English	2016	PDF
MP-23	Jabalpur Milk Union (JMU)	Balance sheet 2016-17	English	2017	PDF
MP-24	Jabalpur Milk Union (JMU)	Field operation and DCS information	English	2017	Excel
MP-25	Jabalpur Milk Union (JMU)	Organogram & HACCP	English	NA	PDF
MP-26	Jabalpur Milk Union (JMU)	Other information set	English	NA	PDF
MP-27	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Answers for questioners	English	2017	PDF
MP-28	Madhya Pradesh State Cooperative Dairy Federation (MPCDF)	Presentation file	English	2017	PDF
MP-29	Madhya Pradesh Poultry and Livestock Development Agency (MPPLDA)	Annual report 2014-15	Hindhi	2015	PDF

Uttar Pradesh state

S/N	Issued by	Name of document or data	Language	Year	Type
UP-01	Department of Animal Husbandry, Dairying and Fishery (DAHDF)	Financial Statement of National Programme for Dairy Development	English	2017	PDF
UP-02	Department of Animal Husbandry, Dairying and Fishery (DAHDF)	State Action Plan of Animal Husbandry,U.P.	English	2017	PDF
UP-03	DCS Amarpur (DCS)	General Information	English	2017	PDF
UP-04	DCS Natwara (DCS)	General Information	English	2017	PDF
UP-05	DCS Rahamatenagar (DCS)	General Information	Hindhi	2017	PDF
UP-06	Department of Dairy Development (DDD))in UP	An overview	English	NA	PDF
UP-07	Department of Dairy Development (DDD))in UP	Answers for questioners	English	2017	PDF
UP-08	Department of Dairy Development (DDD))in UP	UP Milk Act 1976 & Milk Rule 1976	English	1976	PDF
UP-09	Food Safety and Drug Administration (FSDA) in UP	General Information	English	2017	PDF
UP-10	Food Safety and Drug Administration (FSDA) in UP	Regulation annex	English	2017	PDF
UP-11	CP Milk and Food Products Pvt. Ltd (Gyan)	List of machineries	English	2017	PDF
UP-12	Indian Institute of Management (IIM) Lucknow	Strategy for revival of Milk Unions in UP	English	NA	PDF
UP-13	Kanpur Milk Union (KMU)	General & financial information	English	2017	PDF
UP-14	Lucknow Milk Union (LMU)	AI Report	English	2017	Excel
UP-15	Lucknow Milk Union (LMU)	Balance sheet 2014-2015	English	2015	PDF
UP-16	Lucknow Milk Union (LMU)	Balance sheet 2015-2016	English	2016	PDF
UP-17	Lucknow Milk Union (LMU)	Balance sheet 2016-2017	English	2017	PDF
UP-18	Lucknow Milk Union (LMU)	General information	English	2017	PDF
UP-19	Lucknow Milk Union (LMU)	List of machineries	English	2017	PDF
UP-20	Lucknow Milk Union (LMU)	Milk Procurement	English	2017	Excel
UP-21	Lucknow Milk Union (LMU)	Milk Purchase rate	English	2017	Excel
UP-22	Lucknow Milk Union (LMU)	Presentation file	English	2017	PDF
UP-23	Lucknow Milk Union (LMU)	Quality Assurance System	English	NA	PDF
UP-24	Meerut Milk Union (MMU)	General & Financial information	English	NA	PDF
UP-25	National Dairy Development Board (NDDB)	Dairying in U.P A statistical Profile 2017	English	2017	PDF
UP-26	Predesh Cooperative Dairy Federation (PCDF)	Answers for questioners	English	NA	PDF
UP-27	Predesh Cooperative Dairy Federation (PCDF)	Financial information set	English	NA	PDF
UP-28	Predesh Cooperative Dairy Federation (PCDF)	NPD I Monthly report achievement Sep 2017	English	2017	Excel
UP-29	Predesh Cooperative Dairy Federation (PCDF)	New proposed capacities of dairy plant	English	2017	PDF
UP-30	Predesh Cooperative Dairy Federation (PCDF)	NPDD details	English	2017	PDF
UP-31	Predesh Cooperative Dairy Federation (PCDF)	Organogram	English	NA	Excel
UP-32	Predesh Cooperative Dairy Federation (PCDF)	Present processing capacity	English	2017	PDF
UP-33	Predesh Cooperative Dairy Federation (PCDF)	Presentation file	English	2017	PPT
UP-34	Predesh Cooperative Dairy Federation (PCDF)	Price list	English	2017	Excel
UP-35	Predesh Cooperative Dairy Federation (PCDF)	Profit & Loss statement	English	2017	Excel
UP-36	Predesh Cooperative Dairy Federation (PCDF)	RKVY	English	2017	PDF
UP-37	Predesh Cooperative Dairy Federation (PCDF)	Sales report	English	2017	Excel
UP-38	Predesh Cooperative Dairy Federation (PCDF)	Summary	English	2017	Word

UP-39	Predeh Cooperative Dairy Federation (PCDF)	Working capital requirement	English	2017	Excel
UP-40	Saahaj Milk Producer Company (SMPC)	Annual Report 2016-2017	English	2017	PDF
UP-41	Saahaj Milk Producer Company (SMPC)	Presentation	English	2017	PDF
UP-42	State Planning Institute (SPI)	Statistical Diary Uttar Pradesh 2016	English	2016	PDF
UP-43	Uttar Pradesh Livestock Development Board (UPLDB)	Presentation	English	2017	PPT
UP-44	Varanasi Milk Union (VMU)	General & Financial information (1)	English	NA	PDF
UP-45	Varanasi Milk Union (VMU)	General & Financial information (2)	English	NA	PDF
UP-46	Varanasi Milk Union (VMU)	General & Financial information (3)	English	NA	PDF
UP-47	Varanasi Milk Union (VMU)	Offer for new plant	English	2015	PDF

Others

S/N	Issued by	Name of document or data	Language	Year	Type
OT-01	Gopaljee Dairy Foods Ptv. Ltd. (Ananda)	Company Profile	English	NA	PDF
OT-02	Food and Agriculture Organization of the United Nations (FAO)	State of Food and Agriculture	English	2009	PDF
OT-03	Indian Dairy Association (IDA)	General Information	English	NA	PDF
OT-04	Indian Dairy Association (IDA)	Presentation file	English	2017	PDF
OT-05	International Dairy Federation (IDF)	The World Dairy Situation sample	English	2016	PDF
OT-06	IFCN Dairy Research Network MD (IFCN)	Event summery	English	2017	PDF
OT-07	IFCN Dairy Research Network MD (IFCN)	Presentation	English	2017	PDF
OT-08	International Market Analysis Research & Consulting (IMARC)	Dairy Industry in India 2017 Edition	English	2017	PDF
OT-09	Indian Society of Agricultural Economics (ISAE)	Shift from crop-mixed traditional dairying to market oriented	English	2010	PDF
OT-10	Japan International Cooperation Agency (JICA)	Presentation to DAH by JICA Obihiro	English	NA	PPT
OT-11	Mackawa India (MYCOM)	Booklet	English	NA	PDF
OT-12	Param Dairy Limited (Param)	General Information	English	NA	PDF
OT-13	VRS Foods Ltd. (Paras)	Company Profile	English	NA	PPT

Others (Japanese)

S/N	Issued by	Name of document or data	Language	Year	Type
JP-01	オリオン機械株式会社 (ORION)	酪農冷却・飼養・環境機器	日本語	2017	PDF
JP-02	中央酪農会議 (JDC)	日本の酪農	日本語	NA	PDF
JP-03	日本酪農科学会 (JDSA)	日本における乳質改善の経過	日本語	2007	PDF
JP-04	農林水産省生産局畜産部 (MAFF)	畜産・酪農をめぐる情勢	日本語	2017	PDF
JP-05	フォンテラジャパン (Fonterra)	内閣府向けプレゼン資料「フォンテラの取り組みと日本市場への期待」	日本語	2014	PDF
JP-06	早稲田大学出版部 (秋吉 恵)	貧困と女性、二重の制約は克服できるか	日本語	2011	Hard copy

Annex 5: Basic information of milk unions

West Assam Milk Producers' Cooperative Union Ltd.



Registered name	West Assam Milk Producers’ Cooperative Union Ltd. (WAMUL)																														
Website	http://www.purabi.org/index.php																														
Address	R. K. Jyotiprasad Agarwalla Road, Juripar, Panjabari, Guwahati-781037 Assam																														
Phone	+91-0361-2332705																														
E-mail	mktg.purabimilk@gmail.com																														
Year of establishment	1976																														
Brand name	Purabi																														
Number of staffs	130																														
Area of milk collection	Nagaon, Morigaon, Goalpara, Nalbari and Kamrup districts																														
Number of functional DCS/MPI	176																														
Number of BMC	5																														
Total number of members	4,659																														
Number of dairy plants	1 in Guwahati																														
Plant capacity (Per day in litre)	60,000																														
Dairy milk collection (in Kg)	26,150																														
Sales turnover (Rs.)	8,200 Lakh (2016-17)																														
Other facility	Cattle feed plant (Closed in 2014)																														
Products	Standard milk, Smart milk, Ghee, Standard curd, Sweet curd, Lassi, Cream, Paneer																														
Milk procurement price (Rs. /kg)	34.28																														
Milk retail price (Standard milk, Rs.)	25 in Guwahati city & 27 outside the city																														
Certification of plant	N/A (Under preparation)																														
Supports for farmers	AI & its awareness camps,																														
Awards	N/A																														
Remarks	Managed by the National Dairy Development Board (NDDB) since 2008 State government share is 99%.																														
Graphs	<div><p>Milk Procurement and Sales</p><table><thead><tr><th>Fiscal Year</th><th>Daily average local milk procurement '000 Kg per day</th><th>Daily average liquid milk sale '000 litres per day</th></tr></thead><tbody><tr><td>FY 09</td><td>4.85</td><td>4.85</td></tr><tr><td>FY 10</td><td>6.6</td><td>11.88</td></tr><tr><td>FY 11</td><td>8.7</td><td>22.07</td></tr><tr><td>FY 12</td><td>11.9</td><td>32.7</td></tr><tr><td>FY 13</td><td>15.2</td><td>37.36</td></tr><tr><td>FY 14</td><td>19.5</td><td>42.23</td></tr><tr><td>FY 15</td><td>22.56</td><td>40.05</td></tr><tr><td>FY 16</td><td>21.78</td><td>43.83</td></tr><tr><td>FY 17</td><td>26.15</td><td>47.57</td></tr></tbody></table><p>— Daily average local milk procurement '000 Kg per day — Daily average liquid milk sale '000 litres per day</p></div>	Fiscal Year	Daily average local milk procurement '000 Kg per day	Daily average liquid milk sale '000 litres per day	FY 09	4.85	4.85	FY 10	6.6	11.88	FY 11	8.7	22.07	FY 12	11.9	32.7	FY 13	15.2	37.36	FY 14	19.5	42.23	FY 15	22.56	40.05	FY 16	21.78	43.83	FY 17	26.15	47.57
Fiscal Year	Daily average local milk procurement '000 Kg per day	Daily average liquid milk sale '000 litres per day																													
FY 09	4.85	4.85																													
FY 10	6.6	11.88																													
FY 11	8.7	22.07																													
FY 12	11.9	32.7																													
FY 13	15.2	37.36																													
FY 14	19.5	42.23																													
FY 15	22.56	40.05																													
FY 16	21.78	43.83																													
FY 17	26.15	47.57																													

Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd.
(Patna Milk Union)

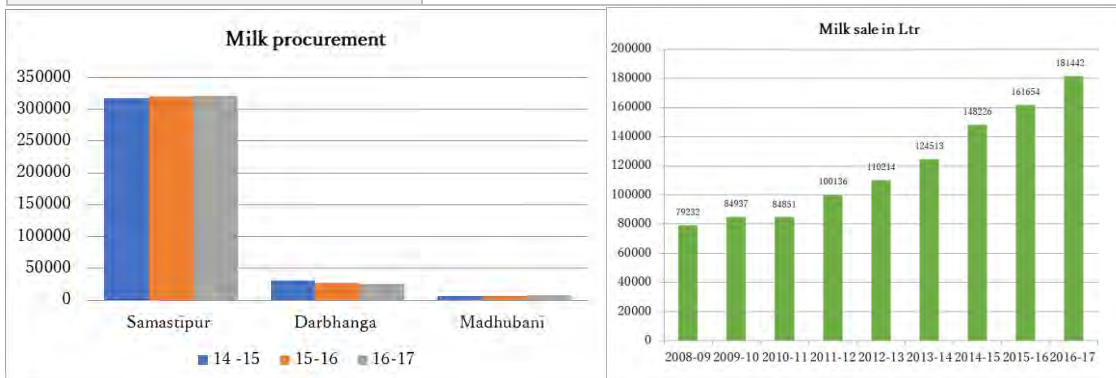


Registered name	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd.
Website	http://www.patnadairy.org
Address	Phulwari Galmber, Khagaul Rd & Anisabad Road & Galmber AMS Road, Sadar Colony, Phulwari Sharif, Patna, Bihar 801505
Phone	+91-0612-2251154, 2252542
E-mail	info@patnadairy.org
Year of establishment	1972
Brand name	Sudha
Number of staffs	310
Area of milk collection	Patna, Vaishali, Nalanda, Saran & Shekhpura districts
Number of functional DCS	2,549
Number of BMC	68
Total number of members	160,318
Number of dairy plants	2 (Patna & Hajipur)
Plant capacity (Per day in litre)	Patna 2.5 LL/day, Hajipur 1LL/day
Dairy milk collection (in Kg)	1040 Lakh (2016-17)
Sales turnover (Rs.)	47,482 Lakh (2016-17)
Other facility	Cattle feed plant 150 MT/day, By Pass protein plant 20MT
Products	Liquid milk, milk powder, butter, ghee, ice cream, peda, paneer and Plain/Misti Dahi, Lassi, Matha and kulfi.
Milk procurement price (Rs.)	N/A
Milk retail price (standard)	N/A
Certification of plant	ISO22000, HACCP, Quality Mark (NDDB)
Supports for farmers	AI with Frozen Semen, Veterinary First Aid (VFA), Vaccination, supply of balanced feed, supply of fodder seeds, treatment of paddy straw/wheat with Urea, supply of Urea Molasses Block (UMB) etc.
Awards	“Best Productivity Performance” 2007, “ Indira Gandhi Excellence Award” 2013, “Dairy Women of the year” 2016, “Glory of India Award” 2016, etc.
Remarks	The NDDB took over the management of the infrastructure during 1981-86. 590 no. of Women Cooperative Societies exclusively managed and run by rural women

Mithila Dugdh Utpadak Sahkari Sangh Ltd.
(Mithila Milk Union)



Registered name	Mithila Dugdh Utpadak Sahkari Sangh Ltd. (Mithila Milk Union)
Website	http://mithiladairy.com/index.php
Address	Samastipur Dairy, Industrial Area, P.O. - Harpur Alloth, Samastipur – 848101
Phone	+91-06274-290172, 290680
E-mail	info@mithiladairy.com
Year of establishment	1987
Brand name	Sudha
Number of staffs	NA
Area of milk collection	Samastipur, Darbhanga & Madhubani districts
Number of functional DCS	2,334 (221 Women's)
Number of BMC	69
Total number of members	173,662
Number of dairy plants	1
Plant capacity (Per day in litre)	250,000
Dairy milk collection (in Kg)	354,380
Sales turnover (Rs.)	47,581 Lakh (2015-16)
Other facility	Powder plant (30MT/day), Chilling center (10KL/day in Tajpur, 20KL/day in Rosera), Packing station (50KL/day in Darbhanga), Mineral mixture plant (8MT/day), Seed processing plant (2MT/hour)
Products	Liquid milk, Ghee, peda, kalakand, Paneer, Rasogulla, Gulabjamun, Butter, Lassi, Misti Dahi etc.
Milk procurement price (Rs.)	NA
Milk retail price (standard)	NA
Certification of plant	ISO9001, HACCP
Supports for farmers	Supply of balanced cattle feed & fodder seeds, by-pass protein feed, mineral mixtures, calcium, AI, veterinary health camps, first aid, vaccination, deworming, etc.
Awards	Best dairy development, Rashtriya eka purashkar etc
Remarks	-

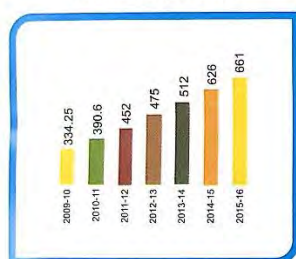


Kaira District Co-operative Milk Producers Union Ltd.

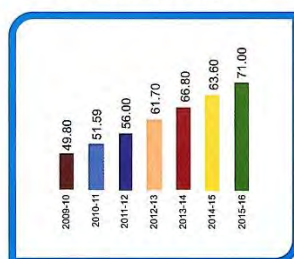


Registered name	Kaira District Co-operative Milk Producers Union Ltd.
Address	Amul Dairy Road, Anand 388001, Gujarat
Phone	(02692)256124
E-mail	sundaran@amuldairy.com
Year of establishment	1946
Brand name	Amul
Number of staffs	NA
Area of milk collection	Kaira District (Anand, Kheda & Mahisagar) Other states (West Bengal, Maharashtra & Punjab)
Number of functional DCS	1,713 (Gujarat: 1,225, West Bengal:226, Punjab:145, Maharashtra :117)
Number of BMC	NA
Total number of members	694,274
Number of dairy plants	Amul dairy in Anand, Amul dairy in Pune, Tribhuvandas food factory in Mogar, Amul Cheese plant in Khatraj, Amul dairy in Mumbai, Amul dairy in Virar, Amul dairy in Siliguri, Amul dairy in Sikkim, Amul dairy in Punjab-Baatala, Amul dairy in Waterloo, USA, etc
Plant capacity (Per day in litre)	5,000,000 (total)
Dairy milk collection (in Kg)	2,558,904
Sales turnover (Rs.)	5,700 crores (2016-17)
Other facility	Amul Research and Development Association, Semen station in Ode, Cattle feed plants (1,200MTs/day in Kanjari & 2,000MTs/day in Kapdivav)
Products	Liquid milk, Butter, Cheese, Infant milk food, Milk powder, Ghee, Cocoa products, Malted milk food, Extruded food, Table margarine, Sweets, Frozen food, Bakery, Therapeutic food, etc.
Milk procurement price	NA
Milk retail price (standard)	NA
Certification of plant	ISO9001, ISO22000, FSSC22000, Halal
Supports for farmers	AI, veterinary health camps, first aid, vaccination, deworming, balanced cattle feed & fodder seeds, by-pass protein feed, mineral mixtures, calcium, etc.
Awards	National Productivity Council Productivity Awards (1985-99), National Energy Conservation Award 2009, etc.
Remarks	1 st created dairy cooperative in India

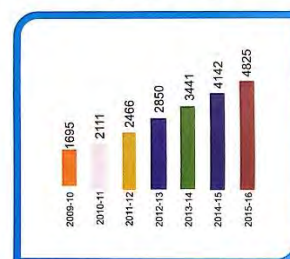
Milk Price Per Kg Fat(in Rs.)



Milk Procurement in Crore Kg.



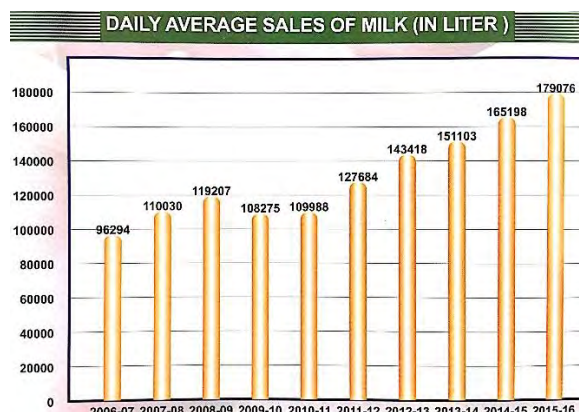
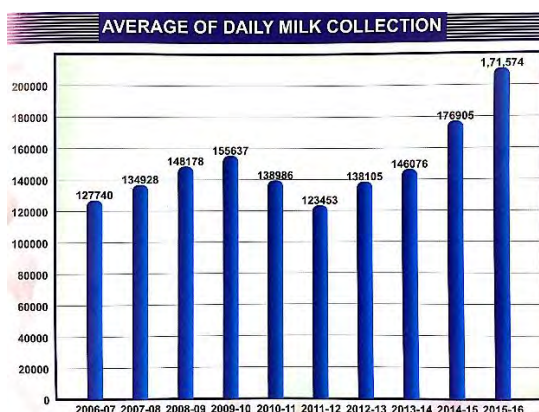
Turnover (Rs. in Crore)



Ghandinagar District Cooperative Milk Producers' Union



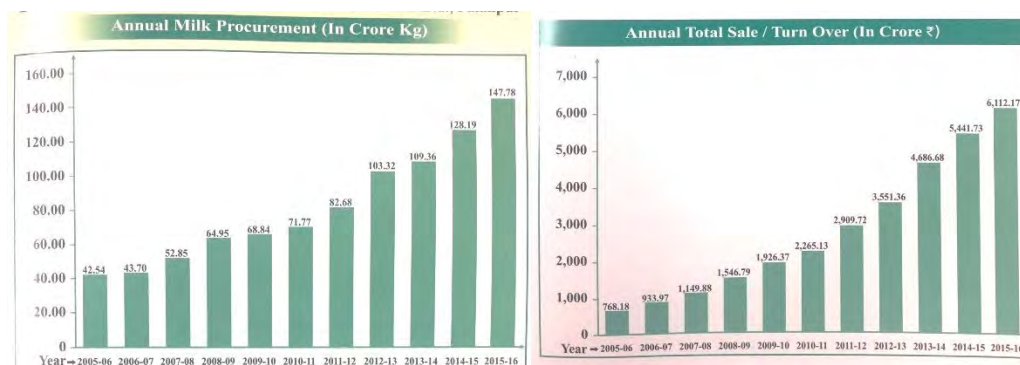
Registered name	Ghandinagar District Cooperative Milk Producers' Union Ltd. (Madhur Dairy)
Website	NA
Address	K-Road, G.I.D.C., Sector-25, Gandhinagar-382 023
Phone	+91-79-23284
E-mail	info@madhurdairy.org
Year of establishment	1971
Brand name	Amul, Madhur
Number of staffs	700
Area of milk collection	Ghandinagar Tehsi
Number of functional DCS	116
Number of BMC	10
Total number of members	42,635
Number of dairy plants	1
Plant capacity (Per day in litre)	300,000
Dairy milk collection (Ave. in Kg)	171,574
Sales turnover (Rs.)	335 Crore
Other facility	Collection Center (in Rajasthan), Cattel Feed plant, Seeds, Testing,
Products	Milk powder, Milk Pouches, Ice cream, Ghee, Paneer, Cheese, Sweets etc.
Milk procurement price	NA
Milk retail price (standard)	NA
Certification of plant	ISO9001
Supports for farmers	Seedlings of green grass, Insurance, Education support, Subsidy, Technical supports, Breeding,
Awards	NA
Remarks	-



Banaskantha District Cooperate Milk Producers' Union



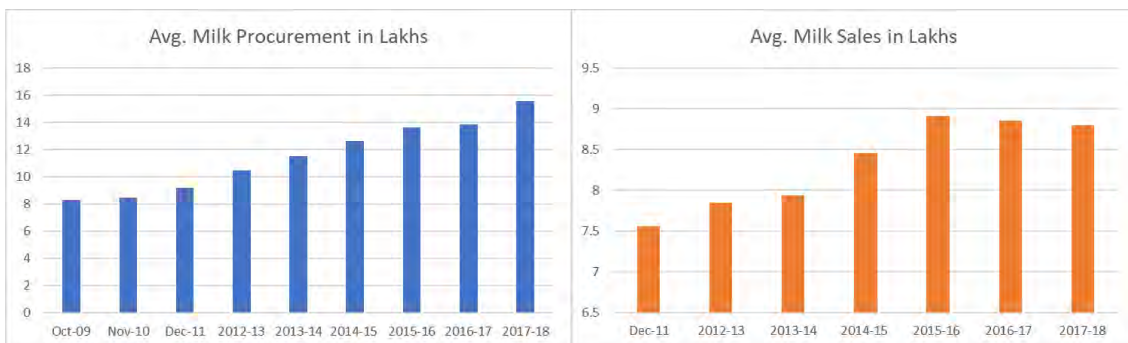
Registered name	Banaskantha District Co-operative Milk Producers' Union Ltd. (Banask Dairy)
Website	http://banasdairy.coop/home.html
Address	Banas Dairy, P.O. Box No 20, Palanpur- 385001
Phone	+91-2742-253881
E-mail	admin@banasdairy.coop
Year of establishment	1969
Brand name	AMUL, SAGAR and BANAS
Number of staffs	2,200
Area of milk collection	Banaskantha and Rajasthan districts
Number of functional DCS	1,290
Number of BMC	1,168
Total number of members	345,862
Number of dairy plants	6 (Banask1:7LLPD, Banask2:24LLPD, Banask3:18LLPD, Faridabad, Lucknow, Kanpur)
Plant capacity (Per day in little)	50 Lac
Dairy milk collection (in Kg)	37.22 Lac (Banaskantha and Rajasthan) 3.15 Lac (UP and NCR)
Sales turnover (Rs.)	6,112 Crore
Other facility	4 Chilling centers, Paneer plant (10MT), Whey powder plant (3LL), UHT plant (10LLPD), Cattle feed plants (Katarva: 1KMTPD, Palanpur: 600MTPD)
Products	Milk powder, UHT tetra pack milk, Milk Pouches, Butter milk, Ice cream, Ghee, Paneer, Cheese, Amul Kool, Lassi, Masti Dahi, Curd etc.
Milk procurement price (Rs.)	Rs.668/Kg Fat
Milk retail price (standard)	NA
Certification of plant	ISO9001, ISO22000, ISO14001
Supports for farmers	Insurance, Educational Assistance, Toilet Construction, National Pension, Animal Health Services, Animal Breeding Services, Animal Husbandry and Animal Breeding Schemes for ST, Cattle Manger Assistant, Chaff Cutter Assistance, Cooling System Assistance, Milking Machine Assistance
Awards	NA
Remarks	One of the biggest plant in Asia. Collecting milk from other states



Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd.



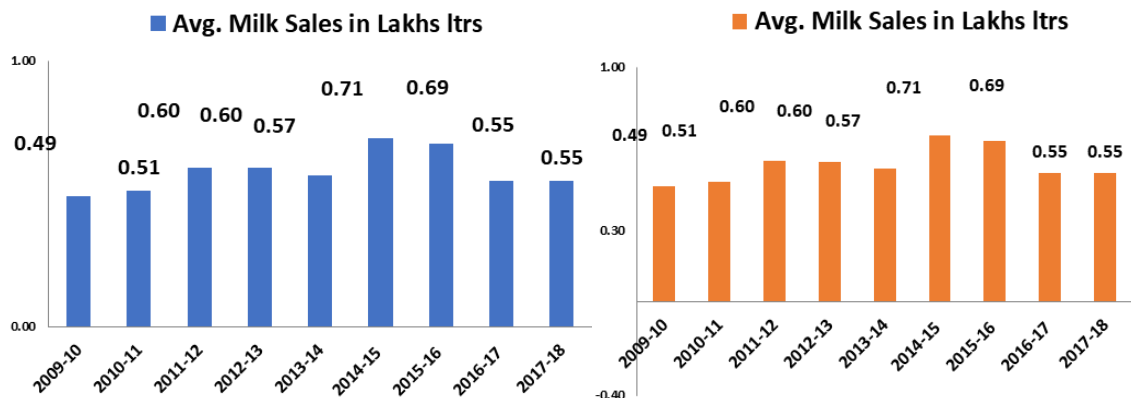
Registered name	Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd., (BAMUL)
Website	http://bamulnandini.coop
Address	Bannerghatta Main Rd, Lakkasandra, Dairy Colony, Adugodi, Bengaluru, Karnataka 560030
Phone	+91 80 2609 6200
E-mail	bamulkmf@yahoo.co.in
Year of establishment	1975
Brand name	Nandini
Number of staffs	759
Area of milk collection	Bangalore urban, Bangalore rural, Ramanagara districts
Number of functional DCS	2,124
Number of BMC	196
Total number of members	356,473
Number of dairy plants	2 (Bangalore & Hosakote)
Plant capacity (Per day in litre)	Bangalore: 10L & Hosakote 2L, (+New plant: 6L in 2018)
Dairy milk collection (Ave. in Kg)	1,532,000
Sales turnover (Rs.)	1,791Lakh
Other facility	Chilling center (Byrapatna, Doddaballapura, Anekal, Solur, Vijayapura, Kanakapura)
Products	Liquid milk, Butter, Ghee, Peda, Flavored Milk, Spiced Butter Milk, Paneer, Set Curds etc.
Milk procurement price	26/kg(3.5%fat/8.5%SNF)
Milk retail price	38/kg (HCM: 3.5%fat/8.5%SNF)
Certification of plant	ISO22000, ISO9001, HACCP, AGMARK
Supports for farmers	Technical Input Services, Animal Health, Breeding Activities, Cattle Feed & Fodder, Cattle Insurance, Training Programs
Awards	"Best Productivity Award" (NPC), 1st place in best Safety Industrial Boiler award for Boiler Maintenance in the year 2007, etc.
Remarks	Started with UNICEF fund. Biggest in South India and fully computerized dairy with highest procurement and sale in Karnataka, and highest seller of curds in the country.



Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Union Ltd.



Registered name	Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Union Ltd. (GUMUL)
Website	http://www.gumul.org
Address	Humnabad Road, Gulbarga, Karnataka - 585 104
Phone	+91-08472-257475/ 258193/ 258088/ 259789/ 257675
E-mail	gumul_g@yahoo.co.in
Year of establishment	1985
Brand name	Nandini
Number of staffs	218
Area of milk collection	Kalaburagi, Bidar & Yadgir districts
Number of functional DCS	390
Number of BMC	22
Total number of members	80,108
Number of dairy plants	2
Plant capacity (Per day in litre)	Kalaburagi: 60,000L/day & Bidar: 30,000L/day
Dairy milk collection (Ave. in Kg)	51,032
Sales turnover (Rs.)	941 Lakh (2016-17)
Other facility	Chilling centres at Hulsoor (5TLPD), Thana Kushnur (5TLPD) and Mallabad (3TLPD)
Products	Liquid milk, Ghee, Curd, Peda, Buttermilk, Lassi, and Paneer
Milk procurement price	NA
Milk retail price (standard)	38/kg (HCM: 3.5%fat/8.5%SNF)
Certification of plant	ISO22000
Supports for farmers	Rearing milch animals and calves, providing subsidized technical inputs, balanced cattle feed to animals, fodder cultivation, organizing calf rallies & dairy related extension activities like on & off campus training programs, field visits, demonstrations, campaigns etc.
Awards	NA
Remarks	Union with resplendent of Self-Help Groups and women societies with four Women Directors on the Union's Board for the first time in the State

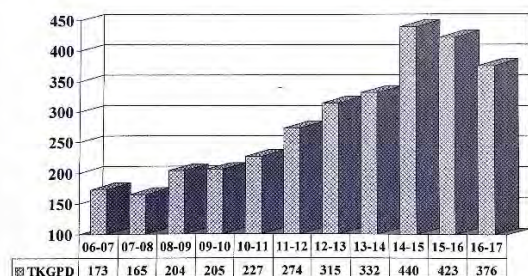


Bhopal Sahakari Dugdh Sangh Maryadit
(Bhopal Milk Union)

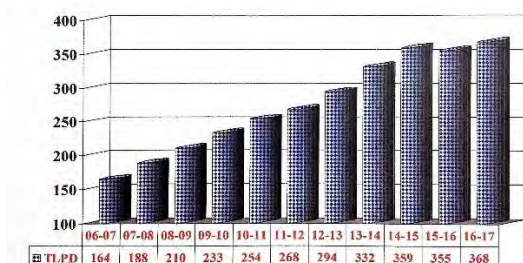


Registered name	Bhopal Sahakari Dugdh Sangh Maryadit (Bhopal Milk Union)
Website	http://mpcdf.nic.in (MPCDF)
Address	Dairy Plot, Habibganj, Kasturba Nagar, Kasturba Nagar, Bhopal, Madhya Pradesh 462024
Phone	+91 755 406 6011
E-mail	NA
Year of establishment	1977
Brand name	Sanchi
Number of staffs	NA
Area of milk collection	Bhopal, Sehore, Raisen, Rajgarh, Hoshangabad, Betul, Harda, Shajapur, Guna, Ashok Nagar, Sgar, Damoh, Chatarpur districts
Number of functional DCS	2,933
Number of BMC	211
Total number of members	112,998
Number of dairy plants	1 + 2 (small scale)
Plant capacity (Per day in litre)	300,000 + 2 (20,000)
Dairy milk collection (Ave. in Kg)	376,000
Sales turnover (Rs.)	72,927 Lakh
Other facility	Butter plant (5MTPD), Ghee plant (5MTPD), 26 Chilling centers, Cattle feed plant (250MT/day)
Products	Liquid milk, Ghee, Butter, SMP, Paneer, Curd, Kheer, Peda, Mawa, Flavored milk, Butter milk, Lassi
Milk procurement price	24.96 (on 11.11.2017, Fat3.5%&SNF8.5%)
Milk retail price (standard)	NA
Certification of plant	ISO22000, ISO14001, ISO9001, AGMARK(Ghee)
Supports for farmers	AI, Feeding practices, Animal health care and management, training on cooperative principles, Women Development Cooperative Leadership Program
Awards	NA
Remarks	-

DCS Milk Procurement



Milk Sale to Consumer's



**Indore Sahakari Dugdh Sangh Maryadit
(Indore Milk Union)**



Registered name	Indore Sahakari Dugdh Sangh Maryadit (Indore Milk Union)
Website	http://mpcdf.nic.in (MPCDF)
Address	Chanda Talawali, Manglia, Mangliya, Indore, Madhya Pradesh 453771
Phone	+91 731 280 2554
E-mail	NA
Year of establishment	1982
Brand name	Sanchi
Number of staffs	NA
Area of milk collection	Indore, Dhar, Khargone, Badwani, Jhabua, Burhanpur, Khandwa, Dewas, Ujjain districts
Number of functional DCS	1,531
Number of BMC	85
Total number of members	75,000
Number of dairy plants	4
Plant capacity (Per day in litre)	Burhanpur (10,000LPD), Barwani (10,000LPD), Khargone (20,000LPD), Jhabua (10,000LPD)
Dairy milk collection (Ave. in Kg)	260,000
Sales turnover (Rs.)	53,776 Lakh
Other facility	11 Chilling centers, SMP plant (15MTPD), Cattle feed plant (150MTPD)
Products	Flavoured Milk, Butter Milk, Lassi, Shrikhand, Paneer, Plain Curd, Probiotic Curd, Chhaina Rabri, Cream, Mawa, Peda, Rasgulla, Gulabjamun, Ghee, SMP, Sweet SMP, WMP, Table Butter, White Butter
Milk procurement price	NA
Milk retail price (standard)	NA
Certification of plant	ISO22000, ISO14000, ISO9001, HACCP
Supports for farmers	AI, Cattle feed, First aid,
Awards	NA
Remarks	-



Jabalpur Sahakari Dugdha Sangh Maryadit, Jabalpur
(Jabalpur Milk Union)



Registered name	Jabalpur Sahakari Dugdha Sangh Maryadit, Jabalpur
Website	http://mpcdf.nic.in (MPCDF)
Address	Opposite Jabalpur Hospital, Napier Town, Jabalpur, Madhya Pradesh 482002
Phone	+91 99818 10444
E-mail	jdssanchi@gmail.com
Year of establishment	1980
Brand name	Sanchi
Number of staffs	96
Area of milk collection	Jabalpur, Ktni, Satna, Rewa, Sidhi, Singroll, Shahdol, Anuppur, Umaria, Dindori, Mandla, Balaghat, Seoni, Narsinghpur, Chhindwara districts
Number of functional DCS	851
Number of BMC	22
Total number of members	27,845
Number of dairy plants	3
Plant capacity (Per day in litre)	Jabalpur (1LLPD), Rewa (0.1LLPD), Shadol (0.1LLPD)
Dairy milk collection (Ave. in Kg)	41,296 or 70,000
Sales turnover (Rs.)	11,308 Lakh (2015-16)
Other facility	2 Chilling centers (Narsinghpur & Seone), Cattle feed plant (50MTPD), Training center
Products	Liquid milk, Ghee, Paneer, Flavoured milk, Shree khand, Matta, Sweet sip, Khawa, Peda, Curd, Cream, Lassi, Chaina Kheer
Milk procurement price	24 (Rs. 200/kg T.S.)
Milk retail price (standard)	NA
Certification of plant	ISO22000
Supports for farmers	AI, Cattle feed & mineral mixture in low price, training, fodder seeds, bonus etc.
Awards	NA
Remarks	Plants for SMP & Paneer are under planning.

Lucknow Producer's Cooperative Milk Union Ltd.



Registered name	Lucknow Producer's Cooperative Milk Union Ltd.
Website	www.paragmilkup.in (PCDF)
Address	29, Park Road, Lucknow-226001
Phone	+91-522-2207196
E-mail	Dusslko2006@yahoo.co.jp ndplmu@gmail.com
Year of establishment	1938
Brand name	Parag
Number of staffs	191
Area of milk collection	Sitapur, Lakhimpur Kheeri, Hardoi, Raibareilly, and Unnao districts
Number of functional DCS	961
Number of BMC	118
Total number of members	37,101 (society members)
Number of dairy plants	1
Plant capacity (Per day in litre)	170,000
Dairy milk collection (Ave. in litre)	68,654
Sales turnover (Rs.)	16,400 Lakh
Other facility	2 Chilling centers, Fodder seed plant
Products	Milk, Ghee, Table Butter, Curd, Flavored Milk, Rice Kheer, Chenna Kheer, Butter Milk, Milk Cake, Peda, Mattha, Gulab Jamun, Rasgulla, Kalakand, Chhach, Paneer, Toned Milk, Laddo
Milk procurement price	NA
Milk retail price (standard)	Parag TAZA 1,000 ML: 39Rs. For agent, 41Rs. For consumers
Certification of plant	ISO22000, ISO9001, HACCP
Supports for farmers	AI, Deworming, Mastitis Control and Tick Control, Vaccination, Mini Kit and Fodder Seeds, Cattle Feed (Isi, Bypass, High Energy). Infertility and Emergency Veterinary Services. Capacity Building on Management by training, Exposure Visits in and outside the State. Regular Bonus Distribution.
Awards	NA
Remarks	First cooperative dairy established in India. New plant (300,000LPD) is under construction.

Kanpur Dugdh Utpadak Sahkari Sangh Ltd.



Registered name	Kanpur Dugdh Utpadak Sahkari Sangh Ltd. (Kanpur Milk Union)
Website	www.paragmilkup.in (PCDF)
Address	127/25/W-1, Barra Bypass Rd Opposite Parag Nagar, Barra Bypass Rd, Opposite Parag Nagar, Juhi Kalan, Juhi, Kanpur, Uttar Pradesh, 208014
Phone	+91 84453 69240
E-mail	NA
Year of establishment	1962
Brand name	Parag
Number of staffs	45
Area of milk collection	Kanpur, Farrukhabad, Etawah, Kannauj districts
Number of functional DCS	41
Number of BMC	4 (only 6 in operation)
Total number of members	10,732 (registered)
Number of dairy plants	1 (Closed)
Plant capacity (Per day in litre)	(150,000)
Dairy milk collection (Ave. in litre)	2,188 (2016-17)
Sales turnover (Rs.)	2,665 Lakh
Other facility	(4 Chilling centers)
Products	Raw milk
Milk procurement price	Rs.35 (Fat 6.5% & SNF9%)
Milk retail price (standard)	Toned milk 1,000ml: 40Rs. For agent, 42Rs for consumers
Certification of plant	ISO22000, HACCP (not renewed)
Supports for farmers	NA
Awards	NA
Remarks	Closed in 1981-1983 & from 2016. Only BMC operation at plant. New plants (4 lakh/ 20MT SMP) are under construction.

Varanasi Dugdh Utpadak Sahakari Sangh Ltd.



Registered name	Varanasi Dugdh Utpadak Sahakari Sangh Ltd. (Varanasi Milk Union)
Website	www.paragmilkup.in (PCDF)
Address	Ram Nagar Industrial Area, Ram nagar Patana, Uttar Pradesh 231305
Phone	+91-5412-269327
E-mail	dussvns@2006@yahoo.com
Year of establishment	1947
Brand name	Parag
Number of staffs	48
Area of milk collection	Varanasi, Ghazipur, Jaunpur, Chandauli districts
Number of functional DCS	369
Number of BMC	22 (9 is operating)
Total number of members	14,923
Number of dairy plants	3
Plant capacity (Per day in litre)	Varanasi (70,000), Ghazipur (2,000), Jaunpur (2,000)
Dairy milk collection (Ave. in litre)	6,849
Sales turnover (Rs.)	3,331 Lakh (2015-16)
Other facility	2 Chilling centers in Ghazipur & Jaunpur
Products	Liquid milk, Ghee, Butter
Milk procurement price	NA
Milk retail price (standard)	NA
Certification of plant	ISO22000 & ISO9001 (Not renewed)
Supports for farmers	Medical Care
Awards	NA
Remarks	New plant (400,000LPD) is under construction.

Meruut Dugdh Utpadak Sahakari Sangh Ltd.



Registered name	Meruut Dugdh Utpadak Sahakari Sangh Ltd. (Meerut Milk Union)
Website	www.paragmilkup.in (PCDF)
Address	C/o Gangol Sahkari Dudgh Utpadak Sangh, Partapur, Meerut
Phone	+91-0121-3262231, 7388889692
E-mail	rmomrt@paragmilkup.in
Year of establishment	1986
Brand name	Parag, Mother Dairy
Number of staffs	NA
Area of milk collection	Meerut, Ghaziabad, Noida, Bulandshahar, Baghpat districts
Number of functional DCS	692
Number of BMC	17 (8 in operation)
Total number of members	NA
Number of dairy plants	2
Plant capacity (Per day in litre)	Meerut (400,000), Noida (400,000)
Dairy milk collection (Ave. in Kg)	840,000
Sales turnover (Rs.)	23,665 Lakh (2015-16)
Other facility	SMP plant in Meerut (300,000), 2 Chilling Centers in Noida & Bulandshahar
Products	Ghee, Curd, Butter milk, Lassi, SMP, Lassi, curd, Flavoured milk, TB, Peda
Milk procurement price	NA
Milk retail price (standard)	NA
Certification of plant	ISO22000, HACCP
Supports for farmers	NA
Awards	NA
Remarks	New plant (400,000LPD) is under construction.

Annex 6: Basic data of states

Assam				Population (persons) *2						Religion (persons) *2									Number of livestock *3				
Sl No.	Name of District	Name of milk union	HPI *1	Total house hold	Total population	SC population	ST population	SC+ST population	% (SC+ST/ Total pop.)	Buddhis t	Christian	Hindu	Jain	Muslim	Sikh	Other religions and persuasions	Religion not stated	Religion Total	Bovine Total	Total Exotic / Cross-bred cattle	Total In- digenous Cattle	Total Cattle	Total Buffalo es
1	Baska	WAMUL	-	191,701	950,075	73,083	331,007	404,090	42.5%	1,189	950,075	782,901	239	135,750	156	353	2,411	950,075	363,915	7,625	353,762	361,387	2,528
2	Barpeta	WAMUL	22.83	337,929	1,693,622	95,320	27,344	122,664	7.2%	49	1,693,622	492,966	399	1,198,036	112	14	1,026	1,693,622	410,592	37,074	346,474	383,548	27,044
3	Bongaigaon		24.03	150,018	738,804	82,784	18,835	101,619	13.8%	236	738,804	359,145	871	371,033	384	9	1,202	738,804	210,673	6,847	202,043	208,890	1,783
4	Cachar		29.22	379,955	1,736,617	264,897	17,569	282,466	16.3%	341	1,736,617	1,038,985	1,673	654,816	280	98	2,789	1,736,617	386,801	20,828	309,937	330,765	56,036
5	Chirang		-	97,395	482,162	35,135	178,688	213,823	44.3%	406	482,162	320,647	125	109,248	87	482	1,420	482,162	235,563	1,712	226,159	227,871	7,692
6	Darrang		23.30	187,783	928,500	40,260	8,419	48,679	5.2%	57	928,500	327,322	724	597,392	431	19	867	928,500	355,547	11,349	331,676	343,025	12,522
7	Dhemaji		19.60	129,869	686,133	44,225	325,560	369,785	53.9%	911	686,133	655,052	167	13,475	297	6,315	1,205	686,133	467,937	826	452,564	453,390	14,547
8	Dhubri	WAMUL	31.98	414,674	1,949,258	70,395	6,332	76,727	3.9%	101	1,949,258	388,380	1,846	1,553,023	254	45	1,502	1,949,258	521,404	6,077	502,284	508,361	13,043
9	Dibrugarh		13.98	276,867	1,326,335	58,876	102,871	161,747	12.2%	4,673	1,326,335	1,198,401	1,055	64,526	2,261	46	2,405	1,326,335	460,393	9,681	438,400	448,081	12,312
10	Dima Hasao		31.44	42,252	214,102	4,337	151,843	156,180	72.9%	680	214,102	143,593	70	4,358	207	1,170	714	214,102	51,252	3,848	23,110	26,958	24,294
11	Goalpara	WAMUL	26.30	198,454	1,008,183	45,094	231,570	276,664	27.4%	194	1,008,183	347,878	477	579,929	771	103	969	1,008,183	295,777	4,120	284,374	288,494	7,283
12	Golaghat		14.52	227,197	1,066,888	62,298	111,765	174,063	16.3%	3,863	1,066,888	917,426	530	90,312	1,131	1,347	1,697	1,066,888	428,040	10,712	402,175	412,887	15,153
13	Hailakandi		27.00	143,350	659,296	70,659	691	71,350	10.8%	490	659,296	251,194	247	397,653	84	636	512	659,296	189,459	12,759	148,753	161,512	27,947
14	Jorhat		21.94	236,262	1,092,256	88,665	139,971	228,636	20.9%	2,378	1,092,256	1,008,219	719	54,684	1,540	578	3,087	1,092,256	517,944	11,893	479,602	491,495	26,449
15	Kamrup	WAMUL	17.44	311,114	1,517,542	107,827	182,038	289,865	19.1%	185	1,517,542	877,495	1,330	601,784	319	55	3,077	1,517,542	549,273	17,489	523,838	541,327	7,946
16	Kamrup Metropolitan	WAMUL	-	293,112	1,253,938	101,789	75,121	176,910	14.1%	1,627	1,253,938	1,064,412	9,250	151,071	3,679	170	4,919	1,253,938	117,229	27,398	88,940	116,338	891
17	Karbi Anglong		33.52	177,646	956,313	44,961	538,738	583,699	61.0%	6,260	956,313	766,000	397	20,290	370	3,568	1,639	956,313	378,278	23,221	340,122	363,343	14,935
18	Karimganj		33.38	247,714	1,228,686	157,890	1,940	159,830	13.0%	446	1,228,686	521,962	524	692,489	114	110	1,051	1,228,686	304,745	16,917	247,787	264,704	40,041
19	Kokrajhar		31.51	181,081	887,142	29,570	278,665	308,235	34.7%	1,718	887,142	529,068	396	252,271	93	123	2,382	887,142	338,952	2,423	323,239	325,662	13,290
20	Lakhimpur		20.23	204,307	1,042,137	81,840	249,426	331,266	31.8%	1,074	1,042,137	797,130	250	193,476	412	2,410	1,168	1,042,137	621,501	3,900	603,782	607,682	13,819
21	Morigaon	WAMUL	20.28	184,602	957,423	117,841	136,777	254,618	26.6%	65	957,423	451,882	244	503,257	113	11	1,017	957,423	322,020	27,777	290,064	317,841	4,179
22	Nagaon	WAMUL	19.16	559,340	2,823,768	266,350	115,153	381,503	13.5%	1,073	2,823,768	1,225,246	1,162	1,563,203	3,036	61	3,143	2,823,768	770,305	43,421	719,439	762,860	7,445
23	Nalbari	WAMUL	15.63	155,248	771,639	60,216	23,364	83,580	10.8%	27	771,639	491,582	1,004	277,488	62	9	1,038	771,639	264,702	24,648	235,502	260,150	4,552
24	Sivasagar		10.31	248,367	1,151,050	42,347	49,039	91,386	7.9%	3,953	1,151,050	1,007,277	286	95,553	902	8,541	1,391	1,151,050	435,505	9,307	401,792	411,099	24,406
25	Sonitpur		24.68	392,919	1,924,110	109,130	232,207	341,337	17.7%	5,088	1,924,110	1,422,824	1,003	350,536	1,363	221	4,909	1,924,110	978,398	34,963	907,329	942,292	36,106
26	Tinsukia		29.14	268,598	1,327,929	37,688	82,066	119,754	9.0%	16,228	1,327,929	1,181,347	837	48,373	1,999	395	1,873	1,327,929	425,784	12,749	395,788	408,537	17,247
27	Udalguri		-	168,717	831,668	37,844	267,372	305,216	36.7%	1,681	831,668	612,425	124	105,319	215	229	1,460	831,668	340,880	6,338	332,767	339,105	1,775
	Assam		23.24	6,406,471	31,205,576	2,231,321	3,884,371	6,115,692	19.6%	54,993	1,165,867	19,180,759	25,949	10,679,345	20,672	27,118	50,873	31,205,576	10,742,869	395,902	9,911,702	10,307,604	435,265

Note:

*1: Source: Human Poverty Index in Assam, 1999

*2: Source: Population Census 2011

*3: Source: 19th Livestock census (2012)

*4: Source: Directorate of Animal Husbandry in Assam (2015-16)

*5: Source: Statistic Handbook 2014, Assam

Annex 6: Basic data of states

Assam			Volume of milk production (liters/year) *4					Area of irrigation (ha)			Irrigation potential created up to 31st March, 2014					Land use (ha)					
Sl No.	Name of District	Name of milk union	Crossbred Cow	Local Cow	Total Cow	Buffalo	Total (Cow+Buf)	Kharif	Rabi & Pre-Kharif	Total	Minor Irrigation	Major/ Medium Irrigation	Total	Through ASMDIC (STW/ LLP)	Grand Total	Geographical Area	Forest	Not available for Cultivation	Other uncultivated land excluding fallow land	Fallow land	Cropped Area
1	Baska	WAMUL	7,165,959	39,576,122	46,742,081	440,459	47,182,540	12,485	1,114	13,599	18,734	28,235	46,969	-	46,969	208,608	99,519	32,826	10,175	3	133,831
2	Barpeta	WAMUL	55,088,943	15,042,401	70,131,344	7,932,386	78,063,730	1,837	174	2,011	15,723	30,741	46,464	9,186	55,650	225,069	572	41,944	17,937	5,305	254,698
3	Bongaigaon		7,437,294	12,876,535	20,313,829	888,395	21,202,224	351	216	567	8,207	-	8,207	2,502	10,709	151,999	44	64,715	10,384	9,221	105,421
4	Cachar		23,089,825	37,574,704	60,664,529	17,839,313	78,503,842	1,130	1,766	2,896	11,761	-	11,761	-	11,761	377,610	138,409	89,148	21,745	12,922	163,057
5	Chirang		2,184,308	7,547,316	9,731,624	1,595,655	11,327,279	5,646	1,376	7,022	14,182	-	14,182	-	14,182	136,926	71,978	14,961	3,099	121	88,722
6	Darrang		7,554,780	18,454,011	26,008,791	4,459,770	30,468,561	4,333	1,340	5,673	10,591	-	10,591	9,465	20,056	180,707	276	43,182	15,653	17,763	145,558
7	Dhemaji		573,296	41,166,332	41,739,628	4,271,891	46,011,519	415	-	415	7,546	-	7,546	3,417	10,963	323,700	59,355	136,963	50,994	8,882	121,227
8	Dhubri	WAMUL	8,983,837	27,380,252	36,364,089	3,390,901	39,754,990	44	263	307	17,434	-	17,434	9,198	26,632	266,601	29,155	78,125	8,949	16,023	173,054
9	Dibrugarh		9,409,431	42,474,108	51,883,539	2,775,619	54,659,158	2,290	120	2,410	13,198	4,153	17,351	9,489	26,840	338,782	23,341	142,488	30,179	3,276	166,107
10	Dima Hasao		1,586,798	8,180,202	9,767,000	4,639,679	14,406,679	3,875	-	3,875	7,272	-	7,272	-	7,272	488,800	67,277	393,352	B	B	54,217
11	Goalpara	WAMUL	7,229,583	24,723,609	31,953,192	1,027,858	32,981,050	2,338	647	2,985	13,071	-	13,071	2,721	15,792	184,262	29,683	62,265	11,002	559	125,242
12	Golaghat		10,442,634	22,243,678	32,686,312	3,684,617	36,370,929	163	-	163	17,198	-	17,198	8,412	25,610	354,070	156,905	51,232	22,332	4,555	182,013
13	Hailakandi		7,655,729	7,546,120	15,201,849	4,148,896	19,350,745	925	805	1,730	5,689	-	5,689	-	5,689	132,587	62,420	14,392	4,923	558	77,280
14	Jorhat		16,854,135	35,591,501	52,445,636	8,957,657	61,403,293	784	394	1,178	12,421	-	12,421	8,418	20,839	285,100	21,904	110,567	20,116	12,273	174,280
15	Kamrup	WAMUL	105,458,125	39,576,122	145,034,247	2,324,414	147,358,661	290	589	879	22,779	-	22,779	-	22,779	308,684	70,885	31,671	27,742	1,132	186,647
16	Kamrup Metropolitan	WAMUL	-	-	-	-	-	4,821	2,992	7,813	4,550	-	4,550	11,304	15,854	115,017	22,140	30,039	18,654	867	49,974
17	Karbi Anglong		22,114,268	42,391,854	64,506,122	2,729,262	67,235,384	32,179	5,658	37,837	59,112	9,637	68,749	-	68,749	1,033,400	319,294	587,707	B	B	201,718
18	Karimganj		11,001,718	25,624,039	36,625,757	9,540,022	46,165,779	1,305	65	1,370	5,478	-	5,478	-	5,478	180,900	55,995	38,518	10,280	72	104,129
19	Kokrajhar		3,304,855	18,311,051	21,615,906	1,862,635	23,478,541	6,578	90	6,668	18,121	15,092	33,213	3,411	36,624	312,900	161,195	43,458	19,448	2,243	172,649
20	Lakhimpur		3,793,241	21,967,948	25,761,189	6,677,134	32,438,323	505	415	920	12,197	-	12,197	6,648	18,845	235,024	29,379	94,361	7,335	3,780	223,208
21	Morigaon	WAMUL	10,530,024	14,793,724	25,323,748	1,226,720	26,550,468	225	818	1,043	16,943	-	16,943	9,699	26,642	158,765	13,207	31,704	13,480	8,363	127,811
22	Nagaon	WAMUL	62,910,524	55,193,575	118,104,099	3,289,014	121,393,113	29,549	4,225	33,774	18,383	85,842	104,225	15,336	119,561	411,030	88,024	64,540	18,457	4,383	299,322
23	Nalbari	WAMUL	13,751,883	13,474,092	27,225,975	2,012,767	29,238,742	64	62	126	7,450	-	7,450	5,184	12,634	100,483	0	26,325	3,027	3,401	120,765
24	Sivasagar		12,771,118	29,084,044	41,855,162	4,034,477	45,889,639	322	21	343	16,240	-	16,240	8,838	25,078	260,290	30,465	56,151	29,211	7,641	149,857
25	Sonitpur		26,247,458	85,924,651	112,172,109	10,887,548	123,059,657	9,185	31	9,216	29,718	32,655	62,373	17,934	80,307	532,298	147,843	194,498	18,983	5,833	270,809
26	Tinsukia		10,444,617	33,832,765	44,277,382	5,784,732	50,062,114	698	17	715	6,585	-	6,585	8,043	14,628	379,000	131,595	114,883	24,932	2,876	143,524
27	Udalguri		4,758,487	10,171,476	14,929,963	259,047	15,189,010	27,830	3,373	31,203	49,570	56,258	105,828	-	105,828	167,393	22,400	30,430	14,502	112	158,903
	Assam		270,109,157	470,026,307	740,135,464	123,053,809	863,189,273	150,167	26,571	176,738	440,153	262,613	702,766	149,205	851,971	7,850,005	1,853,260	2,620,445	433,539	132,164	4,174,023

Bihar				Population (persons) *2						Religion (persons) *2								
Sl No	Name of District	Name of milk union	Poverty rate (%) *1	Number of Households	Total population	SC population	ST population	SC+ST population	% (SC+ST/ Total pop.)	Buddhist	Christian	Hindu	Jain	Muslim	Other religions and persuasions	Religion not stated	Sikh	Religion Total
1	Patna	Vaishal Patliputra	38	861,367	5,838,465	920,918	9,069	929,987	15.9%	60	1,292	1,629,254	109	266,620	8	3,121	197	1,900,661
2	Nalanda	Vaishal Patliputra	30	494,612	2,877,653	607,672	1,442	609,114	21.2%	292	2,126	3,800,598	231	452,370	112	5,283	554	4,261,566
3	Bhojpur	Shahabad Milk	36	383,506	2,728,407	425,402	13,977	439,379	16.1%	52	487	956,396	78	40,886	52	2,821	140	1,000,912
4	Rohtas	Shahabad Milk	25	463,283	2,959,918	549,546	31,650	581,196	19.6%	60	1,342	1,753,829	133	241,760	81	4,387	170	2,001,762
5	Kaimur	Shahabad Milk	26	246,372	1,626,384	369,088	57,981	427,069	26.3%	328	3,262	3,652,168	442	818,912	169	11,534	564	4,487,379
6	Buxar	Shahabad Milk	37	299,516	1,706,352	251,737	26,824	278,561	16.3%	95	1,815	1,252,319	145	110,416	61	2,576	338	1,367,765
7	Gaya	Magadh Milk Union	10	1,071,294	4,391,418	1,334,351	3,098	1,337,449	30.5%	870	3,943	3,876,395	1,723	488,121	108	19,345	913	4,391,418
8	Nawada	Magadh Milk Union	2	328,867	2,219,146	565,112	2,045	567,157	25.6%	167	2,463	2,119,262	133	436,057	28	3,631	271	2,562,012
9	Aurangabad	Magadh Milk Union	7	384,718	2,540,073	612,064	1,033	613,097	24.1%	159	8,443	1,525,746	87	217,621	3,438	4,749	162	1,760,405
10	Jehanabad	Magadh Milk Union	19	181,236	1,125,313	222,974	1,285	224,259	19.9%	248	691	1,045,117	60	75,742	58	3,249	148	1,125,313
11	Arwal	Magadh Milk Union	20	108,612	700,843	141,314	590	141,904	20.2%	7,707	1,407	1,456,229	129	155,283	1,534	3,799	296	1,626,384
12	Bhagalpur	Vikramshila Milk	28	602,182	3,037,766	318,569	67,180	385,749	12.7%	253	2,897	2,672,311	188	740,101	20	7,543	261	3,423,574
13	Banka	Vikramshila Milk	29	387,831	2,034,763	247,858	90,432	338,290	16.6%	407	2,618	2,712,635	359	608,282	86	5,708	369	3,330,464
14	Jamui	Vikramshila Milk	34	307,877	1,760,405	302,649	78,793	381,442	21.7%	136	3,758	1,809,936	546	409,251	42	5,136	271	2,229,076
15	Munger	Vikramshila Milk	32	339,919	1,367,765	183,846	21,404	205,250	15.0%	362	2,203	3,152,346	246	333,980	71	5,106	707	3,495,021
16	Khagaria	DR Milk	23	315,414	1,666,886	247,161	675	247,836	14.9%	187	4,116	1,593,525	1,910	1,207,442	63	3,955	371	2,811,569
17	Lakhisarai	DR Milk	33	168,719	1,000,912	153,209	8,333	161,542	16.1%	323	390	634,099	74	64,259	60	1,579	59	700,843
18	Shekhpura	Vaishal Patliputra	35	108,884	636,342	131,115	617	131,732	20.7%	229	2,330	3,534,772	322	406,449	107	7,282	371	3,951,862
19	Purnia	Koshi Milk Union	4	624,893	3,264,619	390,991	139,490	530,481	16.2%	113	6,138	1,772,655	94	250,925	1,035	3,664	139	2,034,763
20	Kishanganj	Koshi Milk Union	17	325,207	1,690,400	113,118	64,224	177,342	10.5%	229	2,209	2,554,330	276	407,348	57	5,690	402	2,970,541
21	Araria	Koshi Milk Union	1	561,798	2,811,569	382,654	38,848	421,502	15.0%	180	3,556	2,487,866	1,050	537,098	32	7,569	415	3,037,766
22	Katihar	Koshi Milk Union	2	596,501	3,071,029	263,100	179,971	443,071	14.4%	647	2,165	2,518,216	1,472	197,819	48	7,496	544	2,728,407
23	Muzaffarpur	Tirhut Milk	24	885,970	4,801,062	751,975	5,979	757,954	15.8%	288	5,149	4,032,773	382	745,546	98	15,893	933	4,801,062
24	Vaishali	Vaishal Patliputra	8	609,755	3,495,021	738,031	2,274	740,305	21.2%	41	313	596,102	43	37,653	31	2,084	75	636,342
25	West Champaran	Tirhut Milk	22	722,330	3,935,042	553,944	250,046	803,990	20.4%	414	1,978	2,669,775	561	198,033	64	6,435	393	2,877,653
26	East Champaran	Tirhut Milk	9	949,436	5,099,371	649,726	12,461	662,187	13.0%	176	1,299	1,964,620	279	244,394	80	8,048	250	2,219,146
27	Sitamarhi	Tirhut Milk	12	674,458	3,423,574	405,714	2,989	408,703	11.9%	1,062	12,551	5,356,075	2,151	439,952	203	21,668	4,803	5,838,465
28	Sheohar		13	149,685	656,246	96,655	318	96,973	14.8%	1,337	8,469	3,047,427	296	865,090	1,895	9,602	926	3,935,042
29	Darbhanga	Mithila Milk	21	822,300	3,937,385	615,688	2,772	618,460	15.7%	212	8,659	1,684,589	507	1,365,645	2,141	6,522	2,754	3,071,029
30	Samastipur	Mithila Milk	5	828,263	4,261,566	803,128	1,884	805,012	18.9%	79	1,253	1,486,989	86	175,588	115	2,633	143	1,666,886
31	Madhubani	Mithila Milk	3	1,025,076	4,487,379	587,158	3,990	591,148	13.2%	183	5,783	531,236	1,476	1,149,095	28	2,201	398	1,690,400
32	Begusarai	DR Milk	27	572,390	2,970,541	432,270	1,597	433,867	14.6%	334	2,218	2,291,133	775	237,353	19	7,946	295	2,540,073
33	Saharsa	Koshi Milk Union	14	382,562	1,900,661	317,249	6,009	323,258	17.0%	5,090	2,125	1,591,454	97	105,423	57	1,858	248	1,706,352
34	Madhepura	Koshi Milk Union	15	348,224	2,001,762	346,275	12,532	358,807	17.9%	245	3,534	3,042,729	236	881,476	101	8,232	832	3,937,385
35	Supaul	Koshi Milk Union	16	427,656	2,229,076	354,249	10,168	364,417	16.3%	878	4,865	4,086,453	464	990,349	104	15,590	668	5,099,371
36	Saran	Vaishal Patliputra	31	595,066	3,951,862	474,066	36,786	510,852	12.9%	73	522	552,492	52	99,342	44	3,505	216	656,246
37	Siwan	Tirhut Milk	18	516,118	3,330,464	386,685	87,000	473,685	14.2%	353	7,989	1,989,420	1,450	1,255,641	650	8,502	614	3,264,619
38	Gopalganj	Tirhut Milk	11	385,846	2,562,012	320,064	60,807	380,871	14.9%	1,584	2,889	2,645,415	252	300,487	537	6,185	2,569	2,959,918

Note:

*1: Source: Poverty and social assesment a districtwise study of Bihar

*2: Source: Population Census 2011

*3: Source: 19th Livestock census (2012)

*4: Source: Animal Husbandry Department, Government of Bihar (2013-14)

*5: Directorate of Statistics and Evaluation, Bihar Patna.

Bihar			Number of Livestock *3					Volume of milk production (kg/year) *4							Area of Irrigation (ha)			
Sl No	Name of District	Name of milk union	Number of animals Per 1000 Households - Cattle	Number of animals Per 1000 Households - Buffaloes	Number of animals Per 1000 Households - Sheep	Number of animals Per 1000 Households - Goats	Number of animals Per 1000 Households - Pigs	Crossbred Cow	Local Cow	Total Cow	Buffalo	Total (Cow+Buf)	Other	Total Production	Canals	Tank	Tubewells	Other wells
1	Patna	Vaishal Patliputra	355	340	15	208	45	148,386,251	5,34,21,487	201,807,738	190,622,579	392,430,317	4,502,397	342,108,902	24,685	0	84,647	0
2	Nalanda	Vaishal Patliputra	356	642	17	318	46	30,529,408	40,317,433	70,846,841	128,489,290	199,336,131	3,597,862	218,391,443	15,561	3,989	118,367	0
3	Bhojpur	Shahabad Milk	533	526	49	301	343	90,410,351	67,191,137	157,601,488	145,901,190	303,502,678	7,655,129	154,854,351	122,410	0	35,820	0
4	Rohtas	Shahabad Milk	854	645	30	797	23	33,756,206	68,427,378	102,183,584	152,316,879	254,500,463	6,736,183	163,809,756	214,025	8,220	11,481	1,528
5	Kaimur	Shahabad Milk	828	899	174	453	34	2,451,382	53,824,202	56,275,584	100,700,660	156,976,244	7,945,439	142,469,467	82,721	16,219	49,380	0
6	Buxar	Shahabad Milk	540	609	52	270	28	49,660,067	48,105,116	97,765,183	106,847,261	204,612,444	7,707,541	117,380,637	46,036	0	64,600	0
7	Gaya	Magadh Milk Union	610	293	9	400	78	26,328,853	178,258,684	204,587,537	153,747,623	358,335,160	6,043,855	184,096,288	5,217	116	119,629	0
8	Nawada	Magadh Milk Union	933	394	8	682	85	7,162,817	82,114,910	89,277,727	68,219,943	157,497,670	4,139,753	118,313,756	6,383	0	81,992	0
9	Aurangabad	Magadh Milk Union	947	519	66	542	29	12,690,054	103,788,298	116,478,352	93,211,282	209,689,634	8,306,574	251,455,645	86,326	0	83,993	2,963
10	Jehanabad	Magadh Milk Union	441	728	12	406	89	7,867,789	18,001,138	25,868,927	50,259,607	76,128,534	6,659,632	210,714,762	12,721	0	40,638	31
11	Arwal	Magadh Milk Union	488	672	22	462	36	6,539,555	14,624,223	21,163,778	31,059,309	52,223,087	969,081	53,192,168	12,925	0	21,891	0
12	Bhagalpur	Vikramshila Milk	845	316	1	966	15	59,328,504	101,756,361	161,084,865	82,064,206	243,149,071	7,015,069	203,170,266	0	2,164	47,555	0
13	Banka	Vikramshila Milk	1425	367	42	972	55	11,491,681	110,219,969	121,711,650	56,340,783	178,052,433	7,017,592	143,451,461	34,714	1,371	62,476	0
14	Jamui	Vikramshila Milk	1491	254	35	1141	106	20,109,982	131,707,820	151,817,802	52,237,328	204,055,130	4,902,069	250,343,270	397	798	8,778	557
15	Munger	Vikramshila Milk	490	154	1	497	23	41,135,993	42,772,008	83,908,001	30,266,002	114,174,003	1,833,325	155,091,170	19,945	126	18,439	0
16	Khagaria	DR Milk	759	279	0	724	14	92,296,989	34,485,372	126,782,361	56,572,753	183,355,114	4,083,687	203,419,818	0	0	68,675	0
17	Lakhisarai	DR Milk	747	346	8	636	24	26,520,104	20,786,982	47,307,086	27,916,417	75,223,503	3,719,420	307,222,098	18,991	0	24,959	0
18	Shekhpura	Vaishal Patliputra	617	418	10	589	46	5,412,030	14,852,727	20,264,757	19,467,358	39,732,115	3,127,703	276,756,562	6,245	10,446	18,125	294
19	Purnia	Koshi Milk Union	798	212	0	825	31	4,449,799	96,782,670	101,232,469	45,966,753	147,199,222	6,369,468	163,867,138	0	0	108,755	0
20	Kishanganj	Koshi Milk Union	1264	138	5	1253	36	2,392,047	88,882,213	91,274,260	18,398,836	109,673,096	1,196,671	205,809,115	0	0	30,886	0
21	Araria	Koshi Milk Union	1207	535	6	1744	28	3,125,786	75,373,100	78,498,886	56,025,142	134,524,028	5,444,379	259,944,842	0	0	82,993	0
22	Katihar	Koshi Milk Union	1014	169	10	973	38	4,602,343	123,319,084	127,921,427	29,152,146	157,073,573	1,027,600	158,003,844	0	0	113,573	0
23	Muzaffarpur	Tirhut Milk	388	314	2	636	6	69,501,093	61,752,394	131,253,487	111,985,375	243,238,862	10,843,986	181,960,971	16,331	22,362	70,417	0
24	Vaishali	Vaishal Patliputra	349	277	3	491	3	122,641,160	20,382,872	143,024,032	61,100,012	204,124,044	6,889,463	178,752,410	0	0	57,625	0
25	West Champaran	Tirhut Milk	508	360	3	820	24	11,289,860	80,968,326	92,258,186	78,858,799	171,116,985	1,481,655	28,617,353	62,251	0	52,341	0
26	East Champaran	Tirhut Milk	379	359	2	764	17	8,405,804	89,476,042	97,881,846	102,828,913	200,710,759	6,983,736	250,222,598	0	0	141,163	0
27	Sitamarhi	Tirhut Milk	224	276	0	543	9	11,528,830	18,450,779	29,979,609	88,229,914	118,209,523	9,442,579	210,153,338	1,759	3,062	50,247	0
28	Sheohar		270	311	0	640	9	1,526,640	8,769,776	10,296,416	16,839,282	27,135,698	3,237,033	150,501,072	0	0	11,922	0
29	Darbhanga	Mithila Milk	316	269	1	368	11	18,469,425	81,020,658	99,490,083	115,303,498	214,793,581	3,099,742	186,454,856	0	53,628	21,178	0
30	Samastipur	Mithila Milk	563	291	3	467	4	192,632,973	46,222,576	238,855,549	98,750,956	337,606,505	932,012	40,664,127	0	0	130,305	0
31	Madhubani	Mithila Milk	513	371	1	390	15	9,458,474	76,936,638	86,395,112	121,630,424	208,025,536	1,172,809	76,396,312	0	0	109,577	0
32	Begusarai	DR Milk	634	174	0	404	6	228,065,883	7,211,413	235,277,296	38,351,563	273,628,859	4,996,764	397,427,081	0	1,493	70,197	0
33	Saharsa	Koshi Milk Union	778	425	0	907	29	15,177,036	77,720,068	92,897,104	78,965,843	171,862,947	6,110,517	215,800,151	5,180	58	43,192	0
34	Madhepura	Koshi Milk Union	992	2355	2	1158	20	9,208,987	59,226,363	68,435,350	67,998,519	136,433,869	11,341,936	369,677,096	762	0	78,099	0
35	Supaul	Koshi Milk Union	1112	731	38	1049	25	1,814,176	99,624,291	101,438,467	94,716,730	196,155,197	1,149,361	77,277,895	22,219	0	66,505	0
36	Saran	Vaishal Patliputra	540	315	8	315	14	86,858,500	58,909,427	145,767,927	99,673,274	245,441,201	5,212,732	213,238,268	5,667	4,652	102,200	0
37	Siwan	Tirhut Milk	572	289	4	455	20	20,236,299	63,297,319	83,533,618	69,724,227	153,257,845	7,450,543	125,660,066	9,393	3,363	96,510	0
38	Gopalganj	Tirhut Milk	487	298	1	546	16	34,199,970	39,137,352	73,337,322	73,926,717	147,264,039	5,852,269	209,976,313	54,399	0	37,185	0

Bihar					Land Use (ha)													
Sl No	Name of District	Name of milk union	Other Source	Total Net Area Irrigated	Geograp hical area	Forest	Barren and unclutrabale land	land put to non Agriculture Use	Culturable Waste land.	Permanent pasture and graging land	Land under misc. Tree, crops, and Grovis net	Fallow land other than current	current fallow	Total uncultured land total (4,5,9,10,11)	Net area sown.	Total cropped area.	Area sown more than	
1	Patna	Vaishal Patliputra	0	109.332	317.236	56	12.369	76.493	764	113	989	1.572	29.120	121.476	195.760	227.135	31.375	
2	Nalanda	Vaishal Patliputra	13.116	151.033	232.732	4.640	1.160	42.770	209	4	1.247	186	3.253	53.469	179.263	220.553	41.290	
3	Bhojpur	Shahabad Milk	2.390	160.620	237.339	-	6.702	33.713	624	72	1.991	2.564	3.363	49.029	188.310	234.746	46.436	
4	Rohtas	Shahabad Milk	5	235.259	390.722	66.723	16.870	47.565	1.109	96	2.859	789	4.586	140.597	250.125	320.244	70.119	
5	Kaimur	Shahabad Milk	832	149.152	342.447	113.039	19.256	34.024	1.867	139	709	188	1.172	170.394	172.053	222.243	50.190	
6	Buxar	Shahabad Milk	996	111.632	166.999	0	2.196	17.235	665	21	701	609	16.235	37.662	129.337	181.251	51.914	
7	Gaya	Magadh Milk Union	1.267	126.229	493.774	77.836	27.541	72.923	3.265	2.098	3.859	11.463	124.267	323.252	170.522	203.713	33.191	
8	Nawada	Magadh Milk Union	6.602	94.977	248.732	63.775	11.237	35.483	1.131	884	609	2.683	28.297	144.099	104.633	148.901	44.268	
9	Aurangabad	Magadh Milk Union	93	173.375	330.011	18.764	16.410	54.716	1.872	572	598	1.173	12.824	106.929	223.082	279.883	56.801	
10	Jehanabad	Magadh Milk Union	5.425	58.815	94.043	637	3.270	14.695	148	82	697	231	583	20.343	73.700	109.872	36.172	
11	Arwal	Magadh Milk Union	31	34.847	62.631	0	2.180	10.148	92	151	892	1.632	5.804	20.899	41.732	53.999	12.267	
12	Bhagalpur	Vikramshila Milk	0	49.719	254.300	78	22.403	69.474	2.287	634	6.635	4.999	9.088	115.598	138.702	164.112	25.410	
13	Banka	Vikramshila Milk	0	98.561	305.621	46.310	42.961	41.772	7.913	1.081	7.378	11.139	17.673	176.227	129.394	165.784	36.390	
14	Jamui	Vikramshila Milk	0	10.530	305.289	92.855	28.567	39.928	10.312	1.669	2.043	16.137	62.055	253.566	51.723	59.782	8.059	
15	Munger	Vikramshila Milk	0	38.510	139.793	28.524	11.436	31.230	945	206	557	1.959	13.102	87.959	51.834	64.237	12.403	
16	Khagaria	DR Milk	5.817	74.492	149.342	-	13.593	30.782	630	221	3.024	2.231	5.531	56.012	93.330	131.756	38.426	
17	Lakhisarai	DR Milk	630	44.580	128.602	13.445	7.009	14.007	708	57	281	6.384	24.576	66.467	62.135	90.087	27.952	
18	Shekhpura	Vaishal Patliputra	0	35.110	62.084	-	1.017	10.289	236	0	273	1.699	3.502	17.016	45.068	64.287	19.219	
19	Purnia	Koshi Milk Union	0	108.755	313.883	113	12.329	45.431	1.131	50	8.817	4.693	46.064	118.628	195.255	256.823	61.568	
20	Kishanganj	Koshi Milk Union	0	30.886	189.080	354	11.198	34.469	1.189	421	5.063	3.059	14.370	70.123	118.957	157.286	38.329	
21	Araria	Koshi Milk Union	0	82.993	271.712	838	5.009	51.134	547	230	18.993	2.943	6.544	86.238	185.474	268.913	83.439	
22	Katihar	Koshi Milk Union	2.812	116.385	291.349	1.785	22.109	57.068	643	131	11.017	6.037	31.401	130.191	161.158	259.530	98.372	
23	Muzaffarpur	Tirhut Milk	0	109.110	315.351	-	5.267	62.609	317	32	17.203	1.480	18.778	105.686	209.665	329.602	119.937	
24	Vaishali	Vaishal Patliputra	10.470	68.095	201.449	-	24.098	36.830	141	335	9.709	308	5.293	76.714	124.735	195.639	70.904	
25	West Champaran	Tirhut Milk	2.360	116.952	484.351	91.745	2.917	94.176	1.301	1.160	6.429	2.625	5.479	205.832	278.519	399.802	121.283	
26	East Champaran	Tirhut Milk	1.061	142.224	431.715	118	8.079	76.768	262	447	26.971	2.992	11.203	126.840	304.875	390.473	85.598	
27	Sitamarhi	Tirhut Milk	0	55.068	221.891	-	1.751	62.635	125	1.385	13.891	608	5.542	85.937	135.954	200.179	64.225	
28	Sheohar	Mithila Milk	8.162	20.084	43.475	-	409	12.666	27	0	3.593	907	3.217	20.819	22.656	38.691	16.035	
29	Darbhanga	Mithila Milk	0	74.806	254.077	-	1.297	60.127	143	147	12.201	2.195	9.235	85.345	168.732	213.748	45.016	
30	Samastipur	Mithila Milk	0	130.305	262.390	-	3.811	63.043	0	67	8.211	977	4.519	80.628	181.762	299.734	117.972	
31	Madhubani	Mithila Milk	0	109.577	353.498	-	2.236	86.124	511	1.298	22.837	2.962	4.828	120.796	232.702	335.216	102.514	
32	Begusarai	DR Milk	0	71.690	187.828	-	17.961	41.367	40	16	3.637	857	11.409	75.287	112.541	150.391	37.850	
33	Saharsa	Koshi Milk Union	1.708	50.138	164.559	-	10.793	28.516	475	1.150	4.308	3.841	14.758	63.841	100.718	176.535	75.817	
34	Madhepura	Koshi Milk Union	0	78.861	179.589	-	3.923	30.738	0	51	7.073	1.039	34.793	77.617	101.972	145.512	43.540	
35	Supaul	Koshi Milk Union	10.700	99.424	238.603	-	20.229	51.056	1.483	259	3.052	9.538	33.054	118.671	119.932	213.900	93.968	
36	Saran	Vaishal Patliputra	0	112.519	264.887	-	17.915	33.688	161	221	8.553	3.689	17.674	81.901	182.986	230.802	47.816	
37	Siwan	Tirhut Milk	124	109.390	224.410	-	8.741	31.884	754	160	8.542	1.506	5.891	57.478	166.932	246.052	79.120	
38	Gopalganj	Tirhut Milk	0	91.708	203.774	-	5.521	32.874	1.405	209	7.416	2.402	6.092	55.919	147.855	219.541	71.686	

Gujarat					Population('000 persons) *2					Religion (Persons) *2								Number of livestock *3		
Sl No.	Name of District	Name of milk union	Poverty rate in Rural (%) *1	Total house hold	Total population	SC population	ST population	SC+ST population	% (SC+ST/ Total pop.)	Hindu	Muslim	Christian	Sikh	Buddhist	Jain	Other religions & persuasions (incl.Unclassified Sect.)	Religion not stated	Indigenous Cattle ('000)	Crossbred Cattle ('000)	Buffalo ('000)
1	Ahmadabad	Ahmadabad	11.3	3,902	13,869	706	3,604	4,310	31.1%	6,042,416	883,238	50,754	14,542	4,518	209,287	2,055	7,415	200	17	344
2	Amreli	Amreli	0.5	626	2,962	132	917	1,049	35.4%	1,410,463	99,105	919	415	243	2,053	40	952	261	9	201
3	Anand	Kaira	13.6	844	3,453	27	1,151	1,178	34.1%	1,798,794	250,919	29,789	1,524	267	8,591	142	2,719	80	67	407
4	Banas Kantha	Banaskantha	26	710	3,555	136	178	314	8.8%	2,890,305	213,505	1,686	486	281	12,659	83	1,501	529	131	955
5	Bharuch	Bharuch	17.1	990	3,925	118	1,744	1,862	47.4%	1,188,204	343,511	9,494	1,733	442	4,813	342	2,480	103	19	154
6	Bhavnagar	Bhavnagar	1.2	582	2,153	35	87	122	5.7%	2,632,574	212,863	3,457	1,410	445	26,974	127	2,515	329	12	334
7	Dohad	Panch Mahals	41.4	244	1,128	31	463	494	43.8%	2,045,243	66,353	9,907	493	260	3,331	114	1,385	582	7	284
8	Gandhinagar	Gandhinagar	5.2	849	4,015	228	600	828	20.6%	1,319,586	57,273	3,237	1,985	497	6,405	82	2,688	80	68	364
9	Jamnagar	-	-	1,242	5,352	215	1,313	1,528	28.6%	1,810,443	320,805	4,392	1,873	1,086	18,856	136	2,528	349	2	257
10	Junagadh	Junagadh	-	1,371	6,270	204	1,394	1,598	25.5%	2,397,056	334,858	2,586	1,110	1,291	3,841	77	2,263	467	14	378
11	Kachchh	Kachchh	20	695	2,765	278	541	819	29.6%	1,608,921	442,355	6,192	6,353	490	25,312	98	2,650	381	8	226
12	Kheda	Kaira	42.4	994	4,481	192	531	723	16.1%	2,000,884	264,482	26,629	1,403	300	3,479	82	2,626	147	81	628
13	Mahesana	Mehsana	27.3	396	1,714	53	236	289	16.9%	1,885,732	136,431	1,954	1,082	146	7,087	88	2,544	114	103	568
14	Narmada	Bharuch	24.5	762	2,924	97	1,410	1,507	51.5%	559,848	22,600	4,413	147	80	373	2,078	758	137	4	59
15	Navsari	Valsad	6.5	991	3,302	60	1,506	1,566	47.4%	1,225,087	78,669	5,733	2,459	601	13,386	2,823	914	61	96	102
16	Panch Mahals	Panch Mahals	38.3	349	1,584	16	211	227	14.3%	2,220,974	158,513	2,863	662	337	5,236	131	2,060	537	51	616
17	Patan	Mehsana	42.4	413	1,744	101	140	241	13.8%	1,194,745	142,797	916	337	66	3,602	66	1,205	123	8	364
18	Porbandar	Porbandar	-	313	1,438	107	605	712	49.5%	549,749	33,565	500	248	91	515	38	743	81	2	105
19	Rajkot	Rajkot	10.4	2,173	9,640	187	2,064	2,251	23.4%	3,397,406	361,388	5,478	1,918	1,170	33,591	269	3,338	430	22	362
20	Sabar Kantha	Sabarkantha	20.2	1,343	7,096	110	1,330	1,440	20.3%	2,260,560	148,563	6,375	614	168	11,110	52	1,147	469	152	775
21	Surat	Surat	23.1	11,964	39,190	811	11,656	12,467	31.8%	5,260,193	660,772	21,052	5,703	12,902	112,835	3,920	3,945	128	99	247
22	Surendranagar	Surendranagar	20.5	586	2,598	42	402	444	17.1%	1,620,282	109,681	1,419	512	312	22,992	128	942	342	5	290
23	Tapi	Surat	-	1,190	4,758	23	2,930	2,953	62.1%	725,890	22,309	52,930	239	1,476	1,828	408	1,942	169	45	177
24	The Dangs	Valsad	88.4	77	346	26	78	104	30.1%	203,545	3,593	20,029	69	32	39	560	424	60	10	21
25	Vadodara	Baroda	5.6	2,606	10,833	438	3,935	4,373	40.4%	3,713,941	384,579	23,813	9,340	2,069	27,650	1,124	3,110	458	24	462
26	Valsad	Valsad	3.4	713	3,211	151	1,843	1,994	62.1%	1,571,147	94,034	19,661	1,589	913	13,809	1,417	3,108	219	89	97

Note:

*1: Source: <http://environmentportal.in/files/Levels%20of%20living.pdf>

*2: Source: Population Census 2011

*3: Source: Survey Reports on estimates of Major Livestock Products (2012-13), Directorate of Animal Husbandry, Gujarat State, Gandhinagar.

*4: Source: http://shodhganga.inflibnet.ac.in/bitstream/10603/7276/12/12_chapter%203.pdf (2001-2)

Gujarat			Vol. of milk production ('000MT/Year) *3				Land Use ('00ha) *4							Irrigated area and intensity of irrigation ('00ha)*4				
Sl No.	Name of District	Name of milk union	Indigeno us Cattle	Crossbre ed Cattle	Buffalo	Bovine total	Net area sown	% Net area sown	Area sown more than once	Total cropped area	Per capita net area sown	Cropping intensity	Gross cropped area (GCA)	Gross Irrigated area (GIA)	GCA as % GIA	Net irrigated area	Irrigation Intensity (%)	Cropping intensity (%)
1	Ahmadabad	Ahmadabad	99	24	219	341	5,056	63	367	5,423	0.09	107	5,423	1,629	30	1,324	123	107
2	Amreli	Amreli	111	12	181	304	5,407	73	108	5,515	0.39	102	5,515	1,010	18	919	110	102
3	Anand	Kaira	54	136	290	481	1,551	53	356	1,907	0.08	123	1,907	1,439	75	1,191	121	122
4	Banas Kantha	Banaskantha	205	281	697	1,183	7,364	69	3,001	10,365	0.29	141	10,365	4,900	47	4,021	122	108
5	Bharuch	Bharuch	32	22	91	145	3,311	51	39	3,350	0.24	101	3,350	927	28	888	104	101
6	Bhavnagar	Bhavnagar	140	17	240	397	5,474	55	268	5,742	0.22	105	5,742	1,707	30	1,509	113	105
7	Dohad	Panch Mahals	91	2	118	210	1,968	54	115	2,083	0.12	106	2,083	85	4	56	152	106
8	Gandhinagar	Gandhinagar	40	150	231	421	1,597	74	351	1,948	0.12	122	1,948	1,284	66	895	143	122
9	Jamnagar	-	104	2	213	320	5,997	43	260	6,257	0.31	104	6,257	875	14	715	122	104
10	Junagadh	Junagadh	181	24	312	516	5,238	59	784	6,022	0.21	115	6,022	1,545	26	1,231	126	115
11	Kachchh	Kachchh	183	7	169	359	6,689	15	319	7,008	0.42	105	7,008	1,989	28	1,714	116	105
12	Kheda	Kaira	49	129	361	539	3,088	73	501	3,589	0.15	116	3,589	1,891	53	1,513	125	116
13	Maheana	Mehsana	65	213	491	768	3,464	79	1,107	4,571	0.19	132	4,571	2,652	58	2,065	128	132
14	Narmada	Bharuch	28	3	32	63	1,088	40	13	1,101	0.21	101	1,101	183	17	175	105	101
15	Navsari	Valsad	13	148	55	216	1,470	67	231	1,701	0.12	116	1,701	1,006	59	867	116	116
16	Panch Mahals	Panch Mahals	80	60	316	455	2,710	52	136	2,846	0.13	105	2,846	403	14	326	124	105
17	Patan	Mehsana	61	22	271	355	3,866	68	645	4,511	0.33	117	4,511	1,456	32	1,250	116	117
18	Porbandar	Porbandar	30	1	101	133	1,122	49	142	1,264	0.21	113	1,264	194	15	158	123	113
19	Rajkot	Rajkot	144	46	277	467	7,378	66	181	7,559	0.23	102	7,559	1,984	26	1,832	108	102
20	Sabar Kantha	Sabarkantha	102	337	456	896	4,381	59	721	5,102	0.21	116	5,102	1,818	36	1,434	127	116
21	Surat	Surat	44	134	192	370	4,319	56	595	4,914	0.09	114	4,914	2,597	53	2,266	115	114
22	Surendranagar	Surendranagar	161	4	198	363	6,862	65	275	7,137	0.45	104	7,137	1,288	18	1,175	110	104
23	Tapi	Surat	25	80	95	200	-	-	-	-	-	-	-	-	-	-	-	-
24	The Dangs	Valsad	4	15	3	22	-	-	-	-	-	-	574	5	-	4	125	-
25	Vadodara	Baroda	102	34	253	388	5,203	69	438	5,641	0.14	108	5,641	2,358	42	1,969	120	108
26	Valsad	Valsad	29	95	39	163	1,614	53	166	1,780	0.11	110	1,780	503	28	447	113	110

Karnataka				Population('000 persons) *2						Religion (Persons) *2								Number of livestock *3			
Sl No.	Name of District	Name of milk union	Poverty rate (%) *1	Total house hold	Total population	SC population	ST population	SC+ST population	% (SC+ST/ Total pop.)	Hindu	Muslim	Christian	Sikh	Buddhist	Jain	Other religions and persuasions	Religion not stated	Total Exotic / Crossbred	Total Indigenous Cattle	Total Cattle	Total Buffaloes
1	Bagalkot	Bijapur	29.1	565	2,442	897	80	977	40.0%	1,634,229	219,991	3,433	443	412	25,198	166	5,880	42,618	236,797	279,415	234,802
2	Bangalore	Bangalore	9.5	4,647	15,333	2,732	730	3,462	22.6%	7,725,070	1,248,294	504,863	13,254	5,531	83,090	498	40,951	115,941	20,641	136,582	8,453
3	Bangalore Rural	Bangalore	14.3	323	1,171	369	74	443	37.8%	890,429	92,252	5,368	389	272	1,045	85	1,083	122,364	36,456	158,820	24,381
4	Belgaum	Belgaum	23.2	2,818	9,603	2,258	471	2,729	28.4%	4,038,331	528,412	18,418	2,037	1,086	178,310	149	12,918	176,994	415,839	592,833	829,370
5	Bellary	Raichur	23.6	544	2,265	973	237	1,210	53.4%	2,103,633	320,834	14,014	1,029	284	8,044	54	4,703	31,270	312,807	344,077	142,255
6	Bidar	Gulbarga	30.8	684	3,023	1,711	150	1,861	61.6%	1,289,709	335,184	35,438	1,145	30,453	680	521	10,170	14,555	219,964	234,519	130,781
7	Bijapur	Bijapur	28.8	334	1,456	323	139	462	31.7%	1,786,830	369,588	2,433	558	374	8,665	499	8,384	4,715	248,310	253,025	156,860
8	Chamarajanagar	Chamrajnagar	30	164	543	136	94	230	42.4%	942,071	47,210	22,183	136	4,872	761	140	3,418	142,891	119,629	262,520	20,887
9	Chikkaballapura	Kolar	25.2	489	1,837	608	374	982	53.5%	1,100,131	147,810	4,684	264	85	975	77	1,078	162,630	83,709	246,339	47,140
10	Chikmagalur	Hassan	15.7	521	2,023	1,045	155	1,200	59.3%	1,004,553	101,235	26,000	182	109	4,710	4	1,168	79,836	257,740	337,576	70,870
11	Chitradurga	Shimoga	27.6	283	1,260	641	116	757	60.1%	1,520,553	128,751	3,175	322	84	3,778	128	2,665	34,794	241,095	275,889	152,852
12	Dakshina Kannada	D. Kannada	8.6	1,091	2,813	449	146	595	21.2%	1,403,854	501,896	171,398	525	445	10,397	138	996	139,968	113,747	253,715	3,700
13	Davanagere	Shimoga	22.2	298	1,175	464	101	565	48.1%	1,658,465	265,805	5,420	307	164	6,417	1,743	7,176	124,184	207,891	332,075	175,896
14	Dharwad	Dharwad	19.4	509	1,964	542	191	733	37.3%	1,390,020	386,834	28,747	1,486	715	29,037	2,748	7,436	43,904	149,877	193,781	79,513
15	Gadag	Dharwad	26.7	377	1,528	910	54	964	63.1%	907,750	143,665	3,432	231	79	5,993	74	3,346	24,153	118,502	142,655	60,989
16	Gulbarga	Gulbarga	30.5	841	3,118	921	136	1,057	33.9%	2,011,014	513,125	8,344	826	9,589	4,865	330	18,233	12,629	460,488	473,117	91,254
17	Hassan	Hassan	19.3	572	1,974	699	242	941	47.7%	1,630,814	120,011	15,611	289	623	5,820	3	3,250	269,348	337,112	606,460	141,264
18	Haveri	-	24.8	413	1,932	459	232	691	35.8%	1,281,878	297,927	2,406	419	68	9,834	702	4,434	59,833	224,776	284,609	98,468
19	Kodagu	Hassan	7.8	421	1,629	523	155	678	41.6%	448,986	87,274	17,130	139	126	250	220	394	33,226	56,135	89,361	14,578
20	Kolar	Kolar	22.3	306	947	316	77	393	41.5%	1,305,431	199,873	26,722	253	150	2,494	92	1,386	173,620	55,416	229,036	45,876
21	Koppal	Raichur	28.3	216	887	328	27	355	40.0%	1,218,024	161,770	4,081	296	85	2,898	461	2,305	25,786	234,622	260,408	77,860
22	Mandya	Mandya	20.3	634	2,602	1,103	263	1,366	52.5%	1,712,695	77,801	8,506	322	299	3,607	109	2,430	213,618	153,122	366,740	145,516
23	Mysore	Mysore	19	866	2,238	577	299	876	39.1%	2,631,985	290,549	39,361	1,255	16,194	14,419	493	6,871	233,225	316,327	549,552	45,419
24	Raichur	Raichur	30.5	421	1,726	564	243	807	46.8%	1,634,062	272,022	10,394	538	2,265	4,156	29	5,346	22,371	336,753	359,124	136,854
25	Ramanagara	Bangalore	21.6	304	1,086	322	127	449	41.3%	959,260	114,311	6,390	383	104	859	57	1,272	125,450	134,447	259,897	30,619
26	Shimoga	Shimoga	15.8	610	2,277	1,039	217	1,256	55.2%	1,479,424	234,664	26,521	400	120	9,234	367	2,023	111,715	455,828	567,543	149,413
27	Tumkur	Tumkur	25.9	1,086	4,050	2,020	357	2,377	58.7%	2,413,812	245,923	9,130	477	187	5,067	161	4,223	224,360	302,707	527,067	181,118
28	Udupi	D. Kannada	8.8	320	953	243	68	311	32.6%	1,009,179	96,740	65,838	232	161	4,534	155	522	96,758	155,309	252,067	8,846
29	Uttara Kannada	Dharwad	18	369	1,325	428	284	712	53.7%	1,187,306	187,974	44,530	305	12,804	3,624	64	562	47,167	289,788	336,955	87,816
30	Yadgir	Gulbarga	38	399	1,555	505	213	718	46.2%	997,974	155,340	8,677	331	7,970	1,519	996	1,464	2,594	308,133	310,727	76,855
Karnataka				21,425	76,735	24,105	6,052	30,157	39.3%	51,317,472	7,893,065	1,142,647	28,773	95,710	440,280	11,263	166,087	2,912,517	6,603,967	9,516,484	3,470,505

Note:

*1: Source: <http://www.livemint.com/Politics/3Ex8iN0xErnoeXcnQ48eZM/Spatial-poverty-in-Karnataka.html>

*2: Source: Population Census 2011

*3: Source: 19th Livestock census (2012)

*4: Source: Dairying in Karnataka A Statistical Profile 2015

*5: Source: Annual Season & Crop Statistics Report 2011-12 of DE&S, Bangalore. (<http://raitamitra.kar.nic.in/stat/9.htm>)

Karnataka			Volume of milk production ('000MT/Year) *4							Milk yield (kg/day) *4			Water resource *5							Land Use (ha) *4				
Sl No.	Name of District	Name of milk union	Crossbred Cow	Local Cow	Total Cow	Buffalo	Total (Cow+Buff)	Other (Goat)	Total Production	Crossbred Cow	Local Cow	Buffalo	Canals (ha) (Gross)	Tanks (ha) (Gross)	Wells (ha) (Gross)	Tube/Bore wells(ha) (Gross)	Lift Irrigation (ha)(Gross)	Other Sources (ha) (Gross)	Total (ha) (Gross)	reporting area	Forest area	Permanent Pasture and grazing	Fallow land	net Sown area
1	Bagalkot	Bijapur	35	55	90	90	180	5	185	5.78	2.36	2.53	57,775	759	11,303	107,895	2,945	125,658	306,335	659	81	3	41	478
2	Bangalore	Bangalore	140	13	153	19	172	0	172	5.95	2.36	2.57	0	0	0	12,081	0	0	12,081	230	11	4	21	126
3	Bangalore Rural	Bangalore	127	6	133	6	139	0	139	5.94	2.36	2.49	0	0	0	29,719	0	0	29,719	217	5	6	23	51
4	Belgaum	Belgaum	112	75	187	447	634	7	641	5.85	2.34	2.99	98,154	508	156,475	181,690	20,605	65,696	523,128	1,344	190	25	234	767
5	Bellary	Raichur	21	60	81	74	155	3	158	5.77	2.28	2.59	135,078	1,995	4,165	89,944	46,216	11,137	288,535	813	97	5	104	414
6	Bidar	Gulbarga	14	54	68	75	143	3	146	5.68	2.32	2.57	7,771	1,262	26,747	28,257	736	1,474	66,247	542	28	14	78	351
7	Bijapur	Bijapur	3	49	52	68	120	4	124	5.69	2.30	2.57	128,098	735	94,174	105,855	0	17,819	346,681	1,053	2	10	221	749
8	Chamarajanagar	Chamrajnagar	87	30	117	12	129	0	129	5.82	2.44	2.55	15,472	8,582	5,186	57,320	528	0	87,088	570	276	23	29	184
9	Chikkaballapura	Kolar	185	19	204	26	230	3	233	6.70	2.41	2.71	0	0	0	61,494	0	0	61,494	405	50	56	16	205
10	Chikmagalur	Hassan	58	61	119	46	165	0	165	5.77	2.40	2.64	9,493	11,475	624	13,586	260	12,607	48,045	722	200	89	28	293
11	Chitradurga	Shimoga	32	45	77	64	141	3	144	5.76	2.39	2.51	2,160	0	0	93,592	0	0	95,752	771	74	89	112	387
12	Dakshina Kannada	D. Kannada	135	51	186	3	189	0	189	5.73	2.14	2.49	0	0	41,104	9,916	2,147	19,211	72,378	477	128	19	12	131
13	Davanagere	Shimoga	108	46	154	75	229	1	230	5.80	2.43	2.48	127,264	2,149	285	107,483	18,143	351	255,675	598	90	20	26	389
14	Dharwad	Dharwad	42	23	65	39	104	0	104	5.70	2.34	2.56	53,886	0	0	24,622	0	0	78,508	427	35	4	70	289
15	Gadag	Dharwad	17	23	40	33	73	3	76	5.71	2.39	2.52	47,689	1,269	2,487	36,977	50	29,879	118,351	466	33	3	54	353
16	Gulbarga	Gulbarga	15	122	137	82	219	6	225	5.78	2.30	2.56	28,429	689	37,291	28,434	3,289	1,337	99,469	1,094	35	26	53	896
17	Hassan	Hassan	168	77	245	71	316	0	316	5.94	2.44	2.48	42,307	30,747	645	36,627	1,215	891	112,432	663	59	33	81	359
18	Haveri	-	53	35	88	43	131	2	133	5.73	2.34	2.51	6,168	12,980	5	60,315	496	19,064	99,028	485	47	12	18	363
19	Kodagu	Hassan	30	13	43	7	50	0	50	5.73	1.82	2.47	1,611	275	0	88	50	360	2,384	411	135	14	8	170
20	Kolar	Kolar	237	13	250	29	279	0	279	7.15	2.33	2.90	0	0	0	36,370	0	0	36,370	375	21	39	44	183
21	Koppal	Raichur	28	44	72	45	117	3	120	5.61	2.40	2.62	79,824	175	0	94,512	514	161	175,186	552	29	15	100	350
22	Mandya	Mandya	194	13	207	76	283	4	287	5.99	2.40	2.54	125,757	21,428	9,407	7,268	415	3,844	168,119	498	25	32	81	232
23	Mysore	Mysore	168	69	237	27	264	2	266	5.87	2.39	2.49	119,669	18,447	25,379	34,231	240	0	197,966	676	63	47	74	345
24	Raichur	Raichur	12	67	79	49	128	4	132	5.67	2.35	2.49	206,196	1,317	7,830	15,767	7,242	0	238,352	836	18	20	275	458
25	Ramanagara	Bangalore	115	42	157	23	180	0	180	6.07	2.39	2.62	2,238	811	0	40,725	260	0	44,034	356	70	25	41	164
26	Shimoga	Shimoga	83	79	162	54	216	0	216	5.91	2.39	2.45	57,450	56,738	6,082	43,001	4,923	5,914	174,108	848	277	163	34	228
27	Tumkur	Tumkur	168	74	242	97	339	3	342	6.06	2.34	2.61	4,199	13,265	896	164,781	0	0	183,141	1,065	45	76	197	510
28	Udupi	D. Kannada	83	62	145	2	147	0	147	5.75	2.25	2.48	0	731	25,169	554	3,084	5,742	35,280	356	100	11	9	100
29	Uttara Kannada	Dharwad	37	41	78	36	114	0	114	5.61	1.81	2.41	0	7,042	10,016	3,876	680	10,790	32,404	1,025	814	17	20	112
30	Yadgir	Gulbarga	8	43	51	22	73	3	76	5.53	2.32	2.50	116,489	2,841	9,681	12,853	2,558	4,152	148,574	516	34	12	106	304
	Karnataka		2,515	1,404	3,919	1,740	5,659	59	5,718	6.03	2.32	2.65	1,473,177	196,220	474,951	1,539,833	116,596	336,087	4,136,864	19,050	3,072	908	2,210	9,941

* Includes temporary irrigation.

Madhya Pradesh				Population ('000 persons) *2						Religion (Persons) *2										Number of livestock *3			
Sl No.	Name of District	Name of milk union	Poverty rate (%) *1	Total household	Total population	SC population	ST population	SC+ST population	% (SC+ST/ Total pop.)	Hindu	Muslim	Christian	Sikh	Buddhist	Jain	Other religions and persuasions	Religion not stated	Total	Cattle(No.) Total Exotic / Crossbred	Cattle(No.) Total Indigenous Cattle	Cattle(No.) Total Cattle	Total Buffaloes	
1	Agarmalwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	Alirajpur	-	-	246	1,100	75	538	613	55.7%	705,060	17,660	4,600	65	36	780	271	527	728,999	431	440,049	440,480	57,493	
3	Anuppur	-	-	231	809	67	249	316	39.1%	686,524	21,473	2,132	606	86	1,653	35,434	1,329	749,237	7,572	339,929	347,501	62,058	
4	Ashoknagar	Bhopal	-	246	1,205	163	450	613	50.9%	778,214	40,707	635	8,009	1,352	15,094	27	1,033	845,071	11,382	230,187	241,569	120,889	
5	Balaghat	Jabalpur	50.1	375	1,360	190	474	664	48.8%	1,519,384	38,542	5,295	1,050	72,162	4,778	58,064	2,423	1,701,698	10,871	565,912	576,783	141,034	
6	Barwani	Indore	21.6	438	1,713	293	764	1,057	61.7%	1,318,869	58,222	2,967	2,361	416	2,289	263	494	1,385,881	599	399,640	400,239	110,663	
7	Betul	Bhopal	49.6	631	2,135	175	1,145	1,320	61.8%	1,505,745	37,590	3,271	1,078	9,651	3,759	13,048	1,220	1,575,362	22,908	503,145	526,053	120,395	
8	Bhind	Gwalior	26.4	493	2,421	507	533	1,040	43.0%	1,595,400	66,776	973	4,047	12,215	19,950	73	3,571	1,703,005	7,530	102,030	109,560	219,145	
9	Bhopal	Bhopal	52.0	3,066	9,281	1,403	1,945	3,348	36.1%	1,755,861	525,434	23,432	10,789	21,688	25,950	335	7,572	2,371,061	20,658	89,434	110,092	83,655	
10	Burhanpur	Indore	60.6	431	1,887	152	774	926	49.1%	552,526	180,840	1,199	1,074	19,883	1,884	99	342	757,847	2,125	129,372	131,497	36,211	
11	Chhatarpur	Jabalpur	26.7	416	1,611	266	541	807	50.1%	1,676,918	70,351	1,980	968	250	10,409	102	1,397	1,762,375	3,095	340,818	343,913	239,206	
12	Chhindwara	Jabalpur	-	395	1,127	62	374	436	38.7%	1,923,920	100,692	4,893	2,528	24,471	7,830	25,771	1,087	2,090,922	23,080	675,987	699,067	136,696	
13	Damoh	Bhopal	59.2	555	1,892	342	255	597	31.6%	1,186,420	47,966	1,681	1,096	119	25,005	82	1,850	1,264,219	4,868	553,977	558,845	106,723	
14	Datta	Gwalior	24.8	307	1,438	304	487	791	55.0%	747,693	28,483	683	490	7,923	453	10	1,019	786,754	630	106,555	107,185	150,324	
15	Dewas	Indore	21.8	784	3,490	600	1,153	1,753	50.2%	1,376,591	174,259	2,355	2,330	382	6,497	72	1,229	1,563,715	30,259	314,631	344,890	236,555	
16	Dhar	Indore	19.4	1,276	5,772	402	2,674	3,076	53.3%	2,051,219	116,202	2,261	1,607	328	12,199	88	1,889	2,185,793	58,107	565,306	623,413	200,419	
17	Dindori	Jabalpur	80.1	178	546	31	296	327	59.9%	605,435	6,736	4,238	260	61	687	84,006	3,101	704,524	506	375,053	375,559	43,204	
18	Guna	Bhopal	32.8	289	1,316	134	401	535	40.7%	1,172,248	49,203	1,208	3,271	529	13,474	52	1,534	1,241,519	1,510	344,854	346,364	121,184	
19	Gwalior	Gwalior	21.4	1,256	5,265	1,813	910	2,723	51.7%	1,835,299	141,735	4,119	24,790	4,361	18,058	217	3,457	2,032,036	14,824	352,976	367,800	222,426	
20	Harda	Bhopal	35.0	439	1,588	110	854	964	60.7%	527,462	38,640	683	676	93	1,573	55	1,283	570,465	5,723	182,221	187,944	226,089	
21	Hoshangabad	Bhopal	36.7	741	2,435	192	629	821	33.7%	1,175,203	52,269	4,453	3,127	1,550	3,888	107	753	1,241,350	2,469	139,240	141,709	72,850	
22	Indore	Indore	15.1	3,886	16,810	1,632	8,450	10,082	60.0%	2,728,225	415,142	18,523	25,696	11,496	71,667	720	5,228	3,276,697	20,369	319,633	340,002	112,526	
23	Jabalpur	Jabalpur	29.6	2,199	5,451	690	1,428	2,118	38.9%	2,159,065	203,652	23,142	13,256	4,320	33,728	21,010	5,116	2,463,289	81,455	96,129	177,584	155,290	
24	Jhabua	Indore	55.9	471	2,111	197	758	955	45.2%	960,925	15,733	38,423	141	65	8,871	388	502	1,025,048	27,922	337,423	365,345	95,324	
25	Katni	Jabalpur	52.3	400	1,636	190	433	623	38.1%	1,240,650	37,232	3,158	1,167	157	5,342	2,643	1,693	1,292,042	17,409	391,764	409,173	102,807	
26	Khandwa (East)	Indore	17.8	593	2,153	233	632	865	40.2%	1,182,330	116,277	2,800	1,726	1,425	3,856	158	1,489	1,310,061	3,497	431,864	435,361	51,866	
27	Khargone (West)	Indore	19.8	1,086	4,566	231	2,066	2,297	50.3%	1,725,441	135,085	2,075	2,896	284	6,028	89	1,148	1,873,046	7,603	386,045	393,648	54,641	
28	Mandla	Jabalpur	75.5	393	1,158	58	576	634	54.7%	849,518	16,558	12,450	436	297	1,789	170,533	3,324	1,054,905	51,231	245,841	297,072	224,443	
29	Mandsaur	Ujjain	16.2	615	2,775	350	784	1,134	40.9%	1,192,588	125,548	1,120	849	242	19,029	77	958	1,340,411	12,715	129,199	141,914	623,861	
30	Morena	Gwalior	19.8	511	2,362	650	152	802	34.0%	1,875,495	76,159	1,092	557	3,234	6,681	92	2,660	1,965,970	38,080	283,033	321,113	127,230	
31	Narsimhapur	Jabalpur	45.3	445	1,520	192	381	573	37.7%	1,038,628	39,048	914	997	262	8,125	2,873	1,007	1,091,854	21,422	226,366	247,788	138,044	
32	Neemuch	Ujjain	7.3	1,540	6,142	658	2,822	3,480	56.7%	741,288	67,324	1,508	1,110	224	14,165	115	333	826,067	1,408	413,407	414,815	141,895	
33	Panna	Jabalpur	48.7	223	845	103	280	383	45.3%	974,748	35,214	418	186	37	4,734	218	965	1,016,520	12,936	417,270	430,206	118,116	
34	Raisen	Bhopal	61.6	1,477	5,625	897	2,743	3,640	64.7%	1,195,235	120,331	1,725	2,262	253	10,637	190	964	1,331,597	13,223	478,634	491,857	510,774	
35	Rajgarh	Bhopal	15.6	454	2,046	280	197	477	23.3%	1,433,879	106,928	1,243	460	121	1,599	50	1,534	1,545,814	30,443	292,175	322,618	172,635	
36	Ratlam	Ujjain	42.5	1,021	4,083	430	1,932	2,362	57.8%	1,267,043	151,071	3,996	1,353	175	29,353	123	1,955	1,455,069	41,391	872,814	914,205	170,806	
37	Rewa	Jabalpur	42.0	387	1,750	506	409	915	52.3%	2,268,838	85,414	1,964	832	986	655	232	6,185	2,365,106	8,073	794,747	802,820	213,711	
38	Sagar	Jabalpur	61.0	2,464	9,247	1,048	6,363	7,411	80.1%	2,198,297	103,480	5,580	4,146	991	62,992	168	2,804	2,378,458	23,956	829,593	853,549	196,178	
39	Satna	-	22.7	683	2,587	343	780	1,123	43.4%	2,158,623	59,471	2,228	1,163	364	3,135	1,689	2,262	2,228,935	51,522	205,100	256,622	133,069	
40	Seoni	Bhopal	47.4	1,267	5,304	768	2,060	2,828	53.3%	1,163,607	137,980	1,404	640	357	6,232	66	1,046	1,311,332	21,376	491,310	512,686	124,943	
41	Schore	Jabalpur	61.5	206	624	44	180	224	35.9%	1,145,052	79,739	1,857	360	7,288	4,982	135,315	4,538	1,379,131	6,131	500,752	506,883	86,900	
42	Singrauli	-	-	280	1,259	155	354	509	40.4%	1,118,998	46,574	2,332	1,422	338	182	6,139	2,288	1,178,273	29,690	306,744	336,434	292,145	
43	Shahdol	Jabalpur	48.5	241	826	79	282	361	43.7%	997,073	42,426	2,372	912	268	1,737	19,448	1,827	1,066,063	560	244,573	245,133	144,961	
44	Shajapur	Ujjain	32.3	514	2,357	587	327	914	38.8%	1,321,003	174,724	815	631	179	13,755	66	1,508	1,512,681	16,691	527,805	544,496	370,247	
45	Sheopur	Gwalior	27.6	209	1,067	34	217	251	23.5%	638,702	41,396	230	6,387	201	379	40	526	687,861	14,314	433,067	447,381	94,039	
46	Shivpuri	Gwalior	48.7	627	2,885	87	1,587	1,674	58.0%	1,648,749	51,200	1,117	7,151	3,421	12,171	72	2,169	1,726,050	2,850	542,021	544,871	80,167	
47	Sidhi	Jabalpur	54.9	189	688	24	93	117	17.0%	1,077,545	34,419	511	128	92	93	12,556	1,689	1,127,033	6,407	360,563	366,970	232,231	
48	Tikamgarh	Gwalior	49.6	220	1,030	246	312	558	54.2%	1,383,475	44,143	588	251	109	15,569	39	992	1,445,166	33,558	238,866	272,424	309,821	
49	Ujjain	Ujjain	21.3	1,481	5,150	1,136	1,681	2,817	54.7%	1,718,204	233,133	4,659	3,241	945	24,622	211	1,849	1,986,864					

Note:

*1: Source: State Planning Commission, Government of Madhya Pradesh website (2004) (

Madhya Pradesh			Volume of milk production (kg/year) *4		Area of Irrigation (ha) *5					Source wise Irrigation Status (Area in 00					Land Use (ha) *5													
Sl No.	Name of District	Name of milk union	Milk Production (1,000 MT)	note	Net Area Sown	Gross Sown Area	Net Irrigated Area	Gross Irrigated Area	% of Gross Irrigated Area to Gross Sown Area	Rainfed Area	Canals	Tanks	Tube Wells	Wells	Other Source s	Gross Irrigate d Area	Geograp hical area	Forest	Barren and unclutrab le land	land put to non Agricultur e Use	Culturable Waste land.	Permanent pasture and graging land.	Land under mise. Tree, crops, and Grovis net	Fallow land other than current	current fallow	Net area sown.	Total cropped area.	Area sown more than
1	Agarmalwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Alirajpur	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Anuppur	-	146.7	including Shahdol and Umaria	109,700	138,900	19,300	19,300	13.9	119,600	7	1	15	2	168	193	391,465	76,448	21,481	34,560	26,792	3,139	200	25,198	25,228	261,625	269,511	31,899
4	Ashoknagar	Bhopal	187.3	including Guna	307,500	372,300	110,000	110,000	29.6	262,300	98	16	129	282	575	1,100	519,843	52,701	36,241	27,531	25,652	12,366	-	4,142	4,138	304,623	352,701	58,078
5	Balaghat	Jabalpur	83.1	-	273,900	344,000	122,800	141,600	41.2	202,400	44	0	322	159	891	1,416	700,714	353,789	72,479	22,470	9,534	4,366	517	3,286	2,295	231,978	267,570	35,592
6	Barwani	Indore	181.7	including Khargone	228,900	254,400	63,600	142,600	56.1	111,800	852	299	209	2	64	1,426	924,500	504,819	9,623	46,468	28,080	32,177	668	15,344	11,860	275,461	348,922	73,461
7	Betul	Bhopal	111.3	-	403,500	554,800	107,200	107,200	19.3	447,600	117	1	661	95	198	1,072	1,007,800	396,280	25,939	46,798	47,325	27,641	4	35,998	31,684	401,131	579,293	128,162
8	Bhind	Gwalior	275.5	-	329,900	359,000	108,700	112,900	31.5	246,100	256	2	676	184	11	1,129	445,204	8,905	21,827	36,127	11,290	16,567	493	7,146	14,847	328,002	355,531	27,529
9	Bhopal	Bhopal	96.6	-	153,900	227,000	85,600	85,600	37.7	141,400	76	5	229	305	241	856	277,880	44,106	3,947	31,097	4,949	33,051	27	3,546	4,711	152,446	214,718	62,272
10	Burhanpur	Indore	116.2	including Khandwa	104,500	117,900	34,400	41,300	35.0	76,600	4	0	263	109	37	413	342,741	202,368	6,419	15,557	650	10,303	-	1,890	1,709	103,845	116,770	12,925
11	Chhatarpur	Jabalpur	170.5	-	403,800	511,300	226,600	226,600	44.3	284,700	297	50	1,468	21	430	2,266	863,036	214,215	1,609	35,798	74,394	70,513	301	42,058	36,505	397,643	485,018	97,375
12	Chhindwara	Jabalpur	121.5	-	477,200	593,000	110,900	133,700	22.6	459,300	105	24	818	198	192	1,337	1,184,973	479,504	27,193	52,810	18,651	51,794	31	32,467	38,672	483,801	541,969	108,168
13	Damoh	Jabalpur	82.6	-	311,100	398,700	111,600	114,100	28.6	284,600	121	4	232	249	535	1,141	728,583	266,995	59,238	32,113	14,180	33,449	54	7,332	6,189	308,933	388,650	79,717
14	Datta	Gwalior	102.9	-	197,200	278,400	133,500	136,300	49.0	142,100	306	11	767	43	236	1,363	295,874	24,798	14,564	21,607	13,537	4,472	2,814	7,483	7,267	199,332	237,243	37,911
15	Dewas	Indore	166.4	-	386,100	560,600	138,300	217,200	38.7	343,400	44	4	566	813	118	1,545	701,307	206,037	10,846	34,523	2,415	60,850	24	1,424	773	384,415	575,273	190,858
16	Dhar	Indore	233.1	-	504,500	638,800	166,000	166,000	26.0	472,800	86	77	540	1,073	396	2,172	819,541	120,755	75,653	47,401	16,274	46,881	33	3,583	2,559	506,402	696,563	190,161
17	Dindori	Jabalpur	92.5	including Mandla	204,900	273,700	1,500	154,500	56.5	119,200	11	32	1	1,613	3	1,660	358,935	25,311	11,219	26,799	13,493	12,755	60	31,833	32,440	205,345	271,815	66,470
18	Guna	Bhopal	-	-	328,600	427,900	139,500	139,800	32.7	288,100	130	39	361	423	445	1,398	630,766	100,911	61,529	34,246	65,251	29,378	19	9,022	7,719	322,691	410,881	88,190
19	Gwalior	Gwalior	192.1	-	208,800	264,000	113,900	147,000	55.7	117,000	607	3	324	430	106	1,470	456,449	110,640	50,937	33,149	22,906	14,280	75	8,682	9,542	206,238	256,501	50,263
20	Harda	Bhopal	145.7	including Hoshangabad	179,800	316,300	139,500	139,500	44.1	176,800	723	2	315	100	255	1,395	330,579	104,597	6,921	16,402	7,777	18,328	495	3,471	1,379	171,209	298,600	127,391
21	Hoshangabad	Bhopal	-	-	399,100	510,000	261,000	261,000	51.2	249,000	1,423	9	472	445	261	2,610	668,689	255,675	25,792	19,474	28,382	26,580	557	10,072	6,535	295,622	492,871	197,249
22	Indore	Indore	171.6	-	258,200	370,300	93,700	145,100	39.2	225,200	31	42	81	1,151	146	1,451	383,097	52,208	6,857	24,033	14,705	21,526	75	2,973	2,109	258,611	425,814	167,203
23	Jabalpur	Jabalpur	193.8	including Katni	272,700	364,600	108,500	123,600	33.9	241,000	83	1	229	654	269	1,236	519,757	77,639	36,828	31,985	24,155	40,120	53	16,984	17,517	274,476	374,533	100,057
24	Jhabua	Indore	118.3	-	358,900	414,200	57,600	58,200	14.1	356,000	103	69	208	30	172	582	675,716	131,748	83,411	56,739	25,976	8,680	4	5,026	4,927	359,205	415,299	56,094
25	Katni	Jabalpur	-	-	198,300	259,600	59,000	71,900	27.7	187,700	156	17	291	25	230	719	493,092	100,028	37,192	31,398	37,669	39,621	129	25,767	23,264	198,024	263,555	65,531
26	Khandwa (East	Indore	-	-	304,400	381,700	113,900	113,900	29.8	267,800	45	13	749	112	220	1,139	775,616	309,300	8,595	67,855	187	54,424	40	11,961	5,988	317,266	393,711	76,445
27	Khargone (West	Indore	-	-	405,400	453,300	146,000	146,000	32.2	307,300	159	4	916	187	194	1,460	647,789	75,442	31,408	36,178	25,788	58,524	13	8,792	2,305	409,339	475,786	66,447
28	Mandla	Jabalpur	-	-	219,000	280,200	19,900	19,900	7.1	260,300	127	0	26	0	46	199	965,559	592,951	10,631	42,766	19,642	19,603	66	32,656	28,914	218,330	281,048	62,718
29	Mandsaur	Ujjain	261.1	including Neemuch	360,700	477,900	103,300	104,800	21.9	373,100	5	1	584	45	413	1,048	551,790	36,585	48,183	74,494	19,611	13,184	46	1,307	3,184	355,196	459,313	104,117
30	Morena	Gwalior	384.5	including Seorur	262,600	332,200	168,000	169,200	50.9	163,000	360	3	1,115	163	51	1,692	501,686	50,669	89,510	39,767	23,342	18,746	-	6,925	8,812	263,915	326,446	62,531
31	Narsimhapur	Jabalpur	97.7	-	303,500	390,700	174,300	175,500	44.9	215,200	11	0	911	723	110	1,755	513,651	136,207	1,028	24,099	16,675	23,934	164	5,772	4,036	301,736	400,600	98,864
32	Neemuch	Ujjain	-	-	186,700	292,900	84,100	84,200	28.8	208,700	15	0	297	140	390	842	393,553	94,487	39,058	42,656	19,962	7,706	3	971	1,584	188,126	259,009	71,883
33	Panna	Jabalpur	137.6	-	251,500	297,600	84,400	84,400	28.4	213,200	126	88	212	46	372	844	702,924	299,533	22,839	40,598	41,814	20,302	-	15,783	15,309	246,746	282,114	35,368
34	Raisen	Bhopal	180.3	-	431,000	507,400	194,700	194,700	38.4	312,700	565	7	254	686	435	1,947	848,746	333,672	3,617	39,479	17,744	24,336	107	3,085	1,202	430,504	500,037	69,533
35	Rajgarh	Bhopal	155.2	-	424,500	548,400	118,900	158,400	28.9	390,000	51	49	1,021	291	172	1,584	616,300	17,636	30,173	40,692	31,435	68,586	50	5,415	2,417	419,896	584,650	164,754
36	Ratlam	Ujjain	198.4	-	331,900	445,900	92,300	93,300	20.9	352,600	16	35	340	476	66	933	486,007	34,299	42,434	29,857	18,113	28,895	62	1,471	1,317	329,559	461,003	131,444
37	Rewa	Jabalpur	170.3	-	369,400	502,200	88,600	97,900	19.5	404,300	148	20	289	271	251	979	628,745	85,289	34,499	59,931	5,181	27,197	1,596	23,341	20,089	371,622	503,781	132,159
38	Sagar	Jabalpur	140.5	-	539,000	710,700	236,600	236,700	33.3	474,000	79	28	803	463	994	2,367	1,022,759	296,919	18,605	54,099	15,731	76,947	1,575	14,412	10,570	543,901	709,695	175,794
39	Satna	-	167.3	-	357,000	481,400	136,800	138,400	28.8	343,000	72	16	370	632	294	1,384	747,432	203,659	14,882	61,823	46,383	19,817	3,634	16,586	15,963	359,685	475,908	116,223
40	Sehore	Bhopal	153.2	-	383,500	579,500	203,600	203,600	35.1	375,900	392	49	851	525	219	2,036	656,368	172,597	8,342	38,752	11,245	37,944	13	4,511	957	382,007	586,902	204,895
41	Seoni	Jabalpur	88.6	-	368,000	482,700	110,500	110,500	22.9	372,200	492	68	298	15	232	1,105	875,401	328,081	11,835	48,015	38,403	19,829	31	31,324	30,123	367,760	471,005	103,245
42	Singrauli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	Shahdol	Jabalpur	-	-	179,700	206,800	21,000	21,000	10.2	185,800	40	9	26	16	119	210												

Uttar Pradesh			Population (persons)*1						Religion (persons) *1								Total
Sl No.	Name of District	Name of milk union	Total house hold	Total population	SC population	ST population	SC+ST population	% (SC+ST/ Total pop.)	Hindu	Muslim	Christian	Sikh	Buddhist	Jain	Other religions and persuasion	Religion not stated	
1	Agra	Firozabad	2,420	12,565	2,332	157	2,489	19.8%	4,418,797	3,922,718	411,313	10,076	12,057	4,049	21,508	384	36,692
2	Aligarh	Aligarh	1,787	8,590	2,231	11	2,242	26.1%	3,673,889	2,904,140	729,283	7,635	5,875	2,582	2,805	91	21,478
3	Allahabad	Allahabad	5,672	22,820	7,862	532	8,394	36.8%	5,954,391	5,102,041	796,756	13,782	4,377	4,391	2,247	305	30,492
4	Ambodkar Nagar	Faizabad	265	1,184	247	22	269	22.7%	2,397,888	1,985,654	401,678	2,536	869	1,817	235	33	5,066
5	Amethi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Anroha	Moradabad	240	1,239	253	8	261	21.2%	1,840,221	1,075,440	764,881	5,952	5,295	189	517	21	2,439
7	Auraiya	Kanpur	332	1,554	825	0	825	53.1%	1,379,545	1,273,546	101,963	1,004	371	332	228	444	1,657
8	Azamgarh	Azamgarh	665	3,128	1,060	47	1,107	35.4%	4,613,913	3,878,626	718,692	3,810	719	5,652	183	226	6,005
9	Bachhot	Meerut	224	1,057	154	9	163	15.4%	1,303,048	917,474	364,583	1,840	483	161	16,139	25	2,343
10	Bahraich	Gonda	344	1,794	453	13	466	26.0%	3,487,731	2,291,892	1,169,330	6,400	8,212	2,793	1,177	38	7,889
11	Ballia	Azamgarh	420	2,115	395	98	493	23.3%	3,239,774	3,004,240	213,440	4,463	892	1,595	233	64	14,847
12	Balrampur	Gonda	427	1,914	436	19	455	23.8%	2,148,665	1,333,242	805,975	3,228	900	1,866	198	87	3,169
13	Banda	Chitrakoot	226	1,121	318	0	318	28.4%	1,799,410	1,637,549	157,612	1,367	231	168	916	50	1,517
14	Barabanki	Faizabad	1,264	5,742	1,754	30	1,784	31.1%	3,260,699	2,505,444	737,106	4,857	2,090	1,553	3,016	211	6,422
15	Bareilly	Bareilly	1,120	4,565	631	4	635	13.9%	4,448,359	2,830,768	1,536,534	14,822	28,187	4,371	931	339	32,407
16	Basti	Basti	451	2,025	591	14	605	29.9%	2,464,464	2,082,976	364,510	3,493	900	9,753	107	99	6,266
17	Bhadohi	Mirzapur	255	1,130	345	19	364	32.2%	1,578,213	1,368,291	203,887	1,365	199	1,562	161	7	2,741
18	Bijnor	Moradabad	493	2,510	659	21	680	27.1%	3,682,713	2,032,081	1,585,210	6,184	50,624	1,736	2,134	41	4,703
19	Budaun	Bareilly	540	2,786	986	0	986	35.4%	3,681,896	2,867,707	790,515	6,320	1,135	1,959	678	87	13,495
20	Bulandshahar	Meerut	514	2,617	558	10	568	21.7%	3,499,171	2,707,195	777,407	4,088	2,765	669	1,572	86	5,389
21	Chandauli	Varanasi	404	1,753	817	40	857	48.9%	1,952,756	1,727,869	215,081	2,153	1,389	340	1,000	1,175	4,649
22	Chitrakoot	Chitrakoot	125	596	254	0	254	42.6%	991,720	955,372	34,559	693	63	101	285	27	630
23	Deoria	Gorakhpur	843	3,959	748	160	908	22.9%	3,100,946	2,730,957	358,539	3,626	818	1,182	209	146	5,469
24	Etah	Aligarh	751	3,480	1,496	0	1,496	43.0%	1,774,480	1,611,126	146,346	2,464	708	2,887	5,671	18	5,260
25	Etawah	Kanpur	685	2,916	1,482	0	1,482	50.8%	1,581,810	1,457,892	113,961	1,362	1,045	1,733	3,917	94	1,806
26	Faizabad	Faizabad	595	2,492	926	5	931	37.4%	2,470,996	2,094,271	365,806	3,225	1,912	737	358	185	4,502
27	Farukhabad	Kanpur	419	1,770	816	38	854	48.2%	1,885,204	1,596,278	276,846	3,137	3,160	3,161	487	100	2,035
28	Fatehpur	Allahabad	491	2,428	1,261	7	1,268	52.2%	2,632,733	2,274,674	350,700	2,201	402	172	99	47	4,338
29	Firozabad	Firozabad	708	3,574	861	49	910	25.5%	2,498,156	2,140,745	318,112	3,370	1,804	3,395	19,077	61	14,892
30	Gautam Buddha	Meerut	916	3,584	719	8	727	20.3%	1,648,115	1,394,025	215,500	3,366	9,261	895	4,518	91	16,459
31	Ghaziabad	Meerut	2,753	12,328	2,712	50	2,762	22.4%	4,681,645	3,414,427	1,186,776	19,026	23,001	3,487	16,412	265	18,251
32	Ghazipur	Varanasi	729	3,250	1,031	73	1,104	34.0%	3,620,268	3,233,790	368,153	4,181	810	3,145	213	184	9,792
33	Gonda	Gonda	739	3,352	876	24	900	26.8%	3,433,919	2,739,076	678,615	4,735	1,893	649	338	57	8,556
34	Gorakhpur	Gorakhpur	945	4,214	1,042	40	1,082	25.7%	4,440,895	4,009,037	403,847	9,662	2,123	2,848	460	207	12,711
35	Hamirpur	Chitrakoot	94	460	88	13	101	22.0%	1,104,285	1,010,014	91,269	814	196	74	41	273	1,604
36	Hapur	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Hardoi	Lucknow	510	2,609	1,120	1	1,121	43.0%	4,092,845	3,508,131	556,219	5,822	5,688	6,671	446	98	9,770
38	Hathras	Aligarh	309	1,493	469	0	469	31.4%	1,564,708	1,397,225	159,448	1,350	524	424	1,289	63	4,385
39	Jalaun	Jhansi	210	1,137	177	46	223	19.6%	1,689,974	1,509,708	171,581	1,148	463	2,875	256	145	3,798
40	Jaunpur	Varanasi	1,472	7,077	2,012	125	2,137	30.2%	4,494,204	3,981,502	483,750	4,947	1,286	7,898	349	114	14,358
41	Jhansi	Jhansi	575	2,272	902	111	1,013	44.6%	1,998,603	1,823,930	147,842	7,050	4,951	1,203	7,328	311	5,988
42	Kannauj	Kanpur	545	2,614	754	3	757	29.0%	1,656,616	1,375,788	273,967	1,263	504	2,033	606	65	2,390
43	Kanpur Dehat	Kanpur	555	2,820	992	67	1,059	37.6%	1,796,184	1,612,968	176,327	1,300	478	819	155	103	4,034
44	Kanpur Nagar	Kanpur	16,684	83,200	10,687	209	10,896	13.1%	4,581,268	3,992,174	720,660	15,751	29,676	2,533	5,710	589	13,975
45	Kasganj	Aligarh	297	1,465	680	9	689	47.0%	1,436,719	1,211,427	213,822	1,969	2,280	3,907	313	72	2,929
46	Kaushambi	Allahabad	320	1,690	497	107	604	35.7%	1,599,596	1,372,381	220,423	2,225	522	687	545	3	2,810
47	Kushi Nagar	Gorakhpur	480	2,331	334	72	406	17.4%	3,564,544	2,928,462	620,244	5,006	767	4,619	383	133	4,930
48	Lakhimpur Kheri	Lucknow	680	3,127	932	240	1,172	37.5%	4,021,243	3,078,262	807,600	7,502	94,388	18,454	487	226	14,324
49	Lalitpur	Jhansi	109	545	78	24	102	18.7%	1,221,592	1,163,804	33,724	1,351	1,034	69	20,390	41	1,179
50	Lucknow	Lucknow	5,737	18,119	3,602	264	3,866	21.3%	4,589,838	3,537,787	985,070	20,493	23,883	3,877	4,975	504	13,249
51	Maharajganj	Gorakhpur	567	2,985	660	49	667	22.3%	2,684,703	2,196,884	458,650	3,527	1,381	16,030	243	338	7,650
52	Maheba	Chitrakoot	125	589	121	98	219	37.2%	875,958	815,142	57,454	965	389	94	234	157	1,523
53	Mainpuri	Firozabad	731	3,533	1,333	0	1,333	37.7%	1,868,529	1,746,649	100,723	1,729	475	8,814	4,161	38	5,940
54	Mathura	Firozabad	1,428	6,111	2,003	81	2,084	34.1%	2,547,184	2,310,776	216,933	3,179	2,872	883	2,056	126	10,359
55	Mau	Azamgarh	450	1,853	619	30	649	35.0%	2,205,967	1,769,937	428,555	2,109	340	564	155	129	4,179
56	Meerut	Meerut	891	4,270	725	45	770	18.0%	3,443,689	2,183,255	1,185,643	10,582	24,912	1,855	18,544	236	18,662
57	Mirzapur	Mirzapur	393	1,917	719	14	733	38.2%	2,496,970	2,292,534	195,765	2,373	1,133	341	701	27	4,096
58	Moradabad	Moradabad	707	3,432	595	20	615	17.9%	4,772,006	2,488,265	2,248,392	13,157	7,555	1,260	2,426	382	10,569
59	Muzaffar Nagar	MuzNagar	729	3,853	1,036	1	1,037	26.9%	4,143,512	2,382,914	1,711,453	6,495	18,601	1,516	16,345	60	6,128
60	Pilibhit	Bareilly	215	974	225	50	275	28.2%	2,031,007	1,449,007	489,686	9,510	84,787	360	138	45	3,474
61	Pratapgarh	Allahabad	1,214	5,319	1,455	96	1,551	29.2%	3,209,141	2,731,351	452,394	3,920	1,451	7,795	746	43	11,441
62	Raebareli	Lucknow	1,180	4,986	1,448	58	1,506	30.2%	3,405,559	2,975,998	413,243	3,634	2,424	722	397	602	8,539
63	Rampur	Moradabad	299	1,499	423	0	423	28.2%	2,335,819	1,073,890	1,181,337	9,201	65,316	384	1,307	63	4,321
64	Saharanpur	MuzNagar	423	1,668	296	0	296	17.7%	3,466,382	1,966,892	1,454,052	6,523	18,627	1,937	10,208	135	8,008
65	Sambhal	Moradabad	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66	Sant Kabir Nagar	Basti	178	688	195	0	195	28.3%	1,715,183	1,300,586	404,410	1,766	447	4,393	95	35	3,451
67	Shahjahanpur	Bareilly	533	2,577	715	7	722	28.0%	3,006,538	2,412,595	527,581	4,630	51,090	2,312	301	84	7,945
68	Shamli	MuzNagar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	Shravasti	Gonda	268	1,253	475	0	475	37.9%	1,117,361	768,643	343,981	1,427	407	323	68	56	2,456
70	Siddharth Nagar	-	352	1,475	252	27	279	18.9%	2,559,297	1,789,704	748,073	3,042	681	11,964	179	356	5,298
71	Sitapur	Lucknow	723	3,460	1,155	9	1,164	33.6%	4,483,992	3,555,450	893,725	6,579	11,611	2,663			

Uttar Pradesh			Number of livestock *2				Volume of milk production ('000MT/Year) *2							Land use ('000 ha) *2				
Sl No.	Name of District	Name of milk union	Total Exotic / Cross-bred cattle	Total Indigenous Cattle	Total Cattle	Total Buffaloes	Crossbred Cow	Local Cow	Total Cow	Buffalo	Total (Cow+Buf)	Other	Total Production	Reporting Area	Forest Area	PPGL	Fallow Land	Net sown area
1	Agra	Firozabad	59	157	211	978	48	71	119	523	642	43	685	399	36	1	23	279
2	Aligarh	Aligarh	67	136	203	1,130	34	56	90	553	643	27	670	371	3	2	9	304
3	Allahabad	Allahabad	149	551	700	585	93	129	222	261	483	23	506	557	21	2	104	302
4	Ambodkar Nagar	Faizabad	54	174	228	289	18	40	58	148	206	23	229	236	0	1	15	167
5	Amethi	-	44	298	342	270	19	-	50	209	259	4	263	217	21	2	33	147
6	Amroha	Moradabad	57	92	149	658	19	31	50	209	259	4	263	217	21	0	4	172
7	Auraiya	Kanpur	9	94	103	254	9	30	39	158	197	13	210	206	4	1	20	146
8	Azamgarh	Azamgarh	143	397	540	438	77	142	219	259	478	36	514	424	0	1	42	300
9	Baghpat	Meerut	81	18	99	416	31	17	48	313	361	2	363	135	2	0	3	108
10	Bahraich	Gonda	11	525	536	366	5	105	110	172	282	43	325	486	68	1	20	321
11	Ballia	Azamgarh	84	190	274	234	57	62	119	135	254	18	272	299	0	0	20	217
12	Balrampur	Gonda	4	269	273	166	2	63	65	78	143	13	156	325	59	0	7	213
13	Banda	Chitrakoot	1	371	372	374	1	106	107	150	257	12	269	439	5	0	23	345
14	Barabanki	Faizabad	16	322	338	446	12	107	119	182	301	30	331	389	6	2	43	259
15	Bareilly	Bareilly	29	233	262	637	15	53	68	419	487	16	503	407	0	0	10	330
16	Basti	Basti	55	99	154	334	30	40	70	194	264	10	274	277	4	1	8	209
17	Bhadohi	Mirzapur	97	118	210	145	18	16	34	65	99	3	102	437	10	1	19	351
18	Bijnor	Moradabad	95	208	303	663	32	72	104	271	375	9	384	465	54	0	11	326
19	Budaun	Bareilly	24	238	262	802	15	97	112	445	557	22	579	427	7	0	8	351
20	Bulandshahar	Meerut	138	86	224	1,244	62	43	105	1,163	1,268	17	1,285	365	8	1	5	299
21	Chandauli	Varanasi	42	163	205	222	30	45	75	122	197	8	205	253	77	0	7	137
22	Chitrakoot	Chitrakoot	3	419	422	183	2	100	102	80	182	12	194	339	60	0	19	173
23	Deoria	Gorakhpur	110	90	200	211	31	41	72	162	234	31	265	249	0	0	12	197
24	Etah	Aligarh	24	122	146	663	17	68	85	606	691	53	744	244	1	0	19	186
25	Etawah	Kanpur	15	112	127	293	11	39	50	157	207	19	226	240	36	1	17	147
26	Faizabad	Faizabad	28	352	380	290	14	84	98	129	227	19	246	260	3	2	27	173
27	Farukhabad	Kanpur	34	79	113	291	16	37	53	139	192	10	202	220	0	1	26	149
28	Fatehpur	Allahabad	16	305	321	594	7	65	72	216	288	33	321	422	8	3	45	289
29	Firozabad	Firozabad	16	83	99	523	11	32	43	200	333	36	369	241	9	1	12	183
30	Gautam Buddha	Meerut	27	46	73	288	14	5	19	259	278	2	280	125	2	1	29	53
31	Ghaziabad	Meerut	45	17	62	295	63	20	83	574	657	6	663	93	2	0	8	51
32	Ghazipur	Varanasi	56	326	382	479	40	89	129	274	403	27	430	333	0	1	19	254
33	Gonda	Gonda	53	417	470	395	26	99	125	250	375	14	389	401	13	1	30	287
34	Gorakhpur	Gorakhpur	103	186	289	279	100	68	168	197	365	16	381	335	6	0	24	246
35	Hamirpur	Chitrakoot	1	269	270	200	1	70	71	63	134	10	144	391	24	0	25	293
36	Hapur	-	56	17	73	297	-	-	-	-	-	-	-	114	1	0	6	87
37	Hardoi	Lucknow	40	469	509	624	30	106	136	291	427	23	450	599	12	5	57	434
38	Mathas	Aligarh	27	37	64	455	13	23	36	275	311	12	323	180	2	1	4	149
39	Jalaun	Jhansi	7	217	224	256	3	72	75	132	207	30	237	454	28	0	24	351
40	Jaunpur	Varanasi	142	330	472	464	56	159	215	299	514	21	535	400	0	1	52	279
41	Jhansi	Jhansi	3	350	353	243	1	69	70	101	171	23	194	501	34	1	36	336
42	Kannauj	Kanpur	30	100	130	323	11	31	42	181	223	26	249	209	13	2	8	153
43	Kanpur Dehat	Kanpur	18	160	178	308	47	40	87	123	210	16	226	315	6	0	35	222
44	Kanpur Nagar	Kanpur	49	146	195	374	30	43	73	217	290	13	303	301	6	4	34	188
45	Kasganj	Aligarh	10	88	98	793	-	-	-	-	-	-	-	196	2	9	143	143
46	Kaushambi	Allahabad	12	151	163	271	9	31	40	99	139	13	152	186	0	1	18	128
47	Kushi Nagar	Gorakhpur	84	74	158	269	30	39	69	211	280	31	311	291	1	1	5	224
48	Lakhimpur Kheri	Lucknow	53	608	661	578	12	99	111	218	329	21	350	773	165	1	24	480
49	Lalitpur	Jhansi	2	481	483	235	2	92	94	89	183	18	201	510	76	3	25	305
50	Lucknow	Lucknow	42	238	280	275	30	59	89	179	268	10	278	252	12	3	30	138
51	Maharajganj	Gorakhpur	34	52	86	182	17	50	67	169	236	28	264	291	50	0	5	201
52	Mathura	Chitrakoot	0	228	228	136	0	47	47	76	123	19	142	327	16	1	15	239
53	Mainpuri	Firozabad	11	75	86	365	9	34	43	170	213	30	243	273	2	1	27	186
54	Mathura	Firozabad	26	201	227	282	19	55	74	433	507	13	520	330	2	1	9	269
55	Mau	Azamgarh	28	132	160	175	32	56	88	112	200	20	220	172	1	0	16	122
56	Meerut	Meerut	129	36	165	648	63	34	97	632	729	5	734	273	21	0	8	195
57	Mirzapur	Mirzapur	91	336	427	251	51	92	143	116	259	9	268	453	109	1	57	191
58	Moradabad	Moradabad	83	100	183	532	30	59	89	531	620	13	633	224	0	0	4	186
59	Muzaffar Nagar	MuzNagar	166	42	208	553	94	56	150	823	973	7	980	294	24	0	7	220
60	Pilibhit	Bareilly	14	138	152	268	9	50	59	160	219	7	226	378	80	0	8	233
61	Pratapgarh	Allahabad	91	287	378	356	25	60	85	178	263	18	281	362	1	1	75	184
62	Raebareilly	Lucknow	14	380	394	331	29	117	146	200	346	23	369	392	4	3	77	224
63	Rampur	Moradabad	34	124	158	441	23	38	61	258	319	9	328	236	7	0	3	191
64	Saharanpur	MuzNagar	147	113	260	634	32	52	84	425	509	9	518	364	33	0	5	273
65	Sambhal	Moradabad	59	112	171	579	-	-	-	-	-	-	-	245	0	0	5	201
66	Sant Kabir Nagar	Basti	30	63	93	132	11	44	55	84	139	10	149	103	0	0	13	69
67	Shahjahanpur	Bareilly	21	267	288	490	19	71	90	188	278	17	295	128	5	0	2	102
68	Shamli	MuzNagar	67	20	87	305	-	-	-	-	-	-	-	175	4	0	12	121
69	Shravasti	Gonda	2	198	200	131	2	34	36	62	98	9	107	193	34	0	1	132
70	Siddharth Nagar	-	6	266	272	167	6	102	108	191	299	24	323	298	4	1	12	236
71	Sitapur	Lucknow	51	438	489	479	20	137	157	340	497	27	524	574	6	1	39	445
72	Sonbhadra	Mirzapur	15	461	476	275	5	116	121	112	233	14	247	681	326	0	68	146
73	Sultanpur	Faizabad	44	345	389	272	52	120	172	228	400	28	428	266	1	1	29	178
74	Ummio	Lucknow	8	373	381	506	-	80	80	310	395	24	419	460	17	3	46	314
75	Varanasi	Varanasi	53	138	241	295	58	35	93	92	185	9	194	153	0	0	21	96
UP			3,579	15,978	19,557	30,625	1,840	4,546	6,386	17,524	23,910	1,288	25,198	24,170	1,658	65	1,674	16,546

Annex 7

Results of Socioeconomic Situation Survey

1. Basic Descriptions of Socioeconomic Situation Survey

Socioeconomic Situation Survey was conducted in order to elucidate the current situations of dairy activities and the livelihoods of dairy farmers and the social and economic contributions of cooperatives to these farmers.

1.1 Sample Villages of the Survey

The table below shows the list of target villages of the Survey. The target villages were selected from the districts where the target unions of this Study are located. As shown in the table, these villages have different characteristics in location, water source, and social characteristics. Also, three villages where DCS do not exist are included in the target villages (Kanfalla Bhokatgao in Assam, Haravala in Karnataka, Raipura in Uttar Pradesh) in order to compare the socioeconomic situations of the villages where DCS exist.

For the analysis of the following sections, south and north Karnataka are regarded as separate category as the nature of dairy activities are significantly different between them.

Table: 1-1: List of target villages of Socioeconomic Situation Survey

State	District	Village	Union	Water source for agriculture	Characteristics
Gujarat	Anand	Mujkuva	Kaira	Canal, borewell	20Km to Anand city
	Banaskantha	Saral Vid	Banaskantha	Canal, borewell	Scheduled Caste (SC) and Scheduled Tribe (ST) are predominant
		Thavar		Borewell, rainwater	Semi-arid area, but villagers are holding a large number of livestock
Bihar	Patna	Guai	Patna	Canal, borewell	Close to Patna city (15Km)
	Samastipur	Rahmatpur	Samastipur	Borewell	Close to Samastipur city (7Km)
		Chakhaji		Borewell	Remote area
Assam	Kamrup Rural	Uzankuri	WAMUL	Borewell	Close to river and face frequent flood
		Malaybari		Canal, borewell	Remote area (50Km from Guwahati city)
	Golaghat	Kanfalla Bhokatgao	No DCS	Borewell	Close to small town
South Karnataka	Bangalore rural	Kammasandra	Bangalore	Rainwater, borewell	25Km to Bangalore city
	Gulbarga	Kumasi	Gulbarga	Borewell	Relatively dry area

North Karnataka		Haravala	No DCS	Canal	Remote area
Uttar Pradesh	Chandaulli	Nadara	Varanasi	Canal, Borewell	45Km to Varanasi city
		Raipura	No DCS	Canal, Borewell	Bad road access
	Ghaziabad	Sakoorpur	Meerut	Borewell	Close to Delhi

1.2 Characteristics of the Sample Households

As shown in Table-2, the sample size of the survey is 1,171 households where there are 75-85 households for each village. The households are extracted so that both the members of the DCS and non-members are included in the sample.

Table 1-2: Number of sample household for each village

State, Village	Villages with DCS		Village without DCS	Total
	Member	Non-member		
Gujarat	159	72		231
Mujkuva	53	25		78
Saral Vid	67	8		75
Thavar	39	39		78
Bihar	135	102		237
Guai	54	28		82
Rahmatpur	40	35		75
Chakhaji	41	39		80
Assam	83	70	79	232
Uzankuri	40	37		77
Malaybari	43	33		76
Kanfalla Bhokatgao			79	79
Karnataka	95	59	79	233
Kommasandra	43	35		78
Kumasi	52	24		76
Haravala			79	79
UP	112	51	75	238
Nadara	59	26		85
Raipura			75	75
Sakoorpur	53	25		78
Total	584	354	233	1,171

The sample also is diversified in terms of the social category of the households. As shown in Table 1-3, the households of general caste, other backward categories (OBC), scheduled caste (SC), and scheduled tribe (ST) are included in the sample.

Table 1-3: Number of sample households by social category

	Villages with DCS		Total
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	Member	Non-member	Village without DCS	
Gujarat	159	72		231
General	4	9		13
OBC	68	36		104
SC	25	19		44
ST	61	8		69
Others	1			1
Bihar	135	102		237
General	40	28		68
OBC	51	42		93
SC	44	30		74
Others		2		2
Assam	83	70	79	232
General	25	21	20	66
OBC	29	27	27	83
SC	29	22		51
Others			32	32
Karnataka	95	59	79	233
General	47	22	22	91
OBC	15	9	27	51
SC	23	23	21	67
ST	10	5	9	24
UP	112	51	75	238
General	19	9	15	43
OBC	60	31	34	125
SC	33	10	26	69
ST		1		1
Total	584	354	233	1171

2. Ownership of Cattle and Buffalo and Dairy Production and Sales

2.1 Scale of Cattle and Buffalo Holdings

Table 2-1 and 2-2 show the average number of cattle and buffalo and female adult cattle and buffalo per household for each village and state respectively. One can see that the average holding of cattle and buffalo is relatively high in the sample households in Gujarat and Assam. Also, the average holding of milking animal (female adult cattle and buffalo) is only 1.7 in the whole sample.

Table 2-1: Average number of cattle and buffalo and female adult cattle and buffalo per household for each sample village

State, Village	Average number of cattle and buffalo	Average number of female adult cattle and buffalo
Gujarat	5.0	2.8
Mujkuva	3.9	2.2
Saral Vid	4.4	2.3
Thavar	6.7	3.7
Bihar	1.9	0.8
Guai	1.9	0.9
Rahmatpur	2.3	0.8
Chakhaji	1.7	0.7
Assam	4.3	1.8
Uzankuri	3.7	1.8
Malaybari	5.1	2.3
Kanfalla Bhokatgao	4.0	1.3
South Karnataka	2.1	1.4
North Karnataka	2.5	1.2
Kumasi	2.2	0.9
Haravala	2.9	1.5
UP	2.5	1.6
Nadara	2.2	1.4
Raipura	2.4	1.6
Sakoorpur	3.0	2.0
Total	3.2	1.7

Table 2-2: Average number of cattle and buffalo and female adult cattle and buffalo per household for each state

State	Average number of cattle and buffalo	Average number of female adult cattle and buffalo
Gujarat	5.0	2.8
Bihar	1.9	0.8
Assam	4.3	1.8
South Karnataka	2.1	1.4
North Karnataka	2.5	1.2
UP	2.5	1.6
Total	3.2	1.7

Table 2-3 and 2-4 show the average number of cattle and buffalo holding per household for each category of rural households based on the Socioeconomic Situation Survey. One can see that the number of cattle and buffalo holdings increases as the scale of landholdings expands. It also shows that the degree of increase in the number of livestock holdings is much higher in

Gujarat, where the dairy production is highly developed, than other state. The number is relatively high in Assam (but the production volume is relatively low there as the rate of low yield breed is high, which will be discussed in the following sections).

Table2-3: Average number of cattle and buffalo holding per household for each category of rural households for each village

State, Village (Area of landholding: ha)	Large (4ha-)	Medium (2-4ha)	Small (1-2ha)	Marginal (0.002-1 ha)	Tenant (-0.002ha)	Non-farm (-0.002ha)	Total
Gujarat	14.2	9.7	7.6	4.7	4.0	2.8	5.0
Mujkuva	33.0	4.0	13.5	3.8		2.4	3.9
Saral Vid	6.0	7.0	5.3	3.5		4.4	4.4
Thavar	10.7	11.1	9.3	7.0	4.0	2.0	6.7
Bihar		2.7	2.3	2.0	1.8	1.8	1.9
Guai		2.0	1.9	1.9	1.4	2.0	1.9
Rahmatpur		4.0	4.5	2.4	2.1	1.8	2.3
Chakhaji			2.0	1.8	1.6	1.5	1.7
Assam	6.7	4.3	5.1	3.8	4.1	2.9	4.3
Uzankuri	12.5	4.1	4.5	2.2	3.5	2.9	3.7
Malaybari	5.7	4.3	6.2	4.9	7.7	2.9	5.1
Kanfalla Bhokatgao	7.0	5.0	4.4	3.8	3.6	3.0	4.0
South Karnataka		8.3	2.8	2.1		1.3	2.1
North Karnataka	2.6	2.5	2.0	2.2	1.5	3.7	2.5
Kumasi	2.2	2.5	2.1	2.7	1.0	1.4	2.2
Haravala	3.0	2.5	2.0	1.7	2.0	6.0	2.9
UP	3.6	2.5	2.8	2.5	2.2	1.8	2.5
Nadara	2.5	1.9	2.9	2.4	2.3	1.8	2.2
Raipura	3.1	2.3	3.0	2.5	0.5	1.3	2.4
Sakoorpur	6.9	3.0	2.7	2.6	3.0	2.1	3.0
Total	4.7	4.1	4.0	3.0	2.5	2.3	3.2

Table2-4: Average number of cattle and buffalo holding per household for each category of rural households for each state

State	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	14.2	9.7	7.6	4.7	4.0	2.8	5.0
Bihar		2.7	2.3	2.0	1.8	1.8	1.9
Assam	6.7	4.3	5.1	3.8	4.1	2.9	4.3
South Karnataka		8.3	2.8	2.1		1.3	2.1
North Karnataka	2.6	2.5	2.0	2.2	1.5	3.7	2.5
UP	3.6	2.5	2.8	2.5	2.2	1.8	2.5
Total	4.7	4.1	4.0	3.0	2.5	2.3	3.2

Table 2-6 and 2-7 show average number of female adult cattle and buffalo per household

for each category of rural households for each sample village. Similar trends can be seen as table 2-4 and 2-5.

Table 2-6: Average number of female adult cattle and buffalo per household for each category of rural households for each sample village

State, Village	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	8.0	5.3	3.6	2.5	0.0	1.9	2.8
Mujkuva	15.0	3.5	7.8	1.8		1.7	2.2
Saral Vid	4.0	2.3	2.4	1.9		2.9	2.3
Thavar	7.0	6.3	3.9	3.8	0.0	1.4	3.7
Bihar		1.0	1.1	0.8	0.6	0.8	0.8
Guai		0.5	1.2	1.0	0.6	0.9	0.9
Rahmatpur		2.0	0.5	0.9	0.7	0.7	0.8
Chakhaji			2.0	0.6	0.5	1.0	0.7
Assam	2.7	2.0	2.2	1.5	2.0	1.1	1.8
Uzankuri	5.0	1.9	2.6	1.2	1.7	1.2	1.8
Malaybari	2.6	2.2	2.6	2.1	4.7	1.0	2.3
Kanfalla Bhokatgao	2.0	2.0	1.3	1.3	1.4	0.9	1.3
South Karnataka	1.0	1.4	1.0	1.2	0.3	1.7	1.3
North Karnataka	1.0	1.1	1.0	1.0	0.3	2.3	1.2
Kumasi	1.0	1.1	0.9	1.1	0.0	0.6	0.9
Haravala	1.0	1.0	1.0	0.8	0.5	4.1	1.5
UP	2.3	1.6	1.9	1.7	1.3	1.2	1.6
Nadara	1.4	1.2	1.6	1.7	1.4	1.3	1.4
Raipura	2.3	1.6	2.0	1.5	0.5	0.9	1.6
Sakoorpur	4.0	1.8	1.9	2.0	1.5	1.4	2.0
Total	2.4	2.2	1.9	1.5	1.1	1.4	1.7

Table 2-7: Average number of female adult cattle and buffalo per household for each category of rural households for each state

State, Village	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	8.0	5.3	3.6	2.5	0.0	1.9	2.8
Bihar		1.0	1.1	0.8	0.6	0.8	0.8
Assam	2.7	2.0	2.2	1.5	2.0	1.1	1.8
South Karnataka	1.0	1.4	1.0	1.2	0.3	1.7	1.3
North Karnataka	1.0	1.1	1.0	1.0	0.3	2.3	1.2
UP	2.3	1.6	1.9	1.7	1.3	1.2	1.6
Total	2.4	2.2	1.9	1.5	1.1	1.4	1.7

Table 2-8 depicts the distribution of rural households depending on the number of cattle and buffalo holdings based on the Socioeconomic Situation Survey. Figure 2-1 is the graphical

presentation of it. One can see that, for overall, more than half of the households own less than two cattle and buffaloes. The ratio of households who own more than 10 cattle and buffaloes are relatively high in Gujarat and Assam, but it is quite low in other states.

Table 2-8: Distribution of rural households for the number of cattle and buffalo holdings

Number of cattle and buffalo holdings	Gujarat	Bihar	Assam	South Karnataka	North Karnataka	UP	Total
0	13.4%	3.8%	9.9%	26.9%	10.3%	4.2%	9.4%
1	3.9%	32.6%	7.3%	11.5%	25.0%	21.4%	17.3%
2	13.0%	40.6%	18.9%	29.5%	32.6%	33.2%	27.6%
3	11.7%	15.9%	11.6%	14.1%	14.8%	21.8%	15.1%
4	17.3%	4.2%	13.7%	7.7%	9.0%	10.5%	10.8%
5	8.2%	1.3%	11.6%	3.8%	2.5%	3.8%	5.5%
6	7.8%	1.3%	9.4%	2.6%	3.8%	2.9%	4.9%
7	4.3%	0.4%	3.0%	1.3%	0.0%	0.8%	1.8%
8	3.0%	0.0%	1.7%	0.0%	0.6%	0.0%	1.0%
9	2.2%	0.0%	3.0%	1.3%	0.0%	0.4%	1.2%
More than 10	15.2%	0.0%	9.9%	1.3%	2.0%	0.8%	5.4%

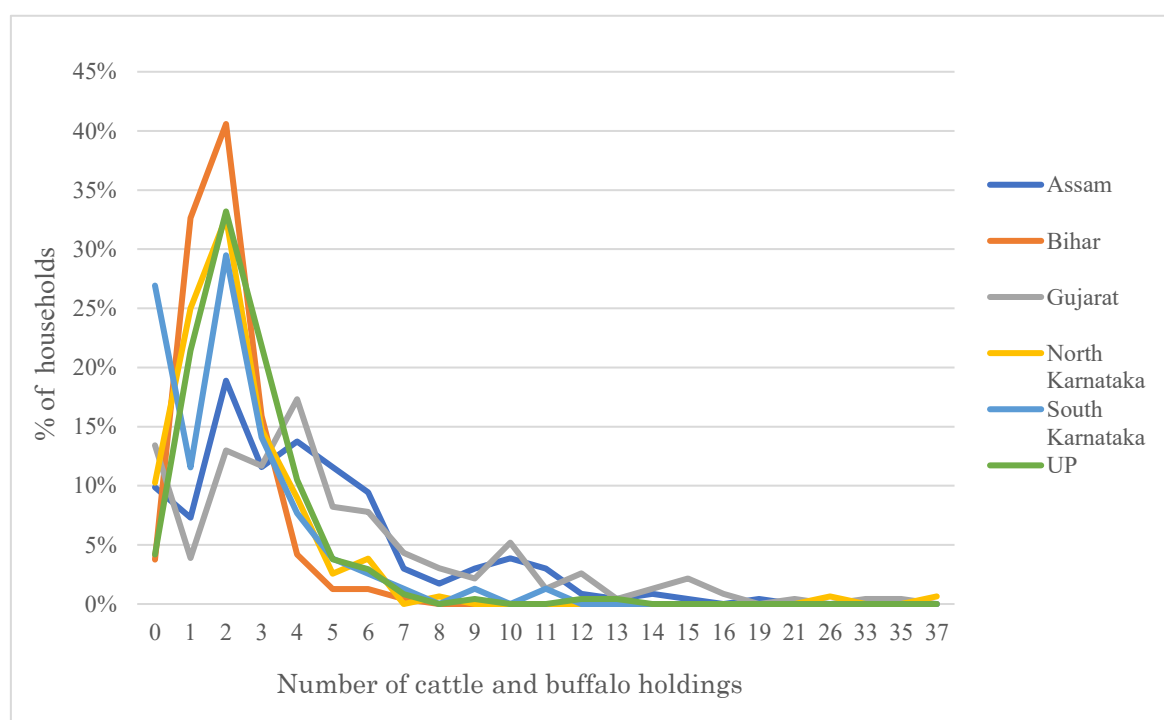


Figure 2-1: Distribution of rural households for the number of cattle and buffalo holdings

Table 2-9 shows the comparison between DCS members and non-members in terms of the number of cattle and buffalo holdings. Figure 2-2 is the graphical representation of it. One

can see that the ratios of farmers who have only 1 or no cattle and buffalo are greater for non-members of DCS.

Table 2-9: Distribution of rural households for the number of cattle and buffalo holdings:
comparison between DCS members and non-members

Number of cattle and buffalo holdings	Villages with DCS		Villages without DCS
	DCS members	Non-members	
0	2%	23%	6%
1	14%	23%	18%
2	28%	22%	35%
3	19%	11%	12%
4	12%	8%	11%
5	6%	4%	6%
6	6%	3%	6%
7	3%	1%	0%
8	1%	1%	1%
9	2%	1%	1%
10	6%	4%	3%

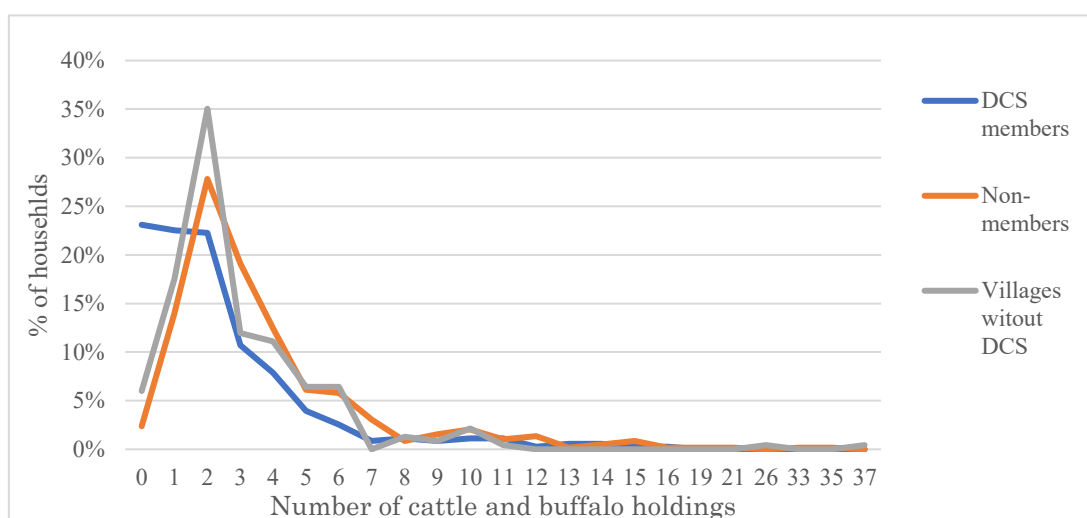


Figure 2-2: Distribution of rural households for the number of cattle and buffalo holdings:
comparison between DCS members and non-members

2.2 Volumes of Milk Production and Sales

Table 2-10,11 and 2-12,13 show the average annual milk production and sales volumes per household respectively. One can see that, for overall, the production and sales volumes increases as the scale of landholdings rise. The production and sales volumes per households are much higher in the sample villages in Gujarat than other states. Those figures for Assam are

relatively low even though the number of livestock holdings is high, indicating the low productivity of the cows and buffaloes reared there.

Table 2-10: Average annual milk production volume per household for each village (liter)

State, Village	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	16,254	12,987	6,728	3,753	2,520	2,241	4,695
Mujkuva	31,590	2,760	6,555	1,878		1,708	2,428
Saral Vid	6,780	5,220	4,659	2,657		3,493	3,510
Thavar	14,300	16,208	10,950	6,919	2,520	2,086	8,102
Bihar		2,850	1,680	1,574	1,169	1,249	1,441
Guai		3,150	1,846	1,496	1,050	1,393	1,512
Rahmatpur		2,250		1,554	830	972	1,203
Chakhaji			2,880	1,647	1,783	1,365	1,595
Assam	2,388	1,283	1,370	569	1,264	650	1,058
Uzankuri	6,300	1,358	2,492	347	1,355	771	1,435
Malaybari	2,311	1,384	1,264	1,350	1,235	771	1,404
Kanfalla Bhokatgao	663	270	242	255	1,131	308	358
South Karnataka		8,920	1,730	2,590		2,562	2,758
North Karnataka	732	639	432	506	135	718	597
Kumasi	1,028	930	401	864	0	304	685
Haravala	435	348	463	148	270	1,131	508
UP	3,547	2,132	3,087	1,976	1,610	1,831	2,301
Nadara	2,455	674	2,668	2,070	1,685	1,907	1,849
Raipura	2,957	2,529	2,918	1,768	630	1,661	2,133
Sakoorpur	6,754	2,903	3,424	2,269	1,875	1,885	2,956
Total	3,340	3,470	2,312	2,009	1,297	1,607	2,157

Table 2-11: Average annual milk production volume per household for each state (liter)

State	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	16,254	12,987	6,728	3,753	2,520	2,241	4,695
Bihar		2,850	1,680	1,574	1,169	1,249	1,441
Assam	2,388	1,283	1,370	569	1,264	650	1,058
South Karnataka		8,920	1,730	2,590		2,562	2,758
North Karnataka	732	639	432	506	135	718	597
UP	3,547	2,132	3,087	1,976	1,610	1,831	2,301
Total	3,340	3,470	2,312	2,009	1,297	1,607	2,157

Table 2-12: Average annual milk sales volume per household for each village(liter)

State, Village	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	14,913	11,718	5,899	3,188	2,210	1,871	4,088
Mujkuva	29,765	2,000	5,745	1,492		1,445	2,060
Saral Vid	6,280	4,749	4,020	2,158		2,940	2,967

Thavar	12,840	14,675	9,734	6,097	2,210	1,684	7,195
Bihar		2,486	1,216	1,244	884	1,041	1,145
Guai		2,764	1,348	1,170	765	1,134	1,182
Rahmatpur		1,930	0	1,283	620	773	973
Chakhaji			1,925	1,268	1,386	1,199	1,270
Assam	1,811	954	1,071	376	961	489	791
Uzankuri	5,500	994	2,073	196	1,040	533	1,123
Malaybari	1,800	1,062	998	1,141	1,057	679	1,131
Kanfalla Bhokatgao	0	84	38	55	796	233	140
South Karnataka		8,198	1,580	2,290		2,196	2,431
North Karnataka	396	369	226	339	0	451	353
Kumasi	792	674	154	645	0	197	473
Haravala	0	64	298	33	0	704	234
UP	2,898	1,583	2,455	1,488	1,188	1,348	1,769
Nadara	1,964	437	2,055	1,571	1,282	1,437	1,409
Raipura	2,357	2,034	2,347	1,329	480	1,225	1,653
Sakoorpur	5,714	2,142	2,745	1,706	1,010	1,351	2,274
Total	2,749	2,927	1,889	1,637	973	1,296	1,762

Table 2-13: Average annual milk sales volume per household for each state(liter)

State	Large	Medium	Small	Marginal	Tenant	Non-farm	Total
Gujarat	14,913	11,718	5,899	3,188	2,210	1,871	4,088
Bihar		2,486	1,216	1,244	884	1,041	1,145
Assam	1,811	954	1,071	376	961	489	791
South Karnataka		8,198	1,580	2,290		2,196	2,431
North Karnataka	396	369	226	339	0	451	353
UP	2,898	1,583	2,455	1,488	1,188	1,348	1,769
Total	2,749	2,927	1,889	1,637	973	1,296	1,762

Table 2-14 depicts that comparison of livestock holdings and milk production and sales between the villages with DCS and without DCS. It shows that the per household milk production volumes in Kanfalla Bhokatgao in Assam and Haravala in Karnataka are much lower than those villages with DCS even though the number of livestock holding are not much different from other villages. Also, the ratios of milk sales volumes to production volumes in these two villages are much lower than other villages. This indicates the tendency of higher productivity and more active milk sales activities by farmers for the villages where DCS are formed, probably due to the services and other activities given by DCS and Unions.

On the other hand, per household production and sales volume and the ratio of milk sales volume to production volume in Raipura village in Uttar Pradesh are not much different from those villages with DCS. As the dairy production is highly developed and there are many private dairy makers exist in Uttar Pradesh, the productivity of livestock and the level of sales

activity seem not much affected by the existence of DCS.

Table 2-14 Comparison of livestock holdings and milk production and sales between the villages with DCS and without DCS

	Village	Average cattle and buffalo holding per HH	Average milk production volume per HH (liter)	Average milk sales volume per HH (liter)	% of sales volume to production volume
Villages without DCS	Kanfalla Bhokatgao (Assam)	4.0	508	140	39%
	Haravala (North Karnataka)	2.9	358	234	46%
	Raipura (UP)	2.4	2,133	1,653	77%
Villages with DCS		3.2	2,449	2,036	83%

3 Rearing Management and Productivity

3.1 Major Breeds and Their Yields

Table 3-1 depicts the average yield of cow per day for major breeds reared in the target villages of Socioeconomic Situation Survey, and Table 3-2 shows the percentages of cows reared by farmers in the target villages by breed. One can see that there are significant differences in the composition of breeds among the states. For example, the percentages of high yield breeds such as HF are quite high in Gujarat and South Karnataka, but the percentages of low yield breeds such as indigenous breeds are quite high in Assam and North Karnataka.

Table 3-1: Average yield of cow per day for major breeds in the target villages

	HF	Jersey	Other foreign breed	Sahiwal	Gir	Haryana	Gaolo	Red Sindhi	Other indigenous	Indigenous non-descriptive
Average yield per day (liter)	11.3	7.0	12.8	7.5	7.3	6.2	6.0	6.5	3.9	3.5

Source: Socioeconomic Situation Survey

Table 3-2: Percentages of cows reared by farmers in the target villages by breed

State	HF	Jersey	Other foreign breed	Sahiwal	Gir	Haryana	Gaolo	Red Sindhi	Other indigenous	Indigenous non-descriptive
Gujarat	63%	4%	0%	0%	4%	0%	0%	0%	0%	29%
Bihar	12%	61%	0%	10%	0%	1%	1%	1%	11%	3%
Assam	2%	28%	1%	0%	0%	0%	0%	0%	0%	68%

South Karnataka	84%	13%	0%	0%	0%	0%	0%	0%	3%	0%
North Karnataka	6%	15%	0%	0%	0%	0%	0%	0%	61%	18%
UP	13%	38%	2%	18%	0%	7%	0%	0%	6%	15%
Total	25%	25%	0%	3%	1%	1%	0%	0%	9%	36%

Source: Socioeconomic Situation Survey

Table 3-3 depicts the comparison of the compositions of breeds between the villages with DCS and without DCS. It shows the ratios of low yield cow are significantly higher for the villages without DCS than the villages with DCS.

Table 3-3: Percentages of cows by breed for villages with and without DCS

	Village	HF	Jersey	Other foreign breed	Sahiwal	Gir	Haryana	Gaolo	Red Sindhi	Other indigenous	Indigenous non-descriptive
Villages without DCS	Kanfalla Bhokatgao (Assam)	0%	10%	0%	0%	0%	0%	0%	0%	0%	90%
	Haravala (Karnataka)	2%	1%	0%	0%	0%	0%	0%	0%	75%	22%
	Raipura (UP)	6%	61%	0%	19%	0%	2%	0%	0%	0%	13%
Villages with DCS		30%	28%	1%	3%	1%	1%	0%	0%	6%	29%

Source: Socioeconomic Situation Survey

Table 3-4 and 3-5 depict the average yield of buffalo per day for major breeds reared in the target villages the percentages of buffalo reared by farmers in the target villages by breed respectively. The difference in yield is not so significant among the breeds compared to the case of cow. The compositions of breeds differ state to state.

Table 3-4: Average yield of buffalo per day for major breeds in the target villages

	Toda	Mehsana	Jaffrabadi	Murrah	Surti	Bhadawari	Other	Indigenous non-descriptive
Average yield per day (liter)	9.0	8.4	7.1	7.0	6.0	4.9	5.1	6.4

Source: Socioeconomic Situation Survey

Table 3-5: Percentages of buffalos reared by farmers in the target villages by breed

State	Toda	Mehsana	Jaffrabadi	Murrah	Surti	Bhadawari	Other	Indigenous non-descriptive
Gujarat	0.4%	20.6%	0.6%	0.0%	0.8%	0.4%	1.2%	76.0%
Bihar	0.0%	6.9%	4.6%	35.4%	0.0%	15.4%	36.2%	1.5%
Assam	0.0%	0.0%	0.0%	53.8%	0.0%	0.0%	0.0%	46.2%
South Karnataka	0.0%	0.0%	1.0%	3.8%	0.0%	0.0%	38.5%	56.7%

North Karnataka	0.0%	0.0%	0.7%	1.4%	0.0%	0.0%	50.4%	47.5%
UP	1.5%	1.5%	0.3%	56.9%	0.0%	4.5%	29.5%	5.7%
Total	0.6%	10.9%	1.0%	22.8%	0.4%	3.4%	17.7%	43.1%

3.2 Mating and Artificial Insemination (AI)

Table 3-6 shows the percentages of who usually use AI for mating of their livestock for cooperative members and non-members in the villages with DCS and the villages without DCS. One can see that the ratio of farmers use AI is significantly higher for the farmers in the villages with DCS than the villages without DCS. Also, the utilization of AI is relatively high in Gujarat and South Karnataka where the AI services of the dairy cooperatives are available in most of the areas.

Table 3-6: % of farmers who usually use AI for mating of their livestock

State, Village	Member	Non member	No DCS
Gujarat	92%	88%	
Mujkuva	90%	100%	
Saral Vid	89%	100%	
Thavar	97%	81%	
Bihar	61%	69%	
Guai	61%	82%	
Rahmatpur	58%	47%	
Chakhaji	63%	78%	
Assam	59%	49%	
Uzankuri	51%	59%	
Malaybari	65%	33%	
Kanfalla Bhokatgao			13%
South Karnataka	100%	100%	
North Karnataka	76%	24%	23%
Kumasi	76%	24%	
Haravala			23%
UP	59%	57%	
Nadara	41%	35%	
Raipura			47%
Sakoorpur	80%	78%	

Table 3-7 shows the percentage of the utilization of institutions for AI services. One can see that percentages of farmers who utilize cooperative AI centers are higher in Gujarat and South Karnataka where the AI services of the dairy cooperatives are available in most of the areas. The percentages of farmers who use cooperative AI centers are lower for non-members of DCS than DCS members.

Table 3-7: Percentage of the utilization of institutions for AI services

State, Village	Villages with DCS						Villages without DCS	
	DCS members			Non-members				
	Coopera tive	Private	Govern ment	Coopera tive	Private	Govern ment	Private	Govern ment
Gujarat	87%	13%	0%	97%	0%	3%		
Mujkuva	100%	0%	0%	100%	0%	0%		
Saral Vid	88%	12%	0%	100%	0%	0%		
Thavar	71%	29%	0%	95%	0%	5%		
Bihar	18%	73%	7%	5%	77%	18%		
Guai	30%	64%	3%	17%	33%	50%		
Rahmatpur	17%	83%	0%	0%	100%	0%		
Chakhaji	4%	77%	19%	0%	93%	7%		
Assam	23%	30%	47%	9%	41%	50%	63%	38%
Uzankuri	0%	32%	68%	0%	31%	69%		
Malaybari	39%	29%	32%	33%	67%	0%		
Kanfalla Bhokatgao							63%	38%
South Karnataka	100%	0%	0%	20%	47%	33%		
North Karnataka	29%	9%	62%	0%	25%	75%	7%	93%
Kumasi	29%	9%	62%	0%	25%	75%		
Haravala							7%	93%
UP	22%	72%	6%	4%	88%	8%	82%	18%
Nadara	8%	75%	17%	0%	100%	0%		
Raipura							82%	18%
Sakoorpur	29%	71%	0%	6%	83%	11%		
Total	52%	35%	13%	27%	53%	20%	60%	40%

3.3 Utilization of TMR

Table 3-8 depicts the percentages of farmers who provide TMR to their livestock everyday. One can see that the percentage is higher for DCS members than non-members. Also, it is significantly lower for the farmers in the villages without DCS than villages with DCS.

Table 3-8: % of farmers who provide TMR to their livestock everyday

State, Village	Villages with DCS		Villages without DCS
	DCS members	Non-members	
Gujarat	62%	33%	
Mujkuva	45%	32%	
Saral Vid	61%	50%	
Thavar	85%	31%	

Bihar	64%	54%	
Guai	67%	57%	
Rahmatpur	50%	43%	
Chakhaji	73%	62%	
Assam	29%	20%	6%
Uzankuri	38%	38%	
Malaybari	21%	0%	
Kanfalla Bhokatgao	66%	36%	6%
South Karnataka	52%	25%	
North Karnataka	40%	43%	16%
Kumasi	40%	43%	
Haravala			16%
UP	40%	47%	47%
Nadara	46%	42%	
Raipura			47%
Sakoorpur	34%	44%	
Total	54%	38%	23%

Table 3-9 shows the percentages of farmers who buy TMR at DCS offices. One can see that these figures are higher in Gujarat and South Karnataka where TMR is sold at most of the DCS offices.

Table 3-9: % of farmer who buy TMR at DCS office

State, Village	Villages with DCS		Villages without DCS
	DCS members	Non-members	
Gujarat	90%	68%	
Mujkuva	92%	60%	
Saral Vid	82%	88%	
Thavar	100%	69%	
Bihar	76%	20%	
Guai	80%	32%	
Rahmatpur	70%	17%	
Chakhaji	78%	13%	
Assam	14%	9%	0%
Uzankuri	13%	14%	
Malaybari	16%	3%	
Kanfalla Bhokatgao			0%
South Karnataka	91%	23%	
North Karnataka	38%	4%	1%
Kumasi	38%	4%	
Haravala			1%
UP	21%	12%	7%

Nadara	20%	15%	
Raipura			7%
Sakoorpur	21%	8%	
Total	58%	25%	3%

3.4 Productivity of Cow and Buffalo

Table 3-10 shows the average yield per cow and buffalo per day for various areas. One can see that the yield per livestock is higher where the ratios of high-yield breed are higher and AI services and TMR are more utilized. The higher ratio of high yield livestock can be considered to be partly caused by extended utilization of AI services. Also, the higher utilization of TMR is likely to increase the productivities of high yield livestock.

One can see that the yields of livestock in Kanfalla Bhokatgao (Assam) Haravala (North Karnataka), where DCS are not, formed are significantly lower than the villages with DCS in the same area. The formation of DCS and its provision of various services (such as AI service, sales of TMR, and the guaranteed purchase of surplus milk) have probably caused this difference. On the other hand, the yields of livestock in Raipura of Uttar Pradesh, where DCS is not formed, are not significantly different from those of the villages with DCS. As dairy sector is highly developed and many private dairy makers conduct procurement of milk in Uttar Pradesh, the formation of DCS seems not generate much influence on the productivity of livestock.

Table 3-10: Average yield per cow and buffalo per day (liter)

Village, State	Cow	Buffalo
Villages without DCS	3.4	4.9
Kanfalla Bhokatgao (Assam)	1.8	--
Haravala (North Karnataka)	2.1	3.0
Raipura (UP)	8.1	6.1
Villages with DCS	7.6	6.9
Gujarat	11.0	7.5
Bihar	6.6	5.7
Assam	3.6	5.0
South Karnataka	12.1	3.8
North Karnataka	4.3	3.5
UP	7.4	6.7
Total	7.0	6.4

4 Household Incomes and Incomes from Livestock Activities

Table 4-1 to 4-6 depict the average household annual total income, annual agricultural income, livestock income, business, wages and salaries, and other incomes respectively for each

state and farmer category¹. One can see that these income levels tend to increase as the areas of landholdings rise. However, the level of difference in livestock income among the farmers categories is significantly lower than that of agricultural income. Also, the average livestock incomes of the tenants and non-farmer households in Gujarat, South Karnataka, and Uttar Pradesh are quite high. It indicates that livelihoods of farmers can be improved by the development of livestock activities even if they have limited scale of landholdings.

Table 4-1: Average household annual total income (Rs.)

State	Large and medium farmers	Small and Marginal farmers	Tenants and non-farmers	Total
Gujarat	423,345	179,909	124,357	187,910
Bihar	371,600	122,547	160,236	278,229
Assam	311,741	115,248	78,380	141,792
South Karnataka	192,213	72,510	47,337	71,415
North Karnataka	134,348	76,419	77,564	98,479
UP	202,737	115,303	82,134	132,707
Total	415,852	119,970	108,902	170,221

Table 4-2: Average household annual income of agriculture (Rs.)

State	Large and medium	Small and Marginal	Tenants and non-farmers	Total
Gujarat	43,386	16,584	47	13,507
Bihar	61,467	32,175	5,378	20,561
Assam	107,769	40,459	6,147	43,630
South Karnataka	127,333	13,148	0	13,157
North Karnataka	90,099	15,980	2,088	41,741
UP	116,852	46,806	12,472	58,349
Total	96,508	29,729	5,038	33,739

Table 4-3: Average household annual income from livestock activities (Rs.)

State	Large and medium	Small and Marginal	Tenants and non-farmers	Total
Gujarat	379,960	140,993	60,390	139,211
Bihar	58,234	27,920	21,837	25,621
Assam	25,405	16,639	19,267	18,987
South Karnataka	60,713	33,399	14,932	30,986
North Karnataka	16,589	24,325	33,899	23,119

¹ Livestock income here include the income of dairy activities (sales and self-consumption of milk) and sales and purchase of livestock (cattle and buffalo and other livestock).

UP	71,991	49,317	48,525	56,248
Total	85,296	49,678	35,641	51,592

Table 4-4: Average household annual income from own business (Rs.)

State	Large and medium	Small and Marginal	Tenants and non-farmers	Total
Gujarat	-1	6,375	26,274	13,038
Bihar	-293,333	1,056	12,076	2,004
Assam	15,434	9,718	14,727	12,126
South Karnataka	4,167	3,694	6,154	4,532
North Karnataka	1,974	2,598	10,743	3,900
UP	3,213	3,348	68	2,295
Total	755	4,798	12,876	6,677

Table 4-5: Average household annual income from wages and salaries (Rs.)

State	Large and medium	Small and Marginal	Tenants and non-farmers	Total
Gujarat		15,940	35,059	21,180
Bihar	425,233	59,420	120,426	227,166
Assam	156,837	46,929	30,645	63,017
South Karnataka		21,357	25,808	22,019
North Karnataka	25,680	33,250	30,667	29,576
UP	8,813	15,270	17,521	13,920
Total	229,656	34,792	52,640	76,190

Table 4-6: Average household other incomes (Rs.)

State	Large and medium	Small and Marginal	Tenants and non-farmers	Total
Gujarat		15,940	35,059	21,180
Bihar	425,233	59,420	120,426	227,166
Assam	156,837	46,929	30,645	63,017
South Karnataka		21,357	25,808	22,019
North Karnataka	25,680	33,250	30,667	29,576
UP	8,813	15,270	17,521	13,920
Total	229,656	34,792	52,640	76,190

Table 4-7 shows the comparison of average household annual income from livestock activities between the villages with and without DCS (Rs.). It shows that the levels of livestock incomes significantly differ between the villages with and without DCS in Assam and North Karnataka. This indicates the likelihood of the increase in livestock income by the formation of DCS which is likely to lead to the improvement of productivity of livestock (as discussed in the previous section). On the other hand, the livestock incomes between the villages with and without DCS do not differ much in the case of Uttar Pradesh. It indicates that the formation of DCS did not have significant effects on the livelihood of target villages in Uttar Pradesh where the dairy sector is highly developed and there are many private dairy makers conduct procurement of milk.

Table 4-7: Comparison of average household annual income from livestock activities between the villages with and without DCS (Rs.)

State	Village	With/without DCS	Average household annual livestock income (Rs.)
Assam	Kanfalla Bhokatgao	without DCS	8,972
	Malaybari	with DCS	26,001
North Karnataka	Haravala	without DCS	11,650
	Kumasi	with DCS	34,587
UP	Raipura	without DCS	42,340
	Nadara	with DCS	47,031

5 Sales of Milk

5.1 Buyer of Milk

Table 5-1 shows the percentages of DCS members in the target villages of the Socioeconomic Situation Survey by type of buyer. As shown in Table 4-21, almost all of the DCS members sell their milk to cooperatives DCS and very small percentages of them sell their milk to other buyers.

Table 5-1: Percentages of dairy farmers by type of buyer (multiple answers are allowed) for DCS members

State, Village	Dairy Cooperative	Middleman	Private firm	Direct sales to shop/restaurant	Other household in the village	Other household outside of the village
Gujarat	100%	0%	0%	0%	0%	0%
Mujkuva	100%	0%	0%	0%	0%	0%
Saral Vid	100%	0%	0%	0%	0%	0%

Thavar	100%	0%	0%	0%	0%	0%
Bihar	100%	0%	0%	0%	2%	0%
Guai	100%	0%	0%	0%	0%	0%
Rahmatpur	100%	0%	0%	0%	0%	0%
Chakhaji	100%	0%	0%	0%	5%	0%
Assam	100%	3%	0%	0%	14%	0%
Uzankuri	100%	0%	0%	0%	23%	0%
Malaybari	100%	5%	0%	0%	5%	0%
South Karnataka	100%	0%	0%	0%	0%	0%
North Karnataka	97%	3%	0%	0%	0%	3%
UP	97%	6%	0%	0%	1%	0%
Nadara	100%	0%	0%	0%	0%	0%
Sakoorpur	94%	12%	0%	0%	2%	0%
Total	99%	2%	0%	0%	2%	0%

Table 5-2 shows the same figures for non-members of DCS. One can see that many of the non-members sell their milk to cooperative DCS. Certain percent of non-members sell their milk to middlemen of unorganized sector and private dairy firms².

Table: 5-2 Percentage of dairy farmers by type of buyer (multiple answers are allowed) for non-members

State, Village	Dairy Cooperative	Middleman	Private firm	Direct sales to shop/ restaurant	Other household in the village	Other household outside of the village
Gujarat	97%	0%	3%	0%	0%	0%
Mujkuva	100%	0%	0%	0%	0%	0%
Saral Vid	100%	0%	0%	0%	0%	0%
Thavar	96%	0%	4%	0%	0%	0%
Bihar	39%	37%	6%	8%	29%	6%
Guai	90%	20%	0%	0%	0%	0%
Rahmatpur	36%	21%	7%	14%	50%	7%
Chakhaji	20%	52%	8%	8%	28%	8%
Assam	69%	17%	0%	9%	31%	0%
Uzankuri	76%	4%	0%	12%	40%	0%
Malaybari	50%	50%	0%	0%	10%	0%
South Karnataka	8%	46%	46%	0%	0%	0%
North Karnataka	0%	100%	0%	0%	0%	0%
UP	50%	44%	6%	0%	0%	0%

² Table 5-2 shows that many of the non-members in South Karnataka sell their milk to private dairy firms. It is because that there is one small private dairy firm is actively collect milk in the village of Kommasandra. As the procurement scales of re is no major private dairy makers in Karnataka are relatively small, the case of this village seem not be is not representing the situation of South Karnataka in this aspect.

Nadara	80%	20%	0%	0%	0%	0%
Sakoorpur	24%	65%	12%	0%	0%	0%
Total	58%	27%	7%	4%	15%	2%

Table 5-3 shows the same figures for the case of villages without DCS. Many of them sell their milk to middlemen of unorganized sector. Some farmers in Raipura in Uttar Pradesh sell their milk to private dairy firms. As no private dairy firm collect milk at Kanfalla_Bhokatgao in Assam and Haravala in North Karnataka, the number of farmers who sell to private dairy firm is zero for these villages. On the other hand, many farmers in Kanfalla_Bhokatgao bring their milk to restaurants/shops as it is close to a town. For the case of Haravala in North Karnataka, which is quite a remote area and is out of any of milk distribution channel, many farmers sell their milk to other households.

Table 5-3: Percentage of dairy farmers by type of buyer (multiple answers are allowed) for villages without DCS

State, Village	Dairy Cooperative	Middleman	Private firm	Direct sales to shop/restaurant	Other household in the village	Other household outside of the village
Kanfalla_Bhokatgao (Assam)	0%	31%	0%	38%	23%	0%
Haravala (North Karnataka)	0%	13%	0%	0%	75%	38%
Raipura (Uttar Pradesh)	0%	88%	12%	0%	0%	0%
Total	0%	72%	9%	6%	10%	3%

5.2 Favorite Buyer and the Reasons for Favoring

Table 5-4 shows the percentage of buyer for the question “Who is your favorite buyer?” for each village. Table 5-5 shows the same figures by comparing the villages with and without villages. One can see most of the farmers in the target villages where DCS are formed answered that dairy cooperative is their favorite buyers. In the cases of Assam, there are certain percentages of households who favor middlemen which indicates the high presence of the loose milk markets of unorganized sector there. Also, some households in Uttar Pradesh prefer private dairy firms which reflects the high presence of private firms there.

Table 5-4: Percentage of type of buyer for the question “Who is your favorite buyer?” for each village

	Dairy Cooperative	Middle man	Private firm	Direct sales to shop/ restaurant	Direct sales to other household in the village	Direct sales to other household outside of the village	Other
Gujarat	99%	1%	0%	0%	0%	0%	0%
Mujkuva	100%	0%	0%	0%	0%	0%	0%
Saral Vid	100%	0%	0%	0%	0%	0%	0%
Thavar	98%	2%	0%	0%	0%	0%	0%
Bihar	78%	1%	10%	1%	7%	2%	1%
Guai	93%	0%	5%	0%	0%	2%	0%
Rahmatpur	74%	0%	4%	2%	19%	0%	2%
Chakhaji	68%	3%	21%	2%	3%	3%	0%
Assam	64%	20%	0%	7%	8%	0%	2%
Uzankuri	70%	14%	0%	5%	12%	0%	0%
Malaybari	76%	24%	0%	0%	0%	0%	0%
Kanfalla Bhokatgao	0%	29%	0%	36%	21%	0%	14%
South Karnataka	76%	10%	14%	0%	0%	0%	0%
North Karnataka	47%	0%	8%	0%	31%	14%	0%
Kumasi	94%	0%	3%	0%	0%	3%	0%
Haravala	0%	0%	13%	0%	63%	25%	0%
UP	62%	1%	37%	0%	0%	0%	0%
Nadara	97%	0%	3%	0%	0%	0%	0%
Raipura	0%	0%	100%	0%	0%	0%	0%
Sakoorpur	76%	3%	21%	0%	0%	0%	0%
Total	77%	6%	12%	1%	3%	1%	0%

Table 5-5: Percentage of type of buyer for the question “Who is your favorite buyer?”

Comparison between the villages with and without DCS

With/without DCS	State/Village	Dairy Cooperativ e	Middlem an	Private firm	Direct sales to shop/ restaurant	Direct sales to other household in the village	Direct sales to other household outside of the village	Other
Villages with DCS	Gujarat	99%	1%	0%	0%	0%	0%	0%
	Bihar	78%	1%	10%	1%	7%	2%	1%
	Assam	73%	19%	0%	3%	6%	0%	0%
	South Karnataka	76%	10%	14%	0%	0%	0%	0%
	North Karnataka	94%	0%	3%	0%	0%	3%	0%
	UP	87%	1%	12%	0%	0%	0%	0%
	Total	85%	5%	6%	1%	2%	1%	0%
Villages without DCS	Assam	0%	29%	0%	36%	21%	0%	14%
	North Karnataka	0%	0%	13%	0%	63%	25%	0%
	UP	0%	0%	100%	0%	0%	0%	0%

	Total	0%	10%	38%	12%	28%	8%	5%
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Table 5-6 shows (among those who chose dairy cooperative as their favorite buyer) the number of farmers who answered different points for the reasons why dairy cooperative is their favorite buyer. It indicates that the stability of purchasing price is the major reason for it, and higher purchasing price follows. Still, many of them answered various service such as bonus, veterinary service, and cattle feed sales as the reasons for it.

Table 5-6: Reasons why cooperative is the favorite buyer (number of farmers; multiple answers are allowed)

	# of HH whose favorite buyer is cooperative	Purchasing price is stable	Purchasing price is higher	Can get some bonus	Do not refuse to buy regardless of market	Cooperative is near to the house	Cooperative provide veterinary services	Cooperative provide cattle insurance	Cooperative provide cattle feed	Can get some other services such as training
Gujarat	187	138	171	68	58	13	56	9	2	1
Mujkuva	56	40	51	23	26	4	23	6		1
Saral Vid	67	48	63	24	18	4	14	1	2	
Thavar	64	50	57	21	14	5	19	2		
Bihar	136	56	38	59	28	48	45	27	24	9
Guai	54	20	17	28	10	17	22	11	8	2
Rahmatpur	40	19	8	21	7	16	9	5	7	4
Chakhaji	42	17	13	10	11	15	14	11	9	3
Assam	79	56	20	34	23	12	3		3	2
Uzankuri	42	33	14	17	12	7	1		2	
Malaybari	37	23	6	17	11	5	2		1	2
South Karnataka	39	12	18	27	2	16	15	15	16	9
North Karnataka	34	14	22	12	10	11	8	5	11	3
UP	122	43	27	64	26	35	1		1	2
Nadara	70	30	11	24	14	17			1	
Sakoorpur	52	13	16	40	12	18	1			2
Total	597	319	296	264	147	135	128	56	57	26

Table 5-7 shows (among those who chose middleman as their favorite buyer) the number of farmers who answered different points for the reasons why middleman is their favorite buyer. Some farmers answered the provision of advance payment is the major reason for it. Also, some claim that they are obliged to sell to middleman as they have debt for advance payment or for the loan provided by middleman for purchasing livestock.

Table 5-7: Reasons why middleman is the favorite buyer (number of farmers; multiple answers are allowed)

	# of HH whose favorite buyer is middleman	Buyer provide advance payment for milk	Do not refuse to buy regardless of market demand	Purchasing price is higher	Buyer comes to house gate, so convenient to sell	Obligated to sell	Purchasing price is stable	Buyer is relative
Assam	24	12	7	1	2	1		
Uzankuri	6	5	1		1			
Malaybari	14	6	5	1		1		
Kanfalla Bhokatgao	4	1	1		1			
Bihar	2	1	1	2	2			
Chakhaji	2	1	1	2	2			
Gujarat	1			1			1	
Thavar	1			1			1	
South Karnataka	5		3	3		2	1	2
UP	2		1	2	1			
Sakoorpur	2		1	2	1			
Total	34	13	12	9	5	3	2	2

Table 5-8 shows (among those who chose private dairy firm as their favorite buyer) the number of farmers who answered different points for the reasons why private dairy firm is their favorite buyer. Many point out the closeness of milk collection point to their houses as a reason. Some farmers point out the stable purchasing price and higher purchasing price as the reasons for it.

Table 5-8: Reasons why private dairy firm is the favorite buyer (number of farmers; multiple answers are allowed)

	# of HH whose favorite buyer is private firm	Collection point is near to the house	Purchasing price is higher	Purchasing price is stable	Do not refuse to buy regardless of market demand	Obligated to sell	Buyer is friend	Buyer is relative
Bihar	18	12	9	2	3			1
Chakhaji	13	7	5	2	3			
Guai	3	3	3					
Rahmatpur	2	2	1					1
South Karnataka	7	2	7	2	1	1		2
North Karnataka	2	1	1	1				
Haravala	1		1					
Kumasi	1	1		1				
UP	72	45	12	16	9	12	5	1

Nadara	2			1	1			
Raipura	56	37	6	15	7	11	4	1
Sakoorpur	14	8	6		1	1	1	
Total	99	60	29	21	13	13	5	4

6 Reasons for Becoming Dairy Cooperative Member and Not Becoming Member

Table 6-1 shows the percentage of farmers who answered for different reasons for becoming the members (multiple answers are allowed). Most of them point out the access to veterinary services is a reason for it. Stable and higher purchasing prices are also major reasons for becoming members³.

Table 6-1: Reasons for becoming the cooperative members

State	Can get veterinary service	Purchasing price is stable	Purchasing price is higher	Do not refuse to buy regardless of market demand	Can get bonus	Can get AI service	Can buy cattle feed at low cost	There is no other buyer	Can get trainings	Can get some other services
Gujarat	95%	75%	89%	41%	31%	23%	10%	5%	13%	33%
Bihar	83%	51%	48%	40%	44%	34%	32%	11%	4%	49%
Assam	80%	58%	23%	41%	27%	6%	6%	27%	5%	27%
South Karnataka	86%	36%	43%	48%	60%	29%	38%	10%	7%	60%
North Karnataka	91%	55%	53%	51%	21%	34%	30%	11%	6%	45%
UP	65%	46%	21%	24%	43%	11%	12%	1%	12%	49%
Total	83%	57%	51%	39%	37%	22%	19%	10%	8%	42%

Source: Socioeconomic Situation Survey

Table 6-2 shows the percentage of non-members (in the villages with DCS) who answered for different reasons for not becoming the members (multiple answers are allowed). Not having enough milk production to sell and not having a milking animal are major reasons for it. Some people claim the poor management of cooperative as a reason for it, which is relatively high in Bihar, South Karnataka, and Uttar Pradesh.

Table 6-2: Reasons for not being the member of dairy coopeartives

State	Not enough milk to sell	Do not have milking cow or buffalo	Management of cooperative is poor	Purchasing price by cooperative is low	Prefer to sell milk to other institution	Cannot trust the quality test	Obligated to sell other buyer
Gujarat	19%	33%	6%	1%	1%	1%	0%
Bihar	51%	7%	29%	30%	16%	15%	1%
Assam	44%	26%	5%	2%	5%	0%	2%

³ Even though the milk unions do not provide any services to members in Uttar Pradesh at present, the members in the sample villages in the state had been provided various services until a few years ago.

South Karnataka	8%	56%	25%	17%	19%	14%	8%
North Karnataka	58%	42%	0%	0%	4%	0%	0%
UP	43%	7%	26%	20%	13%	0%	2%
Total	37%	25%	16%	13%	10%	6%	2%

7 Utilization of Loan and Insurance for Livestock Activities

Table 7-1 shows the percentages of farmers who have used loan for purchasing livestock. One can see that only a limited number of farmers have used loans for purchasing livestock. The Study Team found at the field surveys that there are a number of government schemes which support farmers to utilize bank loans to purchase livestock (by providing the guarantor for loan or subsidies), but it is clear that utilization of loan for purchasing livestock have not been expanded a lot⁴.

Table 7-1: Percentages of farmers who have used loan for purchasing livestock

State, village	Total	Villages with DCS		Village without DCS
		Member	Non-member	
Gujarat	2.2%	1.3%	4.3%	
Mujkuva	2.6%	1.9%	4.0%	
Saral Vid	0.0%	0.0%	0.0%	
Thavar	3.8%	2.6%	5.4%	
Bihar	1.3%	1.5%	1.4%	
Guai	1.2%	1.9%	0.0%	
Rahmatpur	1.3%	0.0%	3.7%	
Chakhaji	1.3%	2.4%	0.0%	
Assam	1.7%	2.4%	1.6%	1.1%
Uzankuri	1.3%	0.0%	3.6%	
Malaybari	2.6%	4.7%	0.0%	1.3%
Kanfalla Bhokatgao	1.3%			
South Karnataka	17.9%	19.0%	16.7%	
North Karnataka	1.3%	1.9%	4.2%	0.0%
Kumasi	2.6%	1.9%	4.2%	
Haravala	0.0%			0.0%
UP	2.1%	4.5%	0.0%	0.0%
Nadara	1.2%	1.7%	0.0%	
Raipura	0.0%		0.0%	0.0%
Sakoorpur	5.1%	7.5%	0.0%	

⁴ One can see that in Table 4-30 that the percentage of farmers who use loan for purchasing livestock is quite high for South Karnataka. It is because that many of the farmers in the sample village of South Karnataka applied for the government supported loan scheme as a group. Thus, the figure is likely to be much higher than other villages in South Karnataka. However, utilization of loan for purchasing livestock seems to be relatively high in Karnataka as there are many government schemes which promote the utilization of loan for livestock purchase.

Total	2.8%	3.4%	3.9%	0.4%
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Table 7-2 shows that percentages of cow and female adult buffaloes which are insured. One can see that the figures are quite high in Karnataka. This is likely to be resulted from the 50% subsidy for insurance fees by milk unions in Karnataka (which was discussed in Chapter 3.8). One can see that the insurance for livestock is not very common in other states.

Table 7-2: Percentages of cow and female adult buffaloes which are insured

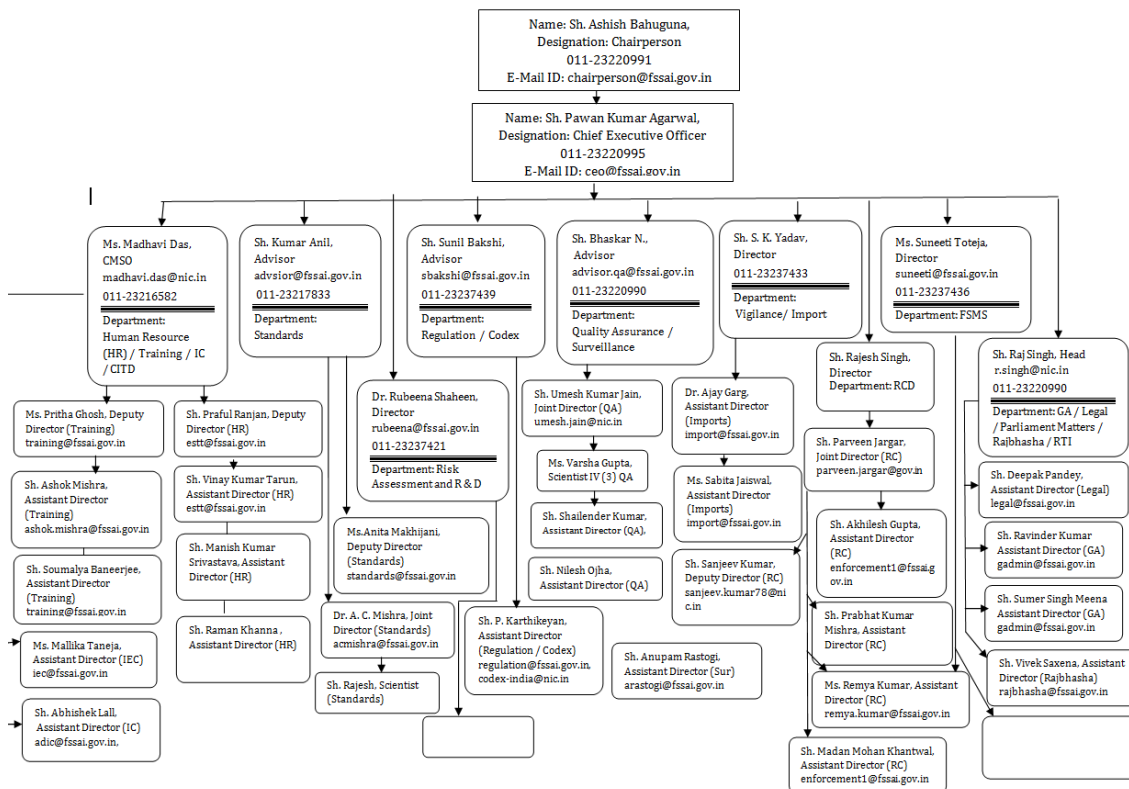
State, village	Total	Villages with DCS		Village without DCS
		Member	Non-member	
Gujarat	1%	1%	0%	
Mujkuva	4%	5%	0%	
Saral Vid	0%	0%	0%	
Thavar	0%	0%	0%	
Bihar	0%	0%	0%	
Guai	0%	0%	0%	
Rahmatpur	0%	0%	0%	
Chakhaji	0%	0%	0%	
Assam	1%	0%	1%	2%
Uzankuri Seguli DCS	1%	0%	1%	
Malaybari Durga DCS	1%	1%	0%	
Kanfalla Bhokatgao	2%			2%
South Karnataka	38%	47%	16%	
North Karnataka	3%	8%	0%	0%
Kumasi	5%	8%	0%	
Haravala	0%			0%
UP	1%		0%	0%
Nadara	2%	2%	0%	
Raipura	0%	3%	0%	
Sakoorpur	1%	1%	0%	0%
Total	3%	4%	1%	1%

Annex 8

FSSAI organization chart

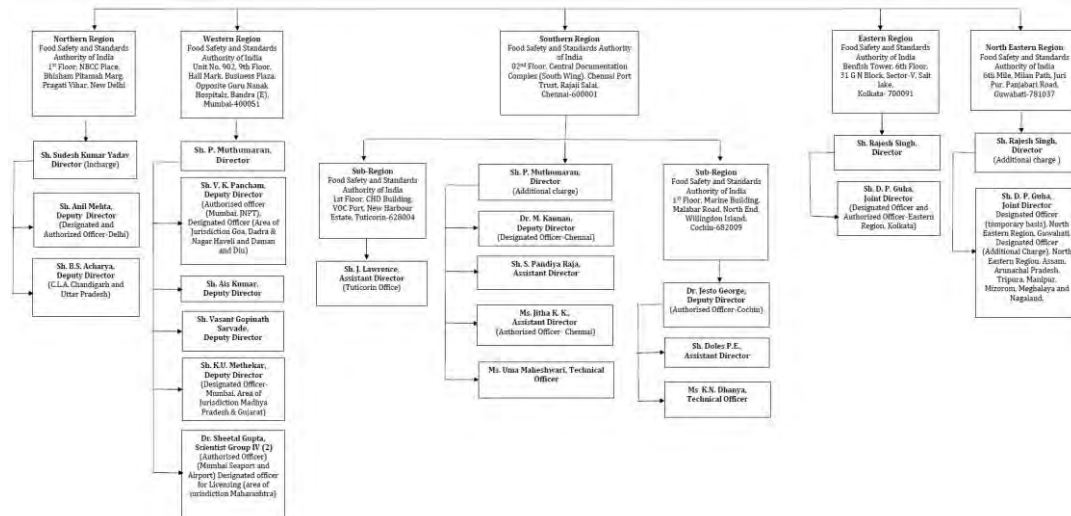
1. FSSAI (Government of India)

(1) Central office



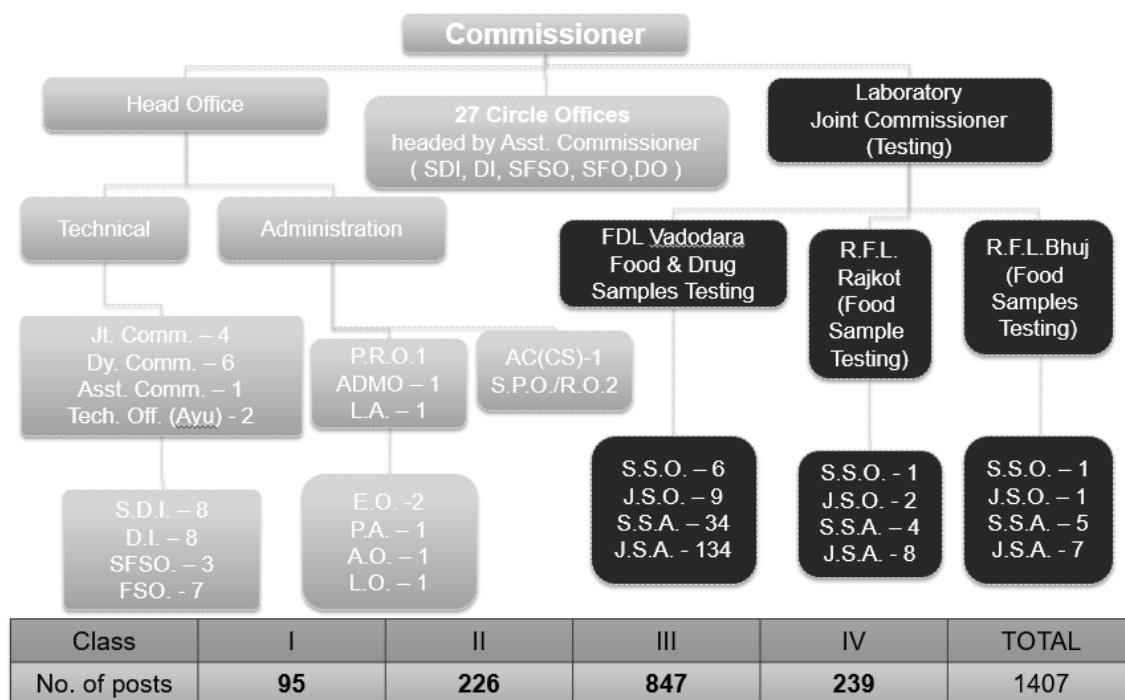
Source: FSSAI website

(2) Regional offices



Source: FSSAI website

2. State Food Safety Commissioners in Gujarat (State government level)



Source: State Food Safety Commissioners in Gujarat

Annex 9

FSSAI Standards of milk, dairy products and its processing

1. Standard of milk

Animal	Type	State	Fat	SNF
Buffalo Milk	Raw, pasteurized, boiled, flavoured, sterilized	Assam, Bihar, Chandigarh, Delhi, Gujarat, Haryana, Jharkhand, Maharashtra, Meghalaya, Punjab, Sikkim, Uttar Pradesh, Uttarakhand, West Bengal	6.0	9.0
		Andaman and Nicobar, Andhra Pradesh, Arunachal Pradesh, Chatisgarh, Dadra & Nagar haveli, Goa, Daman & Diu, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Lakshadweep, Minicoy & Amindivi Island, Madhya Pradesh, Manipur, Mizoram, Nagaland, Orissa, Puducherry, Rajasthan, Tamil Nadu, Tripura	5.0	
Cow Milk	Raw, pasteurized, boiled, flavoured, sterilized	All	3.2	8.2

Source: FSSAI website

2. Standard of dairy products

Type	Process	State	Fat	SNF
Toned Milk	Pasteurised, flavoured and sterilized	All India	3.0	8.5
Double Toned milk	Pasteurised, flavoured and sterilized	All India	1.5	9.0
Standardized milk	Pasteurised, flavoured and sterilized	All India	4.5	8.5
Full Cream Milk	Pasteurised and sterilized	All India	6.0	9.0
Mixed Milk	Raw, pasteurised, boiled, flavoured and sterilised	All India	4.5	8.5
Recombined Milk	Pasteurised, flavoured and sterilized	All India	3.0	8.5
Skimmed Milk	Raw, boiled, pasteurised, flavoured and sterilized.	All India	Not more than 0.5 percent	8.7

Source: FSSAI website

3. Prohibited admixtures

- (1) Cream which has not been prepared exclusively from milk or which contains less than 25 per cent of milk fat.
- (2) Milk which contains any added water;
- (3) Ghee which contains any added matter not exclusively derived from milk fat;
- (4) Skimmed milk (fat abstracted) as milk;
- (5) Vanaspati to which ghee or any other substance has been added;
- (6) Dahi or curd not prepared from boiled, pasteurized or sterilized milk;
- (7) Milk or a milk product specified in Food Safety and Standards (Food Products Standards and Food Additives) regulations, 2011 containing a substance not found in milk, except as provided in the regulations.

Source: Food safety and standards (Prohibition Regulations) regulations, 2011

4. Sanitary requirements

(1) Dairy Establishments shall have the following:

- A) Facilities for the hygienic handling and protection of raw materials and of non-packed or non-wrapped dairy products during loading and unloading, transport & storing including Bulk Milk cooling facilities.
- B) Special watertight, non-corrodible containers to put raw materials or dairy products intended for human consumption. Where such raw materials or dairy products are removed through conduits, these shall be constructed and installed in such a way so as to avoid any risk of

- contamination of other raw materials or dairy products;
 - C) a waste water disposal system which is hygienic and approved;
 - D) facilities for cleaning & disinfecting of tanks used for transporting dairy
 - E) products and raw milk. These containers have to be cleaned after every use.
- (2) The occupier of a dairy establishment shall take appropriate measures to avoid cross-contamination of dairy products in accordance with the cleaning program as specified in point 9.1 of Part II.
 - (3) Where a dairy establishment produces food stuffs containing dairy products together with other ingredients, which have not undergone heat treatment or any other treatment having equivalent effect, such dairy products and ingredients shall be stored separately to prevent cross-contamination.
 - (4) The production of heat-treated milk or the manufacture of milk-based products, which might pose a risk of contamination to other dairy products, shall be carried out in a clearly separated working area.
 - (5) Equipment, containers and installations which come into contact with dairy products or perishable raw materials used during production shall be cleaned and if necessary disinfected according to a verified and documented cleaning programme.
 - (6) Equipment, containers, instruments and installations which come in contact with microbiologically stable dairy products and the rooms in which they are stored shall be cleaned and disinfected according to a verified and documented Food Safety management programme drawn up by the owner/occupier of the dairy establishment.
 - (7) Disinfectants and similar substances used shall be used in such a way that they do not have any adverse effects on the machinery, equipment, raw materials and dairy products kept at the dairy establishment. They shall be in clearly identifiable containers bearing labels with instructions for their use and their use shall be followed by thorough rinsing of such instruments and working equipment with potable water, unless supplier's instructions indicate otherwise.

Source: Food Safety and Standards (Licensing and Registration of Food Businesses), regulations, 2011

5. Personal hygiene requirements

- (1) The Food Business Operator shall employ those persons only in such an establishment to work directly with and handle raw materials or dairy products if those persons have proved to the occupier's satisfaction by means of a medical certificate, on recruitment, that there is no medical impediment to their employment in that capacity.
- (2) Persons working directly with and handling raw materials or dairy products shall maintain the highest standards of personal cleanliness at all times. In particular they shall
 - A) wear suitable, clean working clothes and headgear which completely encloses their hair;
 - B) wash their hands at least each time work is resumed and whenever contamination of their hands has occurred; e.g. after coughing / sneezing, visiting toilet, using telephone, smoking etc.
 - C) cover wounds to the skin with a suitable waterproof dressing. No person with injury on hand, even with dressing, shall be placed in any product making/handling section.
 - D) avoid certain hand habits - e.g. scratching nose, running finger through hair, rubbing eyes, ears and mouth, scratching beard, scratching parts of bodies etc. that are potentially hazardous when associated with handling dairy products, and might lead to food contamination through the transfer of bacteria from the employee to product during its preparation. When unavoidable, hands should be effectively washed before resuming work after such actions

Source: Food Safety and Standards (Licensing and Registration of Food Businesses), regulations, 2011

6. Sanitary requirements for storage

- (1) Immediately after procuring, raw milk shall be placed in a clean place, which is suitably equipped so as to prevent any kind of contamination.
- (2) The cans/ containers made up of mild steel metal and plastic material used for storage and transportation of milk and milk products shall not be allowed.

- (3) If raw milk is brought to the dairy plant by a producer or farmer, then it shall be ensured that he brings it within four hours of milking and it shall be cooled as soon as practicable to a temperature of 4°C or lower and maintained at that temperature until processed.
- (4) Where raw milk is collected daily from a producer, it shall be cooled immediately to a temperature of 4°C to 6°C or lower and maintained at that temperature until processed;
- (5) When the pasteurization process is completed, pasteurized milk shall be cooled immediately to a temperature of 4°C or lower.
- (6) Subject to Paragraph 7 below, any dairy product not intended to be stored at ambient
- (7) temperature shall be cooled as quickly as possible to the temperature established by the manufacturer of that product as suitable to ensure its durability and thereafter stored at that temperature.
- (8) Where dairy products other than raw milk are stored under cooled conditions, their storage temperatures shall be registered, and the cooling rate shall be such that the products reach the required temperature as quickly as possible.
- (9) The maximum temperature at which pasteurized milk may be stored until it leaves the treatment establishment shall not exceed 5°C.

Source: Food Safety and Standards (Licensing and Registration of Food Businesses), regulations, 2011

7. Wrapping and packaging

- (1) The wrapping and packaging of dairy products shall take place under satisfactory hygienic conditions and in rooms provided for that purpose.
- (2) The manufacture of dairy products and packaging operations may take place in the same room if the following conditions are satisfied:
 - A) The room shall be sufficiently large and equipped to ensure the hygiene of the operations;
 - B) the wrapping and packaging shall have been brought to the treatment or processing establishment in protective cover in which they were placed immediately after manufacture and which protects the wrapping or
 - C) packaging from any damage during transport to the dairy establishment, and they shall have been stored there under hygienic conditions in a room intended for that purpose;
 - D) the rooms for storing the packaging material shall be free from vermin and from dust which could constitute an unacceptable risk of contamination of the product and shall be separated from rooms containing substances which might contaminate the products. Packaging shall not be placed directly on the floor;
 - E) packaging shall be assembled under hygienic conditions before being brought into the room, except in the case of automatic assembly or packaging, provided that there is no risk of contamination of the products;
 - F) packaging shall be done without delay. It shall be handled by separate group of staff having experience in handling and product wrapping and
 - G) immediately after packaging, the dairy products shall be placed in the designated rooms provided for storage under required temperature.
- (3) Bottling or filling of containers with heat-treated milk and milk product shall be carried out hygienically.
- (4) Wrapping or packaging may not be re-used for dairy products, except where the containers are of a type which may be re-used after thorough cleaning and disinfecting.
- (5) Sealing shall be carried out in the establishment in which the last heat-treatment of milk or liquid milk-based products have been carried out, immediately after filling, by means of a sealing device which ensures that the milk is protected from any adverse effects of external origin on its characteristic. The sealing device shall be so designed that once the container has been opened, the evidence of opening remains clear and easy to check.

Source: Food Safety and Standards (Licensing and Registration of Food Businesses), regulations, 2011

8. Packaging requirements for Milk and Milk Products

1. Bottling or filling of containers with heat-treated milk and milk product shall be carried out mechanically and the sealing of the containers shall be carried out automatically.

2. Wrapping or packaging may not be re-used for dairy products, except where the containers are of a type which may be re-used after thorough cleaning and disinfecting.
3. Sealing shall be carried out in the establishment in which the last heat-treatment of drinking milk or liquid milk-base products has been carried out, immediately after filling, by means of a sealing device which ensures that the milk is protected from any adverse effects of external origin on its characteristic. The sealing device shall be so designed that once the container has been opened, the evidence of opening remains clear and easy to check.
4. Immediately after packaging, the dairy products shall be placed in the rooms provided for storage.

Source: Food Safety and Standards (Packaging and Labelling), regulations, 2011

Annex 10: List of dairy plants of unions and private dairy companies visited by the study team

General information

State	Name of org	Type	Plant name	Location	Plant visit	Products
Assam	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Union	Guwahati	Guwahati	Yes	Standard milk, Smart milk, Ghee, Standard curd, Sweet curd, Lassi, Cream, Paneer
Gujarat	Kaira District Cooperative Milk Union (AMUL)	Union	Anand	Anand	Yes	Liquid milk, Butter, Cheese, Infant milk food, Milk powder, Ghee, Cocoa products, Malted milk food, Extruded food, Bread spread, Table margarine, Sweets, Frozen food, Bakery, Therapeutic food.
Gujarat	Gandhinagar District Cooperative Milk Union (Madhur Dairy)	Union	Gandhinagar	Gandhinagar	Yes	Liquid milk, Milk powder, Milk Pouches, Ice cream, Ghee, Paneer, Cheese, Sweets etc.
Gujarat	Banaskantha District Cooperative Milk Producer' Union (Banas Dairy)	Union	Banas 3	Palanpur	Yes	SMP, WMP, DW, WB, TB, Cream, Paneer , Fermented Products, Baby powder
M.P.	Bhopal Sahakari Dugdh Sangh Maryadit (Bhopal Milk Union)	Union	Bhopal	Bhopal	Yes	Liquid milk, Ghee, Butter, SMP, Paneer, Curd, Kheer, Peda, Mawa, Flavored milk, Butter milk, Lassi
M.P.	Indore Sahakari Dugdh Sangh Maryadit (Indore Milk Union)	Union	Indore	Indore	Yes	Flavored Milk, Butter Milk, Lassi, Shrikhand, Paneer, Plain Curd, Probiotic Curd, Chhaina Rabri, Cream, Mawa, Peda, Rasgulla, Gulabjamun, Ghee, SMP, Sweet SMP, WMP, Table Butter, White Butter
M.P.	Jabalpur Sahakari Dugdh Sangh Maryadit, Jabalpur (Jabalpur Milk Union)	Union	Jabalpur	Jabalpur	Yes	Liquid milk, Ghee, Paneer, Flavored milk, Shree khand, Matta, Sweet sip, Khowa, Peda, Curd, Cream, Lassi, Chaina Kheer
Bihar	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna Milk Union)	Union	Patna	Patna	Yes	Liquid milk, milk powder, butter, ghee, ice cream, peda, paneer and Plain/Misti Dahi, Lassi, Matha and kulfi.
Bihar	Mithila Dugdh Utpadak Sahkari Sangh Ltd. (Mithila Milk Union)	Union	Smastipur	Smastipur	Yes	Liquid milk, Ghee, peda, kalakand, Paneer, Rasogulla, Gulabjamun, Butter, Lassi, Misti Dahi etc.
Karnataka	Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd., (BAMUL)	Union	Mega dairy	Bangalore	Yes	Liquid milk, Butter, Ghee, Peda, Flavored Milk, Spiced Butter Milk, Paneer, Set Curds etc.
Karnataka	Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Uion Ltd. (GUMUL)	Union	Gulbarga	Gulbarga	Yes	Liquid milk, Ghee, Curd, Peda, Buttermilk, Lassi, and Paneer
U.P	Lucknow Producer's Cooperative Milk Union Ltd.	Union	Lucknow	Lucknow	Yes	Ghee, Paneer, curd, Lassi, Flavored milk, Butter milk Peda, Milk Cake, TB, Besan Laddu, Rice Kheer, Chena Kheer, Gulab Jamun, Rasgulla
U.P	Kanpur Dugdh Utpadak Sahkari Sangh Ltd. (Kanpur Milk Union)	Union	Kanpur	Kanpur	Yes	Raw milk
U.P	Varanasi Dugdh Utpadak Sahakari Sangh Ltd. (Varanasi Milk Union)	Union	Varanasi	Varanasi	Yes	Liquid milk, Ghee, Butter
U.P	Gangol Sahkari Dugdh Utpadak Sangh Ltd. Meerut (Meerut Milk Union)	Union	Meerut	Meerut	Yes	Ghee, Curd, Butter milk, Lassi, MP, Lassi, curd, Flavored milk, TB, Peda
U.P	Saahaj	PC	NA	Agra	No	NA
-	-	Private	NA	-	Yes	Liquide milk, Dahi, Curd, Ghee, Paneer, etc.
-	-	Private	NA	-	No	Liquid milk, Dahi, Ghee, Fresh Paneer
-	-	Private	NA	-	Yes	Liquid milk, Curd, Paneer, Lassi, Butter milk, Ghee, Ice-cream
-	-	Private	NA	-	Yes	Liquid milk, curd, butter milk, lassi, ice-cream, panner, table butter, milk powder, flavored milk, UHT milk and dairy whitener.
-	-	Private	NA	-	Yes	Liquid milk, Ghee, Curds, etc.
-	-	Private	NA	-	Yes	Ghee, Butter, SMP
-	-	Private	NA	-	Yes	Liquid milk, Ghee, SMP, Curd, Flavored milk, Lassi
-	-	Private	NA	-	Yes	Liquid milk, SMP, Ice- cream
-	-	Private	NA	-	No	Liquid milk, Ghee, SMP, Flavored milk etc.
-	-	Private	NA	-	Yes	Liquid milk, Ghee, SMP, Curd, Flavored milk etc.
-	-	Private	NA	-	No	Milk, Paneer, Ghee, Rabri, Dahi, Lassi, Chaach, Yogurt, Flavored milk, Honey drinks, Whey drinks, Butter, Cookies-rusk-matthi, Sweets, Chips
-	-	Private	NA	-	Yes	Liquid milk, Curd, Dahi, Butter milk, SMP, Ghee, etc.
-	-	Private	NA	-	No	Liquid Milk, UHT milk, Flavored Milk, Dahi Cup, Dahi Pouch, Paneer, Ghee, Chach, Milk Shake

General information

Plant/Equipment

State	Name of org	Type	Annual turnover (Lakh Rs.)	Procurement price (standard, Rs.)	Year of plant establish	Capacity (L per day)	Actual usage (L per day)	No. of BMC
Assam	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Union	8,200	34.28	1976	60,000	26,150	5
Gujarat	Kaira District Cooperative Milk Union (AMUL)	Union	570,000	26.76 (DCS)	1946	NA	2,558,904	1,187
Gujarat	Gandhinagar District Cooperative Milk Union (Madhur Dairy)	Union	33,500	NA	1971	300,000	171,574	10
Gujarat	Banaskantha District Cooperative Milk Producer' Union (Banas Dairy)	Union	611,200	NA	2015	1,600,000	3,722,000	1,265
M.P.	Bhopal Sahakari Dugdh Sangh Maryadit (Bhopal Milk Union)	Union	72,927	24.96	1979	300,000	376,000	211
M.P.	Indore Sahakari Dugdh Sangh Maryadit (Indore Milk Union)	Union	53,776	NA	1982	260,000	260,000	76
M.P.	Jabalpur Sahakari Dugdh Sangh Maryadit, Jabalpur (Jabalpur Milk Union)	Union	97,814	24	1980	100,000	41,296	22
Bihar	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna Milk Union)	Union	47,482	29.69 (Fat4.5%& SNF8.5%)	1977	250,000	104,000	68
Bihar	Mithila Dugdh Utpadak Sahkari Sangh Ltd. (Mithila Milk Union)	Union	47,581	NA	1987	250,000	354,380	69
Karnataka	Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd., (BAMUL)	Union	1,791	26	1975	1,000,000	1,322,000	196
Karnataka	Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Uion Ltd. (GUMUL)	Union	941	NA	1985	60,000	51,032	22
U.P	Lucknow Producer's Cooperative Milk Union Ltd.	Union	16,400	32.5 (1.11.2017, Fat6.5% & SNF9.0%)	1938	180,000	101,000	118
U.P	Kanpur Dugdh Utpadak Sahkari Sangh Ltd. (Kanpur Milk Union)	Union	1,269	Rs.35 (Fat 6.5% & SNF9%)	1962	NA (Closed)	22,000 (BMC)	6
U.P	Varanasi Dugdh Utpadak Sahakari Sangh Ltd. (Varanasi Milk Union)	Union	3,331	32.5 (1.11.2017, Fat6.5% & SNF9.2%)	1978	110,000	32,000	16
U.P	Gangol Sahkari Dugdh Utpadak Sangh Ltd. Meerut (Meerut Milk Union)	Union	23,665	32.5 (1.11.2017, Fat6.5% & SNF9.3%)	1982	750,000	72,990	47
U.P	Saahaj	PC	49,800	NA	2014	100,000	345,000	366
-	-	Private	NA	45	2008	8,000	1,000	NA
-	-	Private	NA	NA	2008	250,000	20,000	NA
-	-	Private	NA	28.14 (Fat4.5%& SNF8.5%)	2008	50000 Under construction	NA	50
-	-	Private	17,000	NA	1992	NA	1,680,000	6
-	-	Private	NA	23-27	2008	100,000	50,000	3 (CC)
-	-	Private	NA	NA	1991	NA	200,000	2(CC)
-	-	Private	30,000	NA	1996	600,000	200,000	20 & 15 CC
-	-	Private	15,000	30 (4.5%fat &8.5%SNF)	1994	150,000	NA	0
-	-	Private	NA	40-50	2000	NA	NA	NA
-	-	Private	65,000	35 (6.5%fat/9%SNF)	2007	1,000,000	3-800000	6BMC & 3 CC
-	-	Private	11,050	same with unions	1989	1,000,000	400,000	30CC & 5BMC
-	-	Private	100,000	37 (fat6%/SNF9%)	2010	1,000,000	200,000	40 (BMC &CC)
-	-	Private	200,000	NA	1981	4,100,000	20-2,500,000	50CC

General information

State	Name of org	Type	Recent update	Automation	Kinds of test at collection	Methods of testing at collection	Kinds of test at loading tanker
Assam	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Union	2008	Manual	Fat & SNF	Lactometer	NA
Gujarat	Kaira District Cooperative Milk Union (AMUL)	Union	2017	Automated	Fat & SNF	Machine & Lactometer	NA
Gujarat	Gandhinagar District Cooperative Milk Union (Madhur Dairy)	Union	2014	Manual	Fat & SNF	Machine & Lactometer	NA
Gujarat	Banaskantha District Cooperative Milk Producer' Union (Banas Dairy)	Union	2015	Manual	Fat & SNF, Water	Machine & Lactometer	NA
M.P.	Bhopal Sahakari Dugdh Sangh Maryadit (Bhopal Milk Union)	Union	2017	90% Automated	Fat & SNF	Machine & Lactometer	Fat & SNF
M.P.	Indore Sahakari Dugdh Sangh Maryadit (Indore Milk Union)	Union	2013	Manual	Fat & SNF	Machine & Lactometer	Organoleptic, Fat&SNF, Adulteration, COB
M.P.	Jabalpur Sahakari Dugdh Sangh Maryadit, Jabalpur (Jabalpur Milk Union)	Union	NA	Manual	NA	NA	NA
Bihar	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna Milk Union)	Union	2017	Manual	Fat & SNF	Lactometer	NA
Bihar	Mithila Dugdh Utpadak Sahkari Sangh Ltd. (Mithila Milk Union)	Union	2016	Manual	Fat & SNF	Machine & Lactometer	NA
Karnataka	Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd., (BAMUL)	Union	2016	Automated	Fat & SNF	Machine & Lactometer	Fat & SNF, Acidity, SG
Karnataka	Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Uion Ltd. (GUMUL)	Union	2016	Manual	Fat & SNF	Machine & Lactometer	NA
U.P	Lucknow Producer's Cooperative Milk Union Ltd.	Union	2015	Manual	Fat & SNF, Water	NA	Organoleptic, Fat&SNF, Adulteration, COB
U.P	Kanpur Dugdh Utpadak Sahkari Sangh Ltd. (Kanpur Milk Union)	Union	NA	Automated	Fat & SNF	Machine & Lactometer	Organoleptic, Fat&SNF, Adulteration, COB
U.P	Varanasi Dugdh Utpadak Sahakari Sangh Ltd. (Varanasi Milk Union)	Union	2017	Manual	Fat & SNF, Water	Machine & Lactometer	Organoleptic, Fat&SNF, Adulteration, COB
U.P	Gangol Sahkari Dugdh Utpadak Sangh Ltd. Meerut (Meerut Milk Union)	Union	2016	Manual	NA	NA	NA
U.P	Saahaj	PC	NA	NA	NA	NA	NA
-	-	Private	NA	Manual	Fat & SNF	Lactometer	NA
-	-	Private	2017	NA	NA	NA	NA
-	-	Private	2017	NA	Fat & SNF	Machine	NA
-	-	Private	NA	Partially automated	Fat & SNF	Machine	Organoleptic, Adulteration, Neutralizer, Preservative
-	-	Private	2016	Manual	Fat & SNF	Fat & SNF, Organoleptic, Adulteration	Fat & SNF, Organoleptic, Adulteration
-	-	Private	2016	Manual	NA	Organoleptic test, COB, fat/SNF, Adulterant, Alcohol test	NA
-	-	Private	NA	NA	NA	NA	NA
-	-	Private	2013	Manual	Fat & SNF	Machine	NA
-	-	Private	NA	NA	NA	NA	NA
-	-	Private	NA	Partially manual	NA	NA	NA
-	-	Private	NA	NA	NA	NA	NA
-	-	Private	2014 constructed	Automated	NA	NA	NA
-	-	Private	NA	NA	NA	NA	NA

General information

State	Name of org	Type	Kinds of test at plant reception	Rejection of milk	Kinds of test at dispatch
Assam	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Union	Fat & SNF, CLR, Temp., Acidity	Some times in summer	All types of quality and microbiological tests
Gujarat	Kaira District Cooperative Milk Union (AMUL)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	A few times in year	All types of quality and microbiological tests
Gujarat	Gandhinagar District Cooperative Milk Union (Madhur Dairy)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	Some in summer season	All types of quality and microbiological tests
Gujarat	Banaskantha District Cooperative Milk Producer' Union (Banas Dairy)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	NA	All types of quality and microbiological tests
M.P.	Bhopal Sahakari Dugdh Sangh Maryadit (Bhopal Milk Union)	Union	Fat & SNF, CLR, Temp., Acidity	A few times in year	All types of quality and microbiological tests
M.P.	Indore Sahakari Dugdh Sangh Maryadit (Indore Milk Union)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	Not happened in last 5-6 years	NA
M.P.	Jabalpur Sahakari Dugdh Sangh Maryadit, Jabalpur (Jabalpur Milk Union)	Union	NA	No adulteration in 2013	NA
Bihar	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna Milk Union)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	NA	All types of quality and microbiological tests
Bihar	Mithila Dugdh Utpadak Sahkari Sangh Ltd. (Mithila Milk Union)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	A few times in year	All types of quality and microbiological tests
Karnataka	Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd., (BAMUL)	Union	All	None	All types of quality and microbiological tests
Karnataka	Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Uion Ltd. (GUMUL)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	A few times in year	All types of quality and microbiological tests
U.P	Lucknow Producer's Cooperative Milk Union Ltd.	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	NA	NA
U.P	Kanpur Dugdh Utpadak Sahkari Sangh Ltd. (Kanpur Milk Union)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	3-4 times in a year	All types of quality and microbiological tests
U.P	Varanasi Dugdh Utpadak Sahakari Sangh Ltd. (Varanasi Milk Union)	Union	Organoleptic, Temperature, Adulteration, Acidity, Alcohol test, COB, MBRT, Fat&SNF	A few times in year	All types of quality and microbiological tests
U.P	Gangol Sahkari Dugdh Utpadak Sangh Ltd. Meerut (Meerut Milk Union)	Union	NA	NA	NA
U.P	Saahaj	PC	NA	NA	NA
-	-	Private	Fat & SNF, CLR, Temp., Acidity	NA	NA
-	-	Private	NA	NA	NA
-	-	Private	NA	NA	NA
-	-	Private	Organoleptic, Adulteration, Neutralizer, Alcohol, Acidity, MBRT	$\approx 1\%$ when tanker delayed	NA
-	-	Private	Fat & SNF, Organoleptic, Adulteration	2 times in summer	NA
-	-	Private	Organoleptic test, COB, fat/SNF, Adulterant, Alcohol test	NA	NA
-	-	Private	NA	None	NA
-	-	Private	Fat & SNF, CLR etc.	NA	NA
-	-	Private	Fat & SNF, Bacteria counts	NA	NA
-	-	Private	NA	NA	NA
-	-	Private	NA	NA	NA
-	-	Private	NA	NA	NA
-	-	Private	NA	Less than 5%	NA

General information

State	Name of org	Type	Pasteurizer (year, Company)	Packing machine (year, company)	Compressor (year, company)
Assam	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Union	2008 (IDMC)	2011 (RMC packing)	2008 (Kirloskar)
Gujarat	Kaira District Cooperative Milk Union (AMUL)	Union	NA	NA	NA
Gujarat	Gandhinagar District Cooperative Milk Union (Madhur Dairy)	Union	2016, 2013 (GEA)	2012 (Atomic Engineers)	2003, Johnson Control (USA)
Gujarat	Banaskantha District Cooperative Milk Producer' Union (Banas Dairy)	Union	1998 (IDMC)	Tetrapack	IDMC, Grasso, Mayekawa, Kirloskar
M.P.	Bhopal Sahakari Dugdh Sangh Maryadit (Bhopal Milk Union)	Union	2001 (IDMC), 2007 (Tetra Pak)	2003-2014 (RMC Packing, Accent Pack, Samarpan)	2012 (Grasso-GEA, Kirloskar)
M.P.	Indore Sahakari Dugdh Sangh Maryadit (Indore Milk Union)	Union	1994(HMD),2004(Vede Engineering),2012-13(IDMC)	Deccan Packaging System and Need, RM Packing System	2012 (Frick India)
M.P.	Jabalpur Sahakari Dugdh Sangh Maryadit, Jabalpur (Jabalpur Milk Union)	Union	NA	NA	NA
Bihar	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna Milk Union)	Union	1994 (Tetra Pak), 2016 (IDMC)	2005&2010 (Vijaipac)	NA
Bihar	Mithila Dugdh Utpadak Sahkari Sangh Ltd. (Mithila Milk Union)	Union	1994 (Tetra Pak), 2016 (IDMC)	2005&2010 R.M.C Packing Systems Pvt. Ltd.	1994, Friki India
Karnataka	Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd., (BAMUL)	Union	2000&2015	2010&2012	2000
Karnataka	Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Union Ltd. (GUMUL)	Union	2012 IDMC	2007	1997&2012 Friki India
U.P	Lucknow Producer's Cooperative Milk Union Ltd.	Union	1995&2000 (Tetra Pac)	1995&2003 (Prepac, Samarpan, RMC)	1953 (Frick India)
U.P	Kanpur Dugdh Utpadak Sahkari Sangh Ltd. (Kanpur Milk Union)	Union	NA	NA	NA
U.P	Varanasi Dugdh Utpadak Sahkari Sangh Ltd. (Varanasi Milk Union)	Union	2001&2016 (Tetra Pak)	1998,2008,2017 (Samarpan)	2001&2008 (Kirloskar)
U.P	Gangol Sahkari Dugdh Utpadak Sangh Ltd. Meerut (Meerut Milk Union)	Union	1999 (Alfa label), 2004 (Gea Eco Flex), 2016 (IDMC)	2010, 2011	2010-12 (Frick India), 2012 (Kirloskar)
U.P	Saahaj	PC	NA	NA	NA
-	-	Private	NA	NA	NA
-	-	Private	2017	NA	NA
-	-	Private	2017 (IDMC, SUNDEX)	2017 (IDMC)	2010 (Kirloskar)
-	-	Private	Tetrapack	NA	Kirloskar
-	-	Private	2016 (Aakash Enterprise)	RMC packing	Metlex
-	-	Private	2005(Alfa Laval)	NA	2005
-	-	Private	1996 (TetraPak), 2011 (Alfa laval)	Tetrapack, Samarpan	Thermex
-	-	Private	2013-14 (Jaya Industries)	2013-14 (Shankar, Sunbeam R.M.C Packing)	Kirloskar, Thermax
-	-	Private	NA	NA	NA
-	-	Private	Tetra Pak	RMC, Samarpan	Kirloskar
-	-	Private	NA	NA	NA
-	-	Private	GEA	Samarpan	NA
-	-	Private	NA	NA	NA

General information			Food safety				
State	Name of org	Type	ISO(22000, 14000,9001)	Other (FSSC22000, Quality Mark, Halal, etc.)	HACCP	Cleaness of factory	Cleaness of staffs
Assam	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Union	NA	NA	NA	Well maintained, Wet floor	Well maintained, Some do not wear caps.
Gujarat	Kaira District Cooperative Milk Union (AMUL)	Union	22000, 9001	FSSC22000, Halal	Yes	Very clean	Very clean
Gujarat	Gandhinagar District Cooperative Milk Union (Madhur Dairy)	Union	9001	NA	Yes	Very clean	No gloves, masks for worker
Gujarat	Banaskantha District Cooperative Milk Producer' Union (Banas Dairy)	Union	22000, 14000, 9001	Halal	Yes	Clean in general, dried floor	Cap, Mask, Gloves
M.P.	Bhopal Sahakari Dugdh Sangh Maryadit (Bhopal Milk Union)	Union	22000, 14000, 9001	NA	Yes	Very clean	Clean
M.P.	Indore Sahakari Dugdh Sangh Maryadit (Indore Milk Union)	Union	22000, 14000, 9001	NA	Yes	Clean but wet floor	Clean
M.P.	Jabalpur Sahakari Dugdha Sangh Maryadit, Jabalpur (Jabalpur Milk Union)	Union	22000	NA	Yes	Clean but wet floor	Clean
Bihar	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna Milk Union)	Union	22000	Quality Mark	Yes	Generally clean and well maintained	Workers do not wear mask
Bihar	Mithila Dugdh Utpadak Sahkari Sangh Ltd. (Mithila Milk Union)	Union	9001	NA	NA	Old building, wet floor	No gloves for worker
Karnataka	Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd., (BAMUL)	Union	22000, 9001	Quality Mark, AGMARK	Yes	Very clean	Clean
Karnataka	Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Uion Ltd. (GUMUL)	Union	22000	NA	Yes	Clean but need to improve	Clean
U.P	Lucknow Producer's Cooperative Milk Union Ltd.	Union	22000, 9001	NA	Yes	Clean but need to improve	Clean
U.P	Kanpur Dugdh Utpadak Sahkari Sangh Ltd. (Kanpur Milk Union)	Union	(22000) not renewed	NA	NA	Dirty	NA
U.P	Varanasi Dugdh Utpadak Sahakari Sangh Ltd. (Varanasi Milk Union)	Union	NA	NA	Yes	Dirty	Not every workers wear caps, and masks
U.P	Gangol Sahkari Dugdh Utpadak Sangh Ltd. Meerut (Meerut Milk Union)	Union	22000	NA	Yes	NA	NA
U.P	Saahaj	PC	NA	NA	NA	NA	NA
-	-	Private	No	No	No	NA	NA
-	-	Private	No	No	No	NA	NA
-	-	Private	Yes	NA	Yes	NA	NA
-	-	Private	22000, 9001	NA	Yes	Clean and dried floor	Clean
-	-	Private	22000, 9001	NA	Yes	Clean	Clean
-	-	Private	22000	NA	Yes	Clean	Workers do not wear mask
-	-	Private	22000	FSSC22000	Yes	Very clean	Clean
-	-	Private	22000, 9001	NA	Yes	Clean but wet floor	Clean
-	-	Private	NA	NA	NA	NA	NA
-	-	Private	22,000	NA	Yes	Very clean and dried floor	Clean
-	-	Private	NA	NA	NA	NA	NA
-	-	Private	22,000	FSSC22000, Halal	Yes	Very clean	Clean
-	-	Private	9,001	Halal	Yes	NA	NA

General information

State	Name of org	Type	Anti insect	Remarks
Assam	West Assam Milk Producers' Cooperative Union Ltd. (WAMUL)	Union	Open	Managed by NDDB
Gujarat	Kaira District Cooperative Milk Union (AMUL)	Union	Closed	
Gujarat	Gandhinagar District Cooperative Milk Union (Madhur Dairy)	Union	Almost closed	New plant is under construction
Gujarat	Banaskantha District Cooperative Milk Producer' Union (Banas Dairy)	Union	Closed, Insect killer	Biggest plant in India
M.P.	Bhopal Sahakari Dugdh Sangh Maryadit (Bhopal Milk Union)	Union	Partially open	Actively improving the hygiene management
M.P.	Indore Sahakari Dugdh Sangh Maryadit (Indore Milk Union)	Union	Almost closed	
M.P.	Jabalpur Sahakari Dugdh Sangh Maryadit, Jabalpur (Jabalpur Milk Union)	Union	Almost closed	
Bihar	Vaishal Patliputra Dugdh Utpadak Sahkari Sangh Ltd. (Patna Milk Union)	Union	Partially open and found fly	Date printing before packing paneer
Bihar	Mithila Dugdh Utpadak Sahkari Sangh Ltd. (Mithila Milk Union)	Union	Open	Re-use milk is kept in plastic case with room temperature New plant is under construction
Karnataka	Bangalore Urban, Rural & Ramanagara Districts Co-Operative Milk Producers Societies Union Ltd., (BAMUL)	Union	Closed	First union in south India to have the fully automated processing plant. No hand soap is set in toilet like other plants.
Karnataka	Kalaburagi-Bidar & Yadgir Co-Operative Milk Producers Societies Union Ltd. (GUMUL)	Union	Partially open and found fly	CIP system is in manual, need to be automated to improve stability of quality
U.P	Lucknow Producer's Cooperative Milk Union Ltd.	Union	Partially open and found fly	New plant (3 lakh) is under construction
U.P	Kanpur Dugdh Utpadak Sahkari Sangh Ltd. (Kanpur Milk Union)	Union	Open	New plants (4 lakh/ 20MT SMP) are under construction
U.P	Varanasi Dugdh Utpadak Sahkari Sangh Ltd. (Varanasi Milk Union)	Union	Open	New plant (4 lakh) is under construction
U.P	Gangol Sahkari Dugdh Utpadak Sangh Ltd. Meerut (Meerut Milk Union)	Union	Open	New plant (4 lakh) is under construction
U.P	Saahaj	PC	NA	
-	-	Private	Open	Their dairy business is straggling
-	-	Private	NA	
-	-	Private	NA	New plant is under construction
-	-	Private	Closed	
-	-	Private	Open	
-	-	Private	Partially open	
-	-	Private	Closed	
-	-	Private	Partially open	
-	-	Private	NA	Exported Ghee to Japan in past
-	-	Private	Closed	GM is QC manager, Keep products sample every day
-	-	Private	NA	Registered in Japan to export
-	-	Private	Closed	
-	-	Private	NA	

Annex 11: List of machineries of dairy plants

1. Bangalore Co-operative Milk Union

1.1 Milk processing

Sl.No	Equipment Description	Quantity	Capacity	Year of installation	Operation Rate
RECEPTION AND DESPATCH					
1	PHE for milk reception with Crush proof hose, Dearator vessel and duplex filter	03 set	30 KLPH	2000	
2	PHE for Milk Dispatch	02 no's	20 KLPH	2000	
PROCESS EQUIPMENT					
1	Milk silos	08 no 01 no 01 no 01 no	100 KL 100 KL 100 KL 100 KL	2000 2007 2011 2015	
2	Milk Pasteurization plant with feed/booster pumps/duplex filters and all accessories	03 no 01 no	20 KLPH 20 KLPH	2000 2015	
3	Separators	03 set 01 set	20 KLPH 20 KLPH	2000 2015	
4	Auto standardizing unit	03 set 01 set	20 KLPH 20 KLPH	2000 2015	
5	20 KLPH Homogenizer	01 no	20 KLPH	2012	
CREAM PROCESSING EQUIPMENTS					
1	Raw cream Balance Tank	02 no	2 KL	2000	
2	Cream Chiller	01 no	5 KLPH	2000	
3	SS Jacketed cream storage tank with accessories	01 no	5 KL	2000	
RINSE MILK RECOVERY SYSTEM					
1	Rinse milk Balance tank	01 no	2 KL	2000	
2	PHE chiller	01 no	5 KLPH	2000	
3	Rinse milk storage tank	01 no	5 KL	2000	
CURD PRODUCTION UNIT					
1	Curd pasteurizer with accessories	1 set 1 set	10 KLPH 10 KLPH	2000 2015	
2	Curd balance tank with agitator	03 no		2000	
RECONSTITUTION EQUIPMENTS					
1	Tri-blender unit with accessories	01 no	5 KLPH	2000	
2	SS Vertical milk storage Insulated tank for RSM	02 no	4 KL	2000	
POUCH FILLING SECTION					
1	HMST with accessories	05 no	15 KL	2000	
2	Curd HMST with accessories	01 no	6 KL	2000	
3	Cooling water system with 5 KLPH chiller, balance tank, pump	01 set	---	2000	
4	Pouch filling Machine for Milk	33 no 02 no	5000 pph 600 pph	2010,2011, 2012 2012	
5	Pouch filling Machine for Curd	10 no 01 no	5000 pph 600 pph	2012 2012	
6	Leaky pouch dump tank	03 no	1 KL	2000	
CIP SECTION					
1	Auto CIP system for process Equipments	01 set		2000	
CONDENSATE RECOVERY SYSTEM					
1	Condensate recovery system including	01 Lot		2000	

	tanks, pumps, pipes and fittings, valves etc for the entire plant				
GENERAL EQUIPMENTS					
1	Bulk Acid tank	01 no		2000	
2	Bulk Lye tank	01 no		2000	
3	Lye flake Dissolving tank	01 no		2000	
4	Acid Unloading tank	01 no		2000	

1.2 Other Value-Added Products

Sl. No	Equipment Description	Quantity	Capacity	Year of installation	Operation Rate
1	Milk/Curd Milk Pasteurizer Model: S - 37	01 set	10 KLPH	2015	
2	Cream Pasteurizer with milk pump, Hot water pump, balance tank and accessories Model: S - 37	01 set	5 KLPH	2015	
3	Tri blender with RCM Heater 500 kg/hour	01 set	5 KLPH	2015	
4	Homogenizer	01 no	10 KLPH	1990	
5	Cream Ripening Tank with Agitator and gear box	1 no	10 KLPH	2015	
6	Cream Ripening Tank with Agitator and gear box	4 no	5 KLPH	2000	
7	HMST with accessories	04 no 02 no 01 no	15 KL 15 KL 5 KL	1980 2015 1994	
8	Curd settling tank	1 no	15 KL	2015	
9	Butter Milk Chiller	1 no	6 KLPH	2015	
10	Cup filling machine for curd packing with discharge conveyors	2 no	1200 CPH	2004	
11	SS Insulated vertical tank	2 no	2 KL	2004	
12	SS Culture mixing tank with 38 mm plug valve	2 no	200 ltrs	2004	

13	Stationary Peda vat with accessories	2 no 1 no	120 ltr 120 ltr	2004 2012	
14	Tilting type SS Mysore pak kettle	1 no 1 no	240 ltr 240 ltr	2012 2015	
15	Peda portioning and moulding machine	1 no		2015	
16	Paneer vat with agitator, motor & gear box, 4 head	1 no 1 no	3000 ltr 3000 ltr		
17	Double Chamber Vacuum Sealing machine	1 no 1 no		2012	
18	SS Paneer Soaking tank	2 no 1 no	2000 ltr 2000 ltr	2011	
19	Ghee boiler with agitator, gear box & Motor	2 no 1 no		2004 2015	
20	Ghee balance Tank	1 no	500 ltr		
21	Ghee settling tank	03 no 01 no	2000 ltr 1000 ltr	2015	
22	Ghee storage tank	03 no 01 no	3000 ltr 3000 ltr	2015 2013	
23	Ghee clarifier	01 no 01 no	2 KL 2 KL	2012 2015	
24	Butter melting vat	1 no 1 no	2000 ltrs 2000 ltrs	2004 2015	
25	Hot water Generation PHE Type - S - 14	1 no	20 KLPH		
26	Pre stratification tank	1 no	2 KL	2015	
27	CIP/Recuperation Tank	1 no	4 KL	2015	
28	CIP/Lye Tank	1 no	3000 ltr	2015	
29	CIP/Acid Tank	1 no	3000 ltr	2015	
30	CIP/Hot water tank	1 no	3000 ltr	2015	
31	Bulk Acid storage tank	1 no	3 KL	2015	
32	Bulk lye storage tank	1 no	3 KL	2015	
33	CIP PHE, S/21, (Duplex type)	1 no	20 KLPH	2015	
34	SS Culture preparation tank	1 no		2015	
35	Continuous Butter Making Machine along with associated equipment	1 set	1000kg/hr	2012	
36	Butter Silo	1 no	2.5 Ton Cap	2015	
37	PHE for water cooling No. 1507/16-17, Model: TX110	1 no		2015	
38	CIP PHE S-21 No.201604122			2016	
39	SS CIP Solution balance tank	1 no	500 ltr	2016	
40	Automatic Blister (TUB) packing machine with collating & pick and place device	1 no	36,000 cups/hr	2015	
41	100/200 gms Butter Wrapping machine F1000	1 no	7500 pkt/hr	2015	
42	Automatic cartooning machine (cartomate) No 8554	1 no		2015	
43	500 gms Butter Wrapping machine F100	1 no	5400 pkt/hr	2015	

Source: Bangalore Co-operative Milk Union

2. Gurbulga Cooperative Milk Producers Union Ltd.

	Equipment	Capacity	Qty	Installation	Funded by
1. Reception					
	1. Can Roller Conveyor	10Mt	1	1997	OF II/III
	2. EWM	0-300 Kgs	1	1997	OF II/III
	3. Milk Wigh Bowl	0-300 Kgs	1	1997	OF II/III
	4. Dump Tank	2KL	1	1997	OF II/III
	5. Milk Pump	10KLPH	1	1997	OF II/III
	6. Milk Chiller	10KLPH	1	1997	OF II/III
	7. Can Cleaning Scrubber	Single Can	1	1997	OF II/III
	8. Can Steaming Block	1 Can	1	1997	OF II/III
	9. Milk Storage Tanks				
	Silo	30 KI	2	1997	OF II/III
	HMST	15 KL	3	1997	OF II/III
	HMST	5 KL	2	1997	OF II/III
	10. Curd Storage Tanks				
	HMST	5 KL	2	2015	OF II/III
2. Processing					
	1. Milk Pasteuriser	10 KLPH	1	2012	GOK 2011-12
	2. Cream Seperator	10 KLPH	1	2012	GOK 2011-12
	3. Homogeniser	10 KLPH	1	2012	GOK 2011-12
	4. Curd Pasteuriser	5 KLPH	1	2012	GOK 2011-12
3. Packing Section					
	1. Double Head Machine	5000 PPH	5	2007	GOK 2011-12
	2. Ink Jet Coding Machine	Std	1	2013	GOK 2013-14
	3. EWS for sachet	0-2 Kg	2	2013	GOK 2011-12
4. Products Section					
	1. Butter Churn	1 KL/Batch	1	1997	OF II/III
	2. Ghee Boiling Vat	1 KL/Batch	2	2012	GOK 2011-12
	3. Ghee Settling Tank	1KL	1	1997	GOK 2011-12
	4. Ghee Clarifier	1KLPH	2	1997/2007	GOK 2011-12
	5. Ghee Packing Machine	1200 PPH	1	1997	OF II/III
	6. Khoa Pan	120Lit/Batch	4	2012/2016	GOK 2013-14
	7. Paneer Prod'n Unit	1KL/Batch	1	2016	GOK 2013-14
	8. EWS	0-30 Kgs	1	2015	
5. Refrigeration Section					
	1. Compressor 30TR	6x6	3	1997	
	2. Compressor 50TR	9x9	1	2012	
	3. Booster Compressor	10TR	2	1997	
	4. Cold Storage -1	60TR	1	1997	
	5. Cold Storage -2	60TR	1	2007	
	6. Deep Freez	10TR	1	1997	
6. Boiler Section					
	1. Steam Boiler	850 Kg	1	2007	GOK 2007-08
	2. Steam Boiler	850Kg	1	2012	GOK 2011-12
	3. Hot Water Generator	350Kg/hr	1	1998	
	4. Water Softner 1st Stage	10000 LPH	1	1997	
	5. Water Softner 2nd Stage	5000 LPH	1	2012	GOK 2011-12
	7. Crate Washer	1800No/hr	1	2012	GOK 2011-12
	8. ETP Unit (Aerobic-Two Stage)	1 LLPD	1	1997	OF II/III
	9. Generator Set	500KvA	1	2014	GOK 2013-14
	10. Sub Station	500KvA	1	2014	GOK 2013-14

Source: Gurbulga Cooperative Milk Producers Union Ltd.

3. West Assam Milk Union Ltd.

3.1 Processing plant

Sr. No.	Description	Qty.(No)	Capacity	Make
A	RMRD			
1	Can Conveyor	1	Chain type	IDMC
2	Milk Weighing Balance (Load Cell Based)	1	500 Kg	Avery India
3	Dump Tank	1	1000 L	
4	Can Scrubber	1	425 Litre	IDMC
5	Milk Pump	1	10 KLPH	Alfa laval
B	PROCESS SECTION			
6	Milk Chiller	1	20 KLPH	HMT
7	Milk Chiller for pouch milk chilling	1	10 KLPH	IDMC
8	Milk Pasteurizer	1	5 KLPH	IDMC
9	Milk Pasteurizer	1	10 KLPH	IDMC
10	Homogenizer	1	5 KLPH + 10 KLPH	IDMC / SEA Neilfala
11	Tri Purpose Separator	1	5 KLPH	Alfa Laval
12	Butter Dozing Pump	1	Variable Feeding	Alfa Laval
13	Milk Pumps	3	10 KLPH	Alfa laval, IDMC
14	Powder Mixing Ventury			
15	SS Noninsulated Tank for reconstitution	2	10 KL	Unicorn Industries
C	STORAGE TANKS			
16	Milk Silos (Raw milk/out source milk)	3	30 KL	Sparks India
17	Milk Storage Tanks (Process Milk)	3	15 KL	Unicorn Industries
18	HMST (Raw milk)	2	5 KL	Valcan Laval
19	Milk Storage Tank Vertical Type (Process Milk)	1	2 KL	Denny Dairy & Process Eqpt.
20	CIP SECTION			
21	Acid Tank	1	1 KL	Unicorn Industries
22	Lye Tank	1	1 KL	Unicorn Industries
23	Hot water Tank	1	2 KL	Unicorn Industries
24	Two circuit			
25	CIP Circulating pump	1	10 KLPH	Alfa Laval
26	CIP Return pumps	2	10 KLPH	IDMC
D	PACKAGING SECTION			

27	Double Head Automatic Pouch Filling and Sealing machine (Mechanical Type)	4	5000 Pouches /hr.	RMC Packaging
28	Insulated milk Over head tank with level controller	2	2 KL each	IDMC
29	CIP circuit for packaging machines	1 set		IDMC
30	TTO machine for labelling & marking	8	Automatic	Domono India
31	Cold Store for Pouch Milk		309 Cu.M(10.15Mx10.15Mx2.7M)	
E	PRODUCT SECTION			
32	Automatic Curd Filling & Sealing Machine	1	2000cups /hr.	IDMC
	Automatic Curd Filling & Sealing Machine	1	1200-2400 Cups/Hr	RMC Packaging
33	Multipurpose Vat	1	1000 L + 1058 L	
34	Vacuum Packing Machine	1	Double Chamber	Indvac
35	SS Inoculation Tanks	2	1 KL each	IDMC
36	SS Milk Over Head Tank	1	1 KL	IDMC
37	Curd Chiller	1	2 KLPH	IDMC
38	Milk pump	1	10 KLPH	IDMC
39	Bottles Sterilizer	1	500 bottles/batch	RPM Engineers
40	Shrink Wrapping Machine	2	10 boxes/min	Bajaj Process pack
41	Ink Jet Printers for labelling & marking	2	Continuous	Domino Printech India
42	Hot Cooler Pre fabricated incubator	1	47 Cu.M(5.85Mx2.82Mx2.87M)	Blue Star
43	Pre Fabricated Incubator	1	39 Cu.M(4.2 Mx3.4mx2.7M)	Blue Star
44	Paneer Press	1	Screw type	
F	REFRIGERATION SECTION			
45	KC-3 Ammonia vapour Compressor	3	40 TR,75 HP	Kriloskar Pneumatic
46	PC-2 Ammonia vapour Compressor (Booster)	1	15 TR	Do'
47	Ammonia Reciver	2	2000 L each	
48	Atmospheric Condenser	3set	600 RM each	Alfa Laval/ IDMC
49	IBT	2 Chambers	50 KL each , IBT Coil-1000 RM each	Alfa Laval
50	Air compressor	2	15 HP each,80 cfm at 12kg/sq.cm	Ingersol Rand
G	BOILER SECTION			
51	Steam Boiler	1	2 MT/hr.	IAEC
52	Steam Boiler	1	1.1 MT/hr.	Forbes Marshall
53	Hot water Genarator	1	300000 Kcal/hr.	Ross
54	Water Softener	1 set		

55	Insulated boiler Feed Water Tank	1	2 KL	
56	FO Lifting Pumps	2	1 KLPH	
H	ELECTRICAL SUB STATION			
57	Electrical Transformer	1	600 KVA	Thana Electric Supply Co.ltd.
58	HT Panel	1 set	11 KVA	Crompton Grieves
59	LT Panel	1 set	450 Volts	Crompton Grieves
60	Automatic Power Factor Controller, L& T make	1 set	101 KVAR	Capacitors-C&S Electric Ltd. make
61	D.G set(New)	1	320 KVA	Cummins India
62	D.G set MWM (Old)	1	200 KVA	MWM (Out of Order)
	ETP			
63	Twin Lobe Air Compressor	2	20 HP each & 500 cu. m/hr	Beta
64	Effluents Pumps	2	2 KLPH	
65	Equalising Tank	1 set	200 Cu.M	
66	Aeration Tank	1 set	200 Cu.M	
67	Clarifier	1 set		
68	Sludge Drying Beds	1 set		
69	Sludge Pump	1 set		
	WATER SUPPLY SYSTEM			
70	Bore well	4	2 HP, 2 HP, 3.5 HP, 3HP	
71	Ground Water Storage Tank	2	50 KL each	
72	Over Head Water Storage Tank	2	50 KL each	
73	Sand Filter (Pre filter)	1 set		
74	Iron removing and water filtration unit	1 set		

3.2 Laboratory equipment

Sl. No.	Equipment Name	Make	Sl. No.	Model
1	Garber Centrifugal Machine	Optics Technology	1110	
2	Desiccator	NA	NA	NA
3	Screw Gauge(In-process Lab	Optics Technology	6749	
4	Water Distillation Assembly	Steri	12H799	YSU-410
5	pH meter	Optics Technology	6751	
6	Centrifuge	RemiElectrotechnik	GFLC-7942	R-8C
7	Moisture Analyzer	Optics Technology	3756	M3120060
8	Water Bath	York Scientific industries pvt.	1264521	YSI 413 EX
9	Refrigerator	Blue Star	008LPCD001835	GL-405YVQG4/2010
10	Magnetic Stirrer	Merck Specialities pvt.Ltd.	2011113085	SLM-MGS-04
11	TDS meter	Optics Technology	6750	
12	Butyro-Refractometer	Optics Technology	3757	

Sl.	Equipment Name	Make	Sl. No.	Model
1	Weighing balance	Essae Teraok Ltd.	G85209219030	DS-852J series
2	Electronic Balance	Shimadzu	D432908002	BL-220H
3	Compound microscope		M.No.B-1787	RMH-4T
4	Incubator(37°C)	Optics Technology	6744	
5	pH meter	Merck Specialities pvt.Ltd.	07/2012/F/0176	
6	Refrigerator	SUMSANG	RR19J2104SE/TL/2015	
7	Colony counter	York Scientific industries pvt.	12G0720	YSI-150
8	Laminar Air Flow	Hitech products		
9	Portable Autoclave	Optics Technology	6745	
10	Autoclave	York Scientific industries pvt.	1262391	YSI-402
11	Hot Plate	Marko Scientific Works pvt.	10117491	RMP-1219
12	Hot Air Oven	York Scientific industries pvt.	1114853	YSI-431EX
13	Fumigator	Optics Technology	6753	

Source: West Assam Milk Union Ltd.

Eligibility criteria and lending terms and conditions for providing financial assistance to Milk Unions/ Federations, Milk Producer Companies and subsidiaries of NDDB:

Eligibility Criteria

Cooperative Milk Unions/ Federations, Milk Producer Companies and Subsidiaries of NDDB shall be eligible for funding under this scheme on fulfillment of the following conditions:

1. The cooperative Milk Unions / Federations should be functional under a State Cooperative Act with an elected Board. The Milk Producer Companies should be established as a Producer Company under chapter IX-A of the Companies (Amendment) Act 2002 or under relevant chapter of the subsequent Companies Act.
2. The subsidiaries of NDDB would also be eligible for financial assistance for infrastructure activities.
3. Borrowers should have manpower employed on its rolls. Where a common cadre prevails, the State Federation may position officers from the common cadre in the Union as CEO and in Key positions of functional areas like Processing, Milk Procurement, Quality Control, Marketing and Finance/Accounts. Efforts need to be made to position manpower directly on the roll of Milk Unions over a period of time (to be declared by the concerned State Milk Federation).
4. The borrower should have no long term loan overdues outstanding to any financial institution. Financial assistance for activities other than infrastructure can be considered in case NDDB/other financial institution has allowed reschedulement of loans and the borrower is repaying or has undertaken to repay the entire overdue amount in instalments over a pre-committed period. In the event of failure to repay overdue in accordance with the agreed upon schedule, all funding to stop forthwith.
5. The past accounts of the borrower/grantee must have been duly audited.
6. All NDDB funds, directly lent or routed through the Federation or any other agency, must be duly reconciled.

Lending terms & conditions

1. The projects for financial assistance for infrastructure activities should meet minimum viability criteria of ROI=12% and DSCR=1.5 times after providing for 10% sensitivity for both liquid milk sales and milk procurement (or sensitivity analysis feasible for the projects other than dairy infrastructure on a case-to-case basis).
2. In case of cost overrun of more than 10% for the project, the project would need to be revised and submitted to NDDB for re-appraisal.
3. No personnel cost will be considered for funding.

4. Tenure of loan and moratorium

- a. Tenure of loan would be decided based on the projected cash flow of the borrower. Tenure of loan would be a maximum 10 Years, from the date of the 1st release, including moratorium period of a maximum 2 years on repayment of principal only.

5. Release of loan and grant

- a. The borrower/ grantee shall submit quarterly Fund Utilisation Report (FUR) in a prescribed format within one month of the completion of the quarter. The FUR should be duly audited by an independent firm of Chartered Accountants.
 - b. On receipt of the FUR, NDDB will disburse funds as per recommendation of the concerned technical groups, wherever applicable.
6. If disbursement of funds does not start within one year from the date of the sanction, the sanction will lapse automatically.

7. Imprest advance

- a. In case of non-availability of funds with the borrower to carry out planned activities, the borrower may avail Imprest Advance from NDDB equivalent to 75% of loan amount for the proposed activities during a reference quarter as per the approved plan. The release of Imprest Advance will be at sole discretion of NDDB.
- b. Imprest Advance shall be provided as Interest Bearing Imprest Advance having similar rate of interest as applicable to Interest Bearing Loan.
- c. The Imprest Advance shall be entirely utilised by the borrower within the reference quarter and submit audited Fund Utilisation Report (FUR) within one month of the end of the reference quarter.

- d. The un-utilised Imprest Advance will have to be refunded to NDDB immediately at the end of the reference quarter. Otherwise, the borrower will be required to pay additional interest @3% p.a. over and above the normal rate of interest on the unutilised amount from the date of release to the actual date of adjustment/refund. 90% utilisation of Imprest Advance will be considered in order for not attracting this provision.
- e. The borrower shall utilise the Imprest Advance only for the activities under the approved plan. In case of utilisation of the Imprest Advance for the activities other than included in the approved plan, interest @16% p.a. will be charged, on the amount so diverted, from the date of release to the date of settlement and subsequent funding to the borrower/grantee will be stopped.
- f. In the case of partial/ total non-utilisation of Imprest Advance during the reference quarter, the eligibility of the borrower for further advance will be at the discretion of NDDB.

8. Repayment terms:

- a. Interest
 - i. The rate of interest will be floating rate and will be communicated from time to time.
 - ii. Interest shall be payable monthly. The first payment of interest shall be calculated from the date of release at the prevailing rates and shall be payable on 1st day of the subsequent month.
 - iii. The monthly interest shall be calculated on daily product basis without compounding. The interest amount so calculated shall be payable on the 1st day of the subsequent month.
 - iv. In the event of failure to repay the loan instalments on the due date, the unpaid amount shall attract additional interest @ 3% per annum over and above the normal rate of interest from the scheduled date of repayment till the actual date of repayment.
- b. Principal
 - i. Principal is to be repaid in monthly installments after completion of moratorium period, if any, within the loan tenure. Moratorium period shall be calculated from the date of the first disbursement of loan.
 - ii. Monthly principal repayment instalment shall be calculated on total loan sanctioned for the project. Repayment of the first

instalment of principal shall be due on the 1st day of the following month after the expiry of the moratorium period. The subsequent instalments of principal repayment shall continue thereafter on the 1st day of every month.

9. Commitment charge

- a. The borrower shall provide a quarterly draw-down schedule for every project, which will be part of the sanction letter.
- b. In case, disbursement is less than 80% of the draw-down schedule for a particular quarter, a commitment charge of 1% p.a. on the cumulative difference between the projected draw-down schedule and actual disbursement will be levied from the beginning of the next quarter till the differential amount is withdrawn.
- c. Release of imprest advance will also be part of the draw-down schedule.
- d. A communication of the commitment charges will be sent to the borrower on quarterly basis and the borrower shall pay within 15 days of receipt of communication.
- e. On the request of the borrower and based on the actual utilisation, the draw-down schedule may be revised once in a financial year. The borrower shall have to submit such request for revision in draw-down schedule by 31st December of the previous financial year. Such request would be allowed maximum twice for any project.

10. Security coverage

- a. All loans will be secured (first charge) by way of hypothecation of movable and mortgage of immovable assets, unless Chairman, NDDB approves specifically to waive this condition. Funding for other activities to be considered on execution of Loan/Grant Agreement supported by Board resolution.
- b. The security provided by the borrower for loan should be minimum 1.5 times the loan amount. For any shortfall, the borrower may furnish Bank Guarantee or if the Federations or sister concern agrees, mortgage their immovable assets in favour of NDDB to cover the shortfall.
- c. In case (b) above is not feasible, and the security coverage is at least 1.1 times and the borrower's financials and operations are sound, it can be accepted with specific approval of Chairman, NDDB if the borrower either obtains counter guarantee from Federation/ sister

concern (acceptable to NDDB) or provide escrow arrangement for securing repayment of loan through its banker.

11. Documentation

- a. The following documents shall be required from the borrower in respect of immovable property such as land & buildings:
 - i. Memorandum of Entry (equitable mortgage by way of deposit of title deeds).
 - ii. Undertaking (for existing and future assets)
 - iii. Declaration
- b. The following documents shall be required from the borrower in respect of movable property such as plant & machinery, spares, tools, stocks, etc:
 - i. Letter of Hypothecation
- c. The following documents shall be required to be executed by the borrower:
 - i. Demand Promissory Note
 - ii. Letter of Continuity
 - iii. Irrevocable General Power of Attorney
 - iv. Any additional security document or security requirement as and when required

12. Loan for EIA contribution for VBMPs component under NDP I

The pattern of funding under NDP I for capital items under Village Based Milk Procurement Systems (VBMPs) is 50% grant-in-aid and the remaining 50% funds are to be contributed by the End Implementing Agency (EIA). NDDB, on request of the EIA, provides loan to the extent of 80% of EIA contribution for these capital items. Such proposals will continue to be considered with the terms and conditions as given below:

- a. The project must achieve DSCR of 1.5 times.
- b. The loan is to be repaid in a period of maximum 8 years without any moratorium.
- c. The assets being financed shall be hypothecated to NDDB as security for the loan.

- d. The EIA shall execute documents including Loan Agreement, Hypothecation Deed, Demand Promissory Note and Letter of Continuity or any other document as required by NDDB.
- e. The EIA shall provide a Board Resolution agreeing to the terms and conditions of the sanction.

13. Transparency in purchase procedures

- a. Purchase process for the approved project should be conducted in a transparent manner. Roles and responsibilities of officers involved in the purchase process must be clearly defined through official notification/ orders.
- b. Confidentiality must be observed in the purchase process. No information should be shared with any person who is not involved in the decision making process relating to any purchase. Process of bid evaluation shall be confidential until the contract award.
- c. Post tender opening, all correspondence (including any clarifications) with bidders should be in writing only.
- d. CVC Guidelines must be followed in respect of Negotiations. Complete records of all discussions/ correspondence with the bidders must be maintained.

14. Other conditions

- a. The borrower/grantee shall update all monthly information data by the 15th of the following month, quarterly information within a month of the succeeding quarter and annual information by 30th September next year, as specified by the NDDB for the internet based dairy information system (IDIS). In the event of failing to meet this condition, the NDDB reserves the right to suspend funding.
- b. The borrower/grantee shall regularly (monthly/quarterly) provide information to NDDB as per format attached on key parameters related to the following:
 - i. DCS/MPI/MPP organisation
 - ii. Milk producer membership
 - iii. Milk procurement
 - iv. Sale of milk and milk products
 - v. Cattle feed supply
 - vi. Technical input services

- c. Audit of the annual accounts of the borrower shall be completed within six months after the closure of the financial year and a copy of the audited balance sheet shall be forwarded within one month thereafter. This would facilitate NDDB suggesting implementation of various measures which would help the borrower in achievement of the desired improvement / efficiency.
- d. The Board of Directors of the borrower shall review the progress and implementation of the project on a quarterly basis.
- e. The borrower shall permit the NDDB and its authorized representatives to carry out technical, financial and legal inspections both during the construction and operation periods of the project and to inspect its records, registers and accounts.