AERC REPORT 168

Assessment of the Status of Dairying and Potential to Improve Socio-Economic status of the Milk Producers and Convergence of all Central & State Schemes at District level in Gujarat

S.S. Kalamkar, H. Sharma & M. Makwana

All India Study Coordinated by
Agro-Economic Research Centre
Sardar Patel University, Vallabh Vidyanagar (Gujarat)

Agro-Economic Research Centre
For the States of Gujarat and Rajasthan
(Ministry of Agriculture & Farmers Welfare, Govt. of India)
Sardar Patel University
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Foreword

Gujarat state has made rapid strides in its agriculture sector including the agribusiness sub sector during recent past. Agriculture in Gujarat has been transforming over time from traditional to high value added commercial crops which can be seen from a shift in its cropping pattern from food grains crops to high value cash crops such as oilseeds, fruits, vegetables and spices. The trend in shifting of cropping pattern paved ways for many ancillary industries in the areas of processing, packing, storage, transformation, etc. Agricultural growth in the state is favored by the prevailing eight agro-climatic zones, enterprenuring farming community, policy support from the government, wealth of livestock population, extended coast line and contribution by the agricultural scientist and dedicated NGOs.

About two third of population of Gujarat lives in rural areas and depends for its livelihood on agriculture and the rural non-farm sector that is interlinked with agriculture. Gujarat is traditionally known for its institutions like farmers' cooperatives and other state originations. The Amul model has helped India to emerge as the largest milk producer in the world. Gujarat is a leading state in terms of terms of its quality milch animals and milch production. Gujarat harbours some of the elite breeds of livestock like Gir and Kankrej, Mehsani, Surti, Jafrabadi and Banni buffaloes, Kathiwadi horses, etc. which have high milk yields. Gujarat ranks third position in terms of milk production in the country with the milk production of 122.62 lakh tones which is about 8 per cent of entire country. Major share of motive power of agriculture comes from livestock. Livestock keeping- an integral part of farming system as land, labours and water can be efficiently utilized. An intensive animal vaccination program was launched in all the villages at the '*Krishi Mahotsav'* held since four years, so as to focus on disease management and the rearing of healthy livestock In addition to vaccinating the livestock, animal health camps were also held.

There are plethora of state and central government schemes that provide forward and backward linkages for promotion of dairying involving milk producers. Apart from the government programs, the state milk federations and the milk unions have evolved a variety of schemes that provide incentives to the milk producers. Given the diversity in social and economic contexts, district level milk unions have drawn up schemes to promote dairy development, which are funded through various ingenious ways (partly through profits generated in milk business, partly through token cess/user fee or through charity (synonymous with welfare). Some anecdotal evidence

suggests that the Banaskantha union of Gujarat had evolved some 20 different schemes to their producer members. Needless to say, the schemes are intended to provide impetus for milk production. Convergence of different state and central governments programs in a given geography provide forward and backward linkages to any development program enhancing efficiency in implementation. Convergence of different programs also enhances sustainability. In view of same, the Ministry of Agriculture and Farmers Welfare, Government of India entrusted this study to our Centre. The study is based on both primary and secondary level data. The study came out with important and relevant policy implications which would help to enhance efficiency of implementation benefitting the milk producers.

I am thankful to authors and their research team for putting in a lot of efforts to complete this excellent piece of work. I also thank the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India for the unstinted cooperation and support. I hope this report will be useful for policy makers and researchers.

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Team Leader

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List of Abbreviations

APEDA	-	Agricultural and Processed Food Products Export Development Authority
ASMM	-	Area Specific Mineral Mixture
A.I.	-	Artificial Insemination
A.I.C.	-	Artificial Insemination Centre
Av.	-	Average
BANAS DAIRY	-	Banaskantha District Cooperative Milk Producers' Union Limited
BDO	-	Block Development Officer
BEN	-	Beneficiary
BRGF	-	Backward Regions Grant Fund Programme
CB	-	Cross Breed
DADF	-	Department of Animal Husbandry, Dairying and Fisheries, New Delhi
DCS	-	Dairy Cooperative Society
DES	-	Directorate of Economics and Statistics
DM	-	Dry Matter
DPAP	-	Drought Prone Area Programme
EIA	-	End Implementing Agency
FDG	-	Focus Group Discussion
GCA	-	Gross Cropped Area
GCMMF	-	Gujarat Co-operative Milk Marketing Federation Limited
GDP	-	Gross Domestic Product
GIA	-	Gross Irrigated Area
GNP	-	Gross National Product
GOG	-	Government of Gujarat
GOI	-	Government of India
GRO	-	Grievance Redressal Officer
GVA	-	Gross Value of Agriculture
GVO	-	Gross Value of Output
ha	-	Hectare
HH/hh	-	Household
I.I.	-	Irrigation Intensity
IDA	-	International Development Association
INAPH	-	Information Network for Animal Productivity and Health
ISP	-	International Organization for Standardization
kg	-	kilograms
KVK	-	Krishi Vigyan Kendra
KM	-	Krishi Mahotsav
LTPD	-	Litres per day
LRP	-	Local Resource person
mha	-	Million hectares
MOA	-	Ministry of Agriculture
MU	-	Milk Union (district level)
mt	-	Metric Tonnes
NA	-	Not Available
NBEN	-	Non-Beneficiary
NCDFI	-	National Cooperative Dairy Federation of India
NDDB	-	National Dairy Development Board
NDP	-	National Dairy Plan

Nos	-	Numbers
OF	-	Operation Flood
PCs	-	Producers Company
PDCS	-	Primary Dairy Cooperative Society (village level)
PDO	-	Project Development Objective
PMC	-	Project Management Cell
PMU	-	Project Management Unit
Prodvty.	-	Productivity
PSC	-	Project Steering Committee
RBP	-	Ration Balancing Programme
SC	-	Scheduled Caste
SNF	-	Solid Not Fat
ST	-	Scheduled Tribe
SUMUL	-	Surat Milk Union Limited
SWOT	-	Strength, Weakness, Opportunity and Threat
TE	-	Triennium Endings
VAP	-	Village Awareness Programme
Y	-	Yield

(A) Institution / Farms etc.

V.D	-	Veterinary Dispensaries
F.A.V.C.	-	First Aid Veterinary Centre
DISP	-	Dispensary
AVI	-	Animal Vaccine Institute
ICDP	-	Intensive Cattle Development Programme
IPDP	-	Intensive Poultry Development Project
ISDP	-	Intensive Sheep Development Project
ICBP	-	Intensive Cattle Breeding Programme
CBF	-	Cattle Breeding Farm
PBF	-	Poultry Breeding Farm
SBF	-	Sheep Breeding Farm
Dist.	-	District
B.K	-	Banaskantha
S.K	-	Sabarkantha
P.M	-	Panchmahal
GDDC	-	Gujarat Diary Development Corporation
L.I. Centre	-	Livestock Inspector Centre

(B) Words related to Budget

Sec.	-	Section (Section -I , Section - II)
CFT	-	Coming for First Time
Cont/ Conti	-	Continuous
Co on AH	-	Capital Outlay on Animal Husbandry
Co on DD	-	Capital Outlay on Dairy Development
C.C	-	Cent age Charges
S.C.A	-	Special Central Assistance

(C) Plan / Report / Programmer/ Scheme

SNP	-	Sate Normal Plan
TASP	-	Tribal Area Sub Plan
SCP	-	Special Component Plan
BADP	-	Border Area Development Plan

CSS	-	Centrally Sponsored Scheme
ADP	-	Annual Development Plan
OFP	-	Operation Flood Programme

(D)

DAH	-	Director of Animal Husbandry
JD	-	Joint Director of Animal Husbandry
DD	-	Deputy Director of Animal Husbandry
AD	-	Assistant Director of Animal Husbandry
VO	-	Veterinary Officer
Supdt	-	Superintendent
Sr	-	Senior
Jr	-	Junior
CL	-	Clerk
CL	-	Class

(E) Weight / Measurement etc.

Kg	-	Kilogram
M.T.	-	Metric Tone
Km	-	Kilometer
Hect. Or Hec.	-	Hectare
No.	-	Number
Rs.	-	Rupees

(F) Diseases / Vaccine

R.P.	-	Rinderpest
F.M.D.	-	Foot and Mouth Disease
T.B.	-	Tuberculosis
H.S.	-	Hamorrhagic Septicemia
B.Q.	-	Black Quarter
E.T.	-	Enterotoxaemia
F.D.R.D.	-	Freeze Dried Ranikhet Disease

(G) Others

A.I	-	Artificial Insemination
L.N. 2	-	Liquid Nitrogen
S.C.	-	Scheduled Caste
S.T.	-	Scheduled Tribe
SF/MF/AL	-	Small Farmer, Marginal Farmer, Agricultural Laborer
A.H.	-	Animal Husbandry
M.V.Sc.	-	Master in Veterinary Science

Executive Summary

Animal husbandry in India is closely interwoven with agriculture and obviously plays an important role in the national economy and also in the socio-economic development of millions rural households. Livestock rearing is one of the most important economic activities in the rural areas of the country providing supplementary income for most of the families dependent on agriculture. In many cases, livestock is also a central component of small holder risk management strategies. Apart from providing a subsidiary income to the families, rearing of livestock such as cattle, buffaloes, sheep, goats, pigs, poultry etc. is a source of protein supplement to the family members of the household in the form of milk, eggs and meat. This sector has created a significant impact on equity in terms of employment and poverty alleviation as well. In fact level of rural poverty is significantly higher in states where livestock sector is underdeveloped. This is the sector where the poor contribute to growth directly instead of getting benefit from growth generated elsewhere.

Importance of livestock in general and dairying in particular hardly needs emphasis in a country like India. It is one of the important sub-sectors of agriculture, next only to field crops. The growth of the dairy sector during the last three decades has also been impressive and country has emerged as the largest producer of milk. This has not only placed the industry first in the world, but also represents sustained growth in the availability of milk and milk products for the burgeoning population of the country.

Contribution of Livestock Sector to the National Economy

India is endowed with a significant proportion of the world's livestock population. India stands at first position in terms of cattle and buffalo population in the world, accounts for 14.7 per cent and 58 per cent share respectively of world cattle and buffalo population, most of which are milch cows and milch buffaloes. This sector provides regular employment to 9.8 million peoples in principal status and 8.6 million people in subsidiary status. More importantly, women constitute 71 percent of the labour force in livestock farming.

Livestock sector of India has grown tremendously in the past five decades. From a subsistence activity until 1970s, animal husbandry has grown to emerge as the largest agricultural activity accounting for over one fourth of the agricultural gross domestic product. Its value of output now equals to that of food grains. By controlling 64 per cent of the bovine, 70 per cent of ovine, 73 per cent of caprine and 70 per cent of the poultry population, the small holders make a substantial contribution to livestock production. Animal husbandry and dairying sector contributes about 26.9 percent of the gross value added from total agriculture, forestry and fishing sectors and its overall contribution to the total GVA of the country was about 4.4 per cent in 2014-15, at current prices. The dairy subsector occupies an important place in the agricultural economy of India as milk is the second largest agricultural commodity in contributing to Gross National Product,

next only to rice. Among the sub-sectors of livestock sector, dairy and meat group (poultry meat) are high growth sectors and is reflected in the growing importance of the contribution of these sub-sectors in the livestock economy. While the two third of total value of output from livestock sector during 2013-14 was accounted by milk group followed by one fifth share by meat group. The use of dung as fuel also significantly contributed in total value of out of livestock sector by 6.64 per cent.

Planwise Outlay and Expenditure under Dairying at National Level

Animal husbandry and dairying programme have attained considerable importance in various Five Year Plans (FYP) and several schemes/projects have been taken up by the States and the Centre for the development of this sector. Animal husbandry and dairying is a state subject, and bulk of the investment for their development comes from the state governments. The central government contributes about 10 per cent to the total investment through central and centrally-sponsored schemes as to supplement state governments' resources. In absolute terms, total outlay for animal husbandry and dairying increased over the plan periods. However, as per cent of the total plan outlay, the share of animal husbandry and dairy development declined from 1.1 per cent during first FYP to 0.4 per cent during VI FYP and further to 0.3 per cent in the subsequent FYPs. As proportion of the total outlay for the agricultural sector, the share of livestock fell from 11.2 per cent in II FYP to 3.6 per cent in IX FYP but increased to 9.3 per cent during XI FYP. The share of livestock in the planned investment has never been commensurate with its contribution to GDP or Ag GDP. There has been a large gap between planned and actual expenditure in case of animal husbandry in most plan periods, except during Xth FYP. Thus, despite of its rising share in agricultural GDP, the livestock sector has not received as much policy attention as it deserves. Its share in the total public spending on agricultural and allied activities has never been in congruence with its income contribution. In absolute terms, spending on the livestock sector increased by about 27 percent between TE 1992-93 and TE 2008-09, but as a share of the total spending on the agricultural sector it declined continuously, from 13.6 percent in TE 1992-93 to 4.6 per cent in TE 2008-09. Livestock expenditure as a proportion of the value of output of livestock also declined from 3.6 per cent to 2.3 per cent during this period. For faster growth and holistic development of the livestock sector, the public spending on livestock has to be raised and prioritised, taking into consideration the emerging challenges and regional imbalances. During the 1990s and also earlier, the allocation of livestock investment was biased towards dairy development, which, however, was corrected to a large extent during the 2000s. The share of dairy development in total livestock expenditure fell from about 40% in the 1990s to 25 per cent towards the late 2000s.

Dairy Development in India

Dairy development in India has been acclaimed as one of the most successful development programmes under the world's largest integrated dairy development programme 'Operation Flood'. India ranks first in the

world in milk production, which has increased to 155.5 million tonnes in 2015-16 from 17 million tonnes in 1950-51. Nearly 51 per cent of milk production is contributed by buffalo followed by cow (45%) and goats (4%). Most of the milk is produced by animals reared by small, marginal farmers and landless labourers. It has been witnessed over the years that the stability in dairy income is far stronger than the income realised from agricultural activities. While more than 75 million households in India are engaged in dairy farming, about 15.4 million farmers have been brought under the ambit of 1,60,000 village level dairy corporative societies up to March 2014. The dairy co-operatives have made good impact on the social and economic life of the people in the state. The impact of the White Revolution can be seen in the villages in the form of generation of funds for community development and social welfare, creation of self-employment opportunities, ensuring distributive justice and removal of the evil of untouchability. This silent social revolution has been relatively smooth and hence even unnoticed by the conservative community.

Cooperative Dairy Sector in India

Dairy cooperatives have played an important role in improving farmers' access to markets. During the last two and half decades, the number of dairy milk cooperatives in India has increased significantly. Between 1980-81 to 2015-16, the number of village dairy cooperatives has increased from 13284 to 170992 with an associated increase in dairy members from 1.75 million to 158.35 million and milk procured from less than 1.0 million tonne to 15.53 million tonnes (equivalent to 10% of total milk). During 2015-16, there were about 5.01 million women members in dairy cooperatives, while numbers of all women dairy cooperatives have increased to 32092 across the country (18.77 % to total). Out of the total milk procured, about 75.42 per cent milk is sold as liquid and the rest is converted into value added products. The dairy cooperatives are federated into unions at the district level & further into federations at the state level.

Despite of significant growth at national level, cooperatives have remained centred on a few states. Therefore, distribution of benefits has been uneven. Dairy cooperatives are very strong in Gujarat and adjoining regions. Gujarat with the share of 8 per cent in the country's milk production accounts for about 11 per cent the total village level cooperatives, 21.80 per cent of the members and 42 per cent of the milk procurement (2015-16). In terms of procurement, Karnataka stands next (15.23 %) followed by Maharashtra (8.56 %), Rajasthan (6.12 %) and Tamil Nadu (7.14 %). Together, these states including Gujarat accounts for more than three fourth of the total milk procurement, which is more than twice of their share in milk production. These states also account for close to three fourth of the processing capacity in the cooperative sector.

Growth and Compositional Changes in Livestock in India

India holds more than a quarter of world's bovine population. The livestock population in the country has increased significantly over the period

of time. It has increased from 292.8 million in 1951 to 512.1million in 2012, while the total livestock in the country showing overall decrease in 2012 over 2007, i.e. from 529.70 million in 2007 to 512.1 million in 2012. There were some changes in the composition of livestock at national level at broad groups like bovine, ovine and other livestock during the last six decades. The proportion of bovine population (includes cattle and buffalo) declined from nearly 68 per cent in 1951 to 58.5 per cent in 2012, while the proportion of ovines (sheep and goat) increased from about 29.5 per cent in 1951 to 39.11 per cent in 2012. The share of other animals has also decreased from 2.7 per cent to 2.4 per cent during corresponding period. The population of bovine stock consisting of cattle and buffalo increased at zero rate during 1992-1997 and then registered decline in 2003, increase in 2007 and then again declined in 2012. Between the two species, buffaloes stock increased much faster rate than of cattle population indicating the rising importance of buffaloes because of higher price for buffalo milk and substitution of drought animals with mechanical power in the country. The livestock density per hectare of net sown area has increased from 2.45 in 1951 to 3.63 in 2012. Thus, trends in the composition of bovine and milch animal stock over the years indicate that the breedable cow and buffalo population is important from the milk production point of view. The composition of bovine breeding stock has improved in terms of increased share of in-milk animals in breeding stock as well as in total adult females. While the adult females among cattle account for about 38.4 per cent, while that of buffalo, same was 52 per cent. The rise in buffalo numbers is seen even more clearly in terms of ratio of buffalo to cows in the stock of adult females, or the milch animals. The ratio of milch buffalo to milch cows increased from 0.39 in 1951 to 0.79 in 1997 and then declined to 0.74 in 2012. Thus trends in size and composition of the bovine stock in the country show that the shift is taking place in favour of the bovines as milch animals.

Across the India states, livestock population has increased substantially in Gujarat (15.36%), Uttar Pradesh (14.01%), Assam (10.77%), Punjab (9.57%) Bihar (8.56%); Sikkim (7.96%), Meghalaya (7.41%), and Chhattisgarh (4.34%) in 2012 over 2007. There are significant regional variations in total livestock and bovine population. The highest livestock population was recorded in UP, followed by Rajasthan, AP, MP and Bihar which together accounts for one half of the total livestock in the country. In case of bovine stock, Utter Pradesh accounts for highest share of 18.38 per cent of total bovine stock in India (2012) followed by Rajasthan, MP, Bihar and Gujarat.

Growth in Milk Production and Productivity in India

Milk production in India increased from 17 million tonnes in 1950-51 to 155.5 million tonnes in 2015-16 and expected to reach 160 million tonnes in 2016-17). However, all the states are not doing well and the growth in milk production varies widely in various regions and among states within the regions. The western and central Indian states have done well in terms of growth in milk production during 2015-16, while the North eastern and eastern states, due to their regional peculiarities, are trying to catch up. In case of milk procurement, during the period from 2009-10 to 2015-16, the

central and western Indian regions have done well in milk production at 8.7 per cent and 7.58 per cent, respectively. The sector is witnessing more action from private dairies, which are likely to continue, especially in the area of milk procurement. They are now shifting their strategies to source milk directly from farmer and not through contractors. Simultaneously, they are continuing their focus on production and marketing of value added milk and milk products.

Though India stands at first position in terms of cattle and buffalo population in the world, the productivity of dairy animals in India is very low as compared to other countries. The reason cited for this is inappropriate feeding as well as inadequate supplies of quality feeds and fodder in addition to the low genetic profile of the Indigenous breeds. It is not be possible to achieve higher productivity in a milch animal by merely increasing its genetic potential, due attention needs to be given on proper feeding of milch animal.

Per Capita Milk Availability in India

The per capita availability of the milk in the country has also increased significantly from 130 grams/day in 1950-51 to as increased to 337 gram per day in 2015-16 as against the world average of 294 grams per day during 2013. This represents sustained growth in the availability of milk and milk products for our growing population. However, there are large interregional and interstate variations in milk production as well as in per capita availability in India. The largest producer of milk is Uttar Pradesh which produces 17.0 per cent of the total milk production in the country followed by Rajasthan (11.9) and Gujarat (7.9 %). About 70 percent of national milk production comes from the major eight milk producing states, viz. Uttar Pradesh, Rajasthan, AP, Gujarat, Punjab, MP, Maharashtra and Haryana. However, only 9 States were having per-capita availability more than the national average of 307 gm/day in the year 2013-14. The major milk-producing states in the country have good resource endowment and infrastructure, while eastern states are lagging behind in terms of dairy development. The country's estimated demand for milk is likely to be about 155 million tonnes by 2016-17 and around 200 million tonnes in 2021-22. To meet the growing demand, there is a need to increase the annual incremental milk production from 4 million tonnes per year in past 10 years to 7.8 million tonnes in the next 8 years (210 million by 2021-22). To meet the growing demand, it is necessary to maintain the annual growth of over 4 per cent in the next 15 years. It is therefore, imperative to increase productivity of milch animals.

Status of Availability of Feed and Fodder in India

Feed accounts for 65-70 per cent of the total cost of production and maintenance of the animals. There is a direct relation between the nutritional status of the animals and the type of feed feeded. For getting the best results, feeding of animal needs planned, scientific, practical as well as economical approach. The major sources of fodder supply are crop residues, cultivated fodder and fodder from common property resources like forests, permanent

pastures and grazing lands. At present, there is huge gap between demand and supply of animal feed and fodder. The total area under cultivated fodders was 9.19 million hectares in 2012-13 (2.8% of GCA), while share of area under permanent pastures and other grazing land was hardly 3.1 per cent. The increased growth of livestock particularly that of genetically upgraded animals, has further aggravated the situation. Additionally, the quality of the available fodder is also poor, being deficient in energy, protein and minerals. The pattern of deficit varies in different parts of the country. For instance, the green fodder availability in Western Himalayan, Upper Gangetic Plains and Eastern Plateau and Hilly Zones is more than 60 per cent of the actual requirement. In Trans Gangetic Plains, the feed availability is between 40 and 60 per cent of the requirement and in the remaining zones, the figure is below 40 per cent. In case of dry fodder, availability is over 60 per cent in the Eastern Himalayan, Middle Gangetic Plains, Upper Gangetic Plains, East Coast Plains and Hilly Zones. In Trans Gangetic Plains, Eastern Plateau and Hills and Central Plateau and Hills, the availability is in the range of 40-60 per cent, while in the remaining zones of the country the availability is below 40 per cent. The regional deficits are more important than the national deficit, especially for fodder, which is not economical to transport over long distances. In animal feed supply, coarse cereals have a major role and these account for about 17 per cent of the total cereals (However, in India their use is mainly for direct consumption mostly by poor in the villages. Compound feed plays an important role in improvement in milk yields of cattle and buffalo by offering balanced diet, while current production amounts are sufficient to feed only about 7 per cent of the total breedable animals in India.

Veterinary Infrastructure and Manpower Availability in India

Improving animal health and veterinary services has been a priority on India's livestock development agenda. As its share in total spending increased gradually, veterinary infrastructure and manpower has grown considerably. Between 1982 and 2010, the number of veterinary institutions (hospitals, polyclinics, dispensaries, stockman centres and mobile dispensaries) increased 1.6 times and the number of field veterinarians by almost three times. The number of livestock units per veterinarian declined from more than 15,540 in 1982 to less than 7,000 in 2010. But there is considerable regional variation in veterinary infrastructure and manpower. Livestock units per veterinary institution are high in some of the poorest states such as Jharkhand, Bihar, Madhya Pradesh and Chhattisgarh. High income states such as Punjab and Haryana, on the other hand, have relatively better infrastructure and less number of livestock units per veterinary institution. The delivery of veterinary services, however, remains weak. Shortage of manpower, poor supplies of medicines, vaccines and equipment are often-cited reasons for inefficiency in the delivery of services.

Dairy Development in Gujarat

Gujarat has been consistently clocking impressive agricultural growth rates. This has been possible because the government has focused on improving not only irrigation, quality of seeds and power but also tertiary

sectors like animal husbandry. The growth of the animal husbandry sector has resulted not only in increased milk production but has also provided a boost to the overall agro-economy of the state. The livestock sector in Gujarat has achieved a remarkable success over the period due to collective efforts of government organisations, non-government organisation and the milk producers. Gujarat is one of the leading states in terms of milk production. The cooperative sector has been the key driver of the tremendous increase in Gujarat's milk production. It is no surprise that Gujarat, the birthplace of India's white revolution, has a thriving milk cooperative sector. The largest dairy co-operative in India, Amul, is based in Anand, Gujarat. "Amul" pattern is well known and accepted by all the states in our country and some of the other countries also.

Role of Dairy Sector in State Economy of Gujarat

Animal husbandry has been playing a significant role in boosting the agrarian economy of the state. It is not only a subsidiary source of livelihood in rural Gujarat, it is a major economic activity, especially in the arid and semi-arid regions of the state. Thus, this sector plays a vital role in the rural economy of the state and has significant impact on employment generation for marginal, sub-marginal and landless farmers. Out of about 102 lakhs total household, about 43 lakh families keep livestock in Gujarat as a primary or secondary source of income. Dairy industry in Gujarat state is well-established at present and is taken as a model for replicating in other states of the country. Bullocks and milch animal are the main support of agricultural operations and also a major source of supplementary income to the marginal and small farmer and landless agricultural labourers. On the other hand, the by-products of agricultural produce happen to be the chief ingredients of food for cattle and milch animals. Farmers are in a position to follow animal husbandry and dairying as an adjunct to cultivation. The requisite labour for keeping dairy animals is also available from within the farmer's family. A very large portion of female labour force of cultivator households which otherwise have suffered from disguised unemployment, gets self-employment in several occupations allied to cattle and buffalo rearing.

Trend in Contribution of Dairy in GSDP

Animal husbandry plays a vital role in Gujarat's rural economy, while contributing 5.32 per cent to the state GSDP in 2013-14, while the contribution of agriculture to total GSDP was 16.83 per cent. The contribution of agriculture and livestock to total GSDP was estimated to be 22.15 per cent, while contribution of livestock to agriculture and livestock together was around 24 per cent. Thus, one fourth of the agriculture sector output comes from livestock sector Milk contributes to around 20 per cent to the agricultural GDP of Gujarat and is one of the biggest sectors for supporting livelihood in the state. Livestock output at constant prices was reported at Rs. 141 billion in 2011-12 (at constant prices), of which milk contributes about 86 per cent or Rs. 122 billion.

Composition of Livestock in the State

Gujarat State possesses a remarkable position in the country so far as livestock wealth and development are concerned. The Nineteenth Livestock Census (2012) of India has placed total livestock population at 512.1 million, out of which, 27.12 million livestock (5.3 %) population was in the state of Gujarat. The state accounts for 5.23 per cent share in cattle population, 9.55 per cent of buffalo population, 2.62 per cent sheep population and 3.67 per cent goat population of the country. The significant share of donkeys (12.18 %) and camels (7.80 %) in national stock has also been recorded (2012). There is an increase in livestock population over 2007 to 2012, registering a positive growth of 15.36 per cent in the total number of animals of various species. Among the species, buffalo contributes highest share (38.28%) in total livestock population followed by Cattle (36.80%), Goat (18.28 %) and Sheep (6.30 %), besides marginal contribution is attributed by other livestock species such as Camel, Mules, Donkeys, Horses and Ponies. The females among the indigenous cattle, crossbred and buffalo population numbered 5.03 million, 1.73 million and 9.6 million, respectively. There is an increase of 15.36 per cent in livestock population in 2012 over 2007. The highest growth in population was recorded in population of cattle (25.18 %) followed buffalo (18.37 %) and goat (6.88 %), while sheep population registered decline.

The share of cattle population in total livestock population has declined from 44.6 per cent in 1951 to 36.8 per cent in 2012, while share of buffalo population has increased considerably (21% to 38.3%). In absolute term, the rate of increase in buffaloes population (313 %) is much faster as compared to rate of increase in cows population (87 %). In case of small ruminants, sheep population has increased by 8.6 per cent while goat population declined by 6 per cent in 2012 over 1951. Total livestock population in Gujarat has increased by 127 per cent during last six decades period.

Banaskantha (9.38 %) has the highest number of livestock population followed by Panchamahal (7.41%), Kuchch (7.14%), Sabarkantha (6.8%), Dahod (6.41%) and Vadodara (6.13%). These six districts together accounted for 44 percent of total livestock population in the state in 2012. Banaskantha has the highest number of in-milk buffaloes and cows followed by Sabarkantha and Mehsana district. Sabarkantha has the highest number of in-milk crossbreds and Kachchh, the highest in in-milk indigenous cattle. In-milk indigenous cattle like Gir are predominantly spread across Saurashtra region covering Rajkot, Junagadh and Bhavnagar districts of Gujarat, whereas Kankrej are found mostly in northern Gujarat and Kachch region. The highest livestock and bovine animal density was recorded in Dahod.

India has a total 137 breeds of domesticated animals, of which about 18 breeds, including some internationally recognised ones, are available in Gujarat. The State has high-quality, high-yielding breeds of cattle and buffaloes. Gir and Kankrej breeds in cows, and Mehsani, Jafarbadi and Surti breeds in buffaloes were known for their high milk yielding capacity. Gir and kankrej breeds are dual purpose breeds. The Gir breed is found in Amreli, Bhavnagar, Junagadh, Jamnagar, Rajkot and

Surendranagar districts. In rest of the districts of Gujarat, Kankrej breed is found along with a Non-descriptive breed of the total number of buffaloes. The Surti breed is found in Bharuch, Kheda, Surat, Vadodara, Panchmahals etc, whereas the Mehsani breed is found in Mehsana, Sabarkantha, Banaskantha and Ahmedabad. In respect of the population of buffaloes in the state, Kheda district ranks first, followed by Mehsana and Sabarkantha district. With the recognition of the Banni breed by the National Bureau of Animal Genetic Resources (NBAGR), Gujarat is now proud home to four major buffalo breeds of the total 12 recognised breeds in India.

Planwise Outlay and Expenditure under Dairy Development in Gujarat

The outlay and expenditure on dairy development has also increased over the period of time. However, percentage share of expenditure on dairy development to total expenditure has declined considerably. As compared to around 42-45 per cent share of total expenditure on dairy development during 1974-1980, it has declined to 23-28 per cent during the last one decade. The proportion of expenditure to outlay on dairy development was much better during the corresponding period, which was recorded to be around 70 per cent in 2015-16. During the year 2015-16, out of the total expenditure of Rs. 6534.48 lakh incurred on dairy development, about 96.64 per cent (Rs. 6314.90) was incurred on Direction and Administration head. While out of Rs. 21394.77 lakh expenditure incurred on Animal Husbandry, Rs. 17104.39 was spend together on heads related to dairy animal development (veterinary services and animal health, cattle and sheep development, feed and fodder development). Under non-plan section, total Rs. 26629.12 lakh was spent on animal husbandry and dairy development in the state. Besides, plan and non plan expenditure spending by state government, the additional support has been provided by the Central government under Rastriya Krishi Vikas Yojana and Central sponsored schemes for animal husbandry and dairy development. During 2015-16, Rs. 3745.18 lakh expenditure was incurred under RKVY, while Rs. 3274.77 was spent through various centrally sponsored schemes.

Growth in Milk Production and Productivity in Gujarat (Regional trend)

Gujarat is a leading state in terms of its quality milch animals and milk production. Gujarat ranks third among the milk producing states in India, achieving 122.62 lakh MT in 2015-16, which has increased from the 30.9 lakh tonnes during 1983-84. The numbers of initiatives were taken by the government which could help in improving the milk productivity over the period. There is a consistent increase in the production of milk over the years. The milk production has increased from 5.32 million tonnes in 2000-2001 to 12.26 million tonnes in 2015-16 registering a growth of 131 per cent over base year. Except for the period of drought from 1986-87 to 1988-89, milk production in the state has been increasing continuously. The milk production declined during 1986-1989 due to the worst drought situation in the state. The rate of increase in milk production was faster

than rate of increase in state's human population. As a result, the per capita availability of milk in the state increased from 321gms/day in 2003-04 to 506 gm/day in 2015-16.

Out of total milk production, about 53.11 per cent of the milk production is contributed by Indigenous Buffaloes followed by 22.94 per cent by indigenous cattle. The crossbreed cattle contribute 21.6 per cent of the total milk production in the state whereas Goat contributes 2.36 per cent to total milk production. The productivity of cows and buffalo in term of daily milk yield is increasing continuously. Despite of increase in milk yield, there is still a wide scope for improving milk yield of milch animals.

Out of total bovine milk production, 55.4 per cent accounts buffalo milk, 23.5 per cent share accounts for indigenous cows and remaining 22.1 per cent was of cross breed cows. The significant growth in population of in milk bovine animals supported by increase in milk yield of bovine animals which has increased (bovine milk production) by 135 per cent in 2015-16 over 1983-84. The share of cross bread cows in total milk production has increased while share of indigenous cows and buffalo has declined during last one and half decade. The corresponding share was 66.75 per cent, 28.19 per cent and 5.06 per cent respectively in 2000-01.

Banaskantha is the highest milk producing district in the state with an estimated milk production of about 1644 thousand tonnes during 2015-16 accounting more than ten percent of total milk production in the state. Sabarkantha is the second largest producer of milk with an estimated share of about 9 percent, followed by Mahesana (6.51 %) and Kheda (5.57%). The top ten districts together contributes about 62 per cent of milk production of the state, those are Banaskantha, Sabarkantha, Mahesana, Kheda, Junagadh, Panchmahals, Rajkot, Anand, Kachchh, and Surendranagar. Category-wise share of milk production in Gujarat clearly indicate that top ranked milk producer five districts in Gujarat are dominated by the production of milk by cross bred cows, followed by buffalo and goat.

Among the species, the highest milk yield was recorded in cross breed cows. The highest bovine milk yield is recorded in Mehsana district (6.17 kg/day) and the lowest was in Dahod district (3.0 kg/day). In case of indigenous cows, highest milk yield was recorded in Amreli (4.77 kg/day) and the lowest was in Dangs (1.26 kg/day). Among the species, the highest milk yield was recorded in cross breed cows in Banaskantha district (10.68 kg/day) and the lowest was in Dangs district (7.29 kg/day). Parbandar district was the top rank district in case of buffalo yield (5.69 kg/day) while same was recorded lowest in Narmada (3.28 kg/day). The highest milk density is recorded in Gandhinagar (542 kg/day/sqkm), while highest per capita milk availability is recorded in Banasknatha (1060 gm/day) (Fig. 2.10).

Milk Consumption and Marketable Surplus

Out of the total production of milk at the home, about 77.6 per cent was sold, while 17.7 per cent milk was consumed at the home and remaining

4.7 per cent milk was converted into milk products in 2015-16. The share of quantity sold in total production has been increased by 25.4 percent points in 2015-16 over 197-98, while consumption of milk share declined by 17.4 percent points and share of converted into milk products declined by 8.1 per cent points during corresponding years. The breed wise milk utilisation shows that goat milk was preferred for consumption during monsoon and summer season, while during winter, it is used for conversion into milk products.

Status of Availability of Feed and Fodder in Gujarat

As against the estimated animals' requirements, feed resources available in Gujarat are lower. In the last decade (2003 to 2011), shortage of dry matter in the State reduced from 137 per cent of the requirement to 66 per cent; total digestible nutrients from 200 per cent to 73 per cent while the crude protein availability increased from -98 per cent to a surplus of 19 per cent. Eleven cattle feed factories, in the cooperative sector and spread across the State, produced about 2.6 million tonnes of concentrated cattle feed for bovines during 2012-13 and was sold at prices ranging from Rs. 11.9 to 14.3 a kg. The usage of concentrate increased from 2.1 kg to 2.7 kg per in-milk cattle, while for buffaloes, it declined from 3.0 kg to 2.7 kg during the same period.

Green fodder is a comparatively economical source of nutrients. However, the availability of green fodder is lower than estimated requirement. In Gujarat, the area under fodder crop has fallen over the last eight years, viz. from 10.47 per cent of the gross sown area in 2000-01 to 6.96 per cent in 2007-08 (Fig. 2.13). Patan district had the largest area under fodder crops (18.48%) followed by Kuccha, Navasari, Ahmedabad and Gandhinagar district.

Infrastructure Development in Gujarat

Gujarat is third largest producer of milk in our country. This could happen because of strong network of milk cooperatives and development of infrastructure at the village as well as district level. The co-operatives have developed modern systems of veterinary care and artificial insemination and provide these services to a large number of milk producers at very low prices. The district co-operatives have vans equipped with a trained veterinary surgeon and medicines stationed in different centres to cater to the needs of the members of the co-operatives. The special emphasis on development was dairy infrastructure was given during the Operation Flood movement.

The animal health care is more important for all over economic growth in Gujarat state. For veterinary Services 675 Veterinary Dispensaries, 45 Mobile Veterinary Dispensaries, 27 Branch Veterinary Dispensary, 552 First aid veterinary Centers, 23 Veterinary polyclinics and One Biological Product Station-Gandhinagar are working at present. Still these facilities are not available in the interior villages, 120 Mobile Animal Disease Diagnostic Laboratory Ambulance Van cum Veterinary Dispensaries are established and attached with veterinary Dispensary. A New Scheme of

"Mobile Veterinary Dispensary per 10 Villages" was established in the year 2015-16. Under this scheme 115 M.V.D. were came into existence. The objective of this scheme is to provide veterinary services at village level through mobile vehicle in each 10 villages of respective Veterinary Dispensary by different prescribed route. The coverage of livestock unit per institution is around 13771. For the control of emerging diseases of livestock and poultry, 17 Diseases Diagnostic Units, 2 Epidemiology Units and one Foot and mouth typing unit are working in the State. There are number of emerging and re-emerging livestock diseases like P.P.R (goat plague), Brucellosis, Leptospirosis and Blue tongue.

Over the period, as production of milk increases, numbers of milk processing dairies were build up. Eighteen Co-operative Dairy Unions have total 140.50 Lakh Liter per Day milk processing capacity and they procured 125.75 LLPD milk. During the year 2012-13, these Eighteen dairy union have 73 chilling center also having capacity of 57.19 LLPD of milk. Banaskantha, Mehsana and Sanbarakanta district have these infrastructure available on larger number than other districts in the state. Nine District Co-operative Unions have established 12 Cattle Feed Factories to produce and supply cattle feed to their members at village level at no profit no loss basis.

Status of Dairy Development Institutions in Gujarat

Dairy industry in Gujarat state is well-established at present and it was taken as a model for replicating in other parts of the country. The pace of dairy development in state was very rapidly due to well organised and assured market agency, reasonably good prices for milk supplied to the dairy and easy access for all veterinary and health care services offered by the co-operative dairy sector at village level. The co-operative dairy structure is very sound is central, north and partially in the southern region of the state. Majority of milk producers of these regions sell their milk through milk co-operative societies. The dairy development was also driven by the establishment of producer organizations such as MAHI. Few producers sell milk either directly to consumers or to milk vendor/middlemen or Mahi. The exploitation of milk producers by milk vendor/ middlemen is low due to the existence of co-operative societies in the village. Milk producers have easy access to all types of veterinary and health care services available in co-operative milk producers union and in nearby Government veterinary clinic.

The institutions of national Importance such as National Dairy Development Board (NDDB) and National Cooperative Dairy Federation of India Limited (NCDFI) are established and located in Anand district of Gujarat. Though the area coverage of these institutions is all India level, but it helped the Gujarat state is developing its dairy sector. Gujarat is now the leading milk producer in the country with cooperative dairy sector well established. The State Government established Gujarat Dairy Development Co-operation (GDDC) in 1973 with a view to supporting dairy development programme for the districts which lagged behind. By the end of 2015-16, 19 out of 33 districts had been covered under the co-operative milk producers union. Out of 18 dairy plants, 12 dairy plants are under Gujarat Cooperative Milk

Marketing Federation (GCMMF) and 6 dairy plants viz. Jamnagar, Surendranagar, Amreli, Bhavnagar, Junagadh and Kachchh are under GDDC. The average capacity of these dairies is to process around 30 lakh liters of milk per dairy. Factories for milk products have been producing products per day on an average 24 lakh liters of milk. There are 10 cattle feed factories under GCMMF/GDDC with production capacity of 1800 MT per day. There are 35 chilling cooling centres with a capacity to hold 14.82 lakh liters milk. GCMMF markets milk products under brand names like "AMUL", "SAGAR" and "SUGAM" These brand names are household names throughout India. GCMMF has been leading the way in milk production and distribution. Today GCMMF has around 2 lakh retail outlets in India.

The milk cooperative sector in Gujarat started in 1942 with one milk cooperative union and only two producers. Today, it has grown impressively and includes 18149 milk cooperative societies attached to 18 district level milk unions with 3.42 million milk producers (2015-16) contributing milk twice a day. About 17 per cent PDCS in five districts of Gujarat (Banaskantha, Mehsana, Kheda, Sabarkanta and Surat) are ISO certified. More than 70 per cent of the members are small or marginal farmers and landless labourers including a sizeable population of tribal folk and people belonging to the scheduled caste. In the last ten years, the milk pouring of cooperatives has increased from 46 lakh litres to 174 lakh litres per day. Because of Government efforts, Gujarat today is not only self sufficient but Gujarat's dairies send surplus milk to Delhi, Mumbai and Kolkata, along with supplying milk powder to our armed forces. Over the period, dairy cooperatives in Gujarat have created an economic network that links more than 3.4 million village milk producers with millions of consumers in India.

The the highest number of village level cooperative milk societies are in Panchamahal district (11.8 % to state total) followed by Sabarkanta (10.6%), Banaskantha (8.0%), Vadodara (8.0%), Valsad (7.0 %), Mehsana (7.4%), Kheda (6.7%) and Surat (6.4%).These eight districts together accounts for two third of total primary cooperative milk societies in the state. Out of the total 18149 cooperative milk societies in the state, about 21 percent are female cooperative milk societies. The proportion of female cooperative milk societies to total societies in each district was found highest in Bhavanagar district (82.3 %), followed by Valsad district (72.4 %) and Rajkot district (53.6%).

Gujarat is known for its marketing institutions like farmers' cooperatives and other organisation. The most successful institution in farmers' cooperative is Gujarat Cooperative Milk Marketing Federation (GCMMF) that covers 3.2 million farmers. GCMMF has 18 district unions as members (Box 3.1). GCMMF is the apex marketing agency of the dairy network in the state of Gujarat and it is manages the physical delivery and distribution of milk and dairy products from all the Milk Unions to the end users. GCMMF is also responsible for all decisions related to market development and customer management. GCMMF also plays a key role in working with the different Milk Unions to coordinate the supply of milk and dairy products.

Maahi Milk Producer Company Limited was incorporated on June 7, 2012, as a Producer Company under the provisions of Part-IXA of the Companies Act, 1956, in the State of Gujarat, to undertake the business of pooling, purchasing, processing of milk and milk products primarily of the Members and also of others, marketing of the same and to deal in activities that are part of or incidental to any activity related thereto. The Company commenced its commercial operations from 18th March 2013 with its milk procurement operations extending to the then seven districts of Saurashtra and Kutch region of Gujarat covering 2066 villages and 2,296 MPPs (Milk Pooling Points) and with shareholders' base consisting of 85,194 members, who were milk producers. Even though a Producer Company is a company there are certain features which differentiate it from other companies. Presently, the Company's milk procurement operations continue to remain extended in Saurashtra and Kutch region of Gujarat in eleven districts (i.e., Junagadh, Gir Somnath, Amreli, Botad, Bhavnagar, Surendranagar, Morbi, Jamnagar, Dev Bhumi Dwarka, Kutch and Porbandar), and in several cases, reaching to the remotest villages in these areas, where competitors have not made any breakthrough.

Institutional Weakness/Deficiency/Inefficiency

A cooperative is an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise. However, over the years, cooperative societies have failed to develop competitive competence, interference of political leaders have increased and thus its autonomy is almost withdrawn. Despite of significant growth in the various parametres of dairy, cooperative sector in Gujarat, there are few weaknesses in the present milk cooperative structure, as follows: (a) Strong dependency on weak infrastructure & completely dependent on villages for its raw materials, (b) Poor raw milk quality, poor veterinary services, lack of good dairy practice, low dairy plants efficiency , inappropriate milk collection system in some area, (c) Low Compitative Competatnce, (d) Availibility of less staff as wellas as frequent transfer of staff, (e) Inadequate avaialibility of feed and fodder, (f) Risk of highly complex supply chain system, (g) Short of its productc, and (h) ncreasing Political interefence.

Besides the present dairy cooperativs have threats such as (a) there are many competitors in dairy product, mainly chocklate and ice cream market - Hindustan Unilever, nestle, Britannia, Mother Dairy and local players, (b) Stiff competition from MNCs in butter, growing price of milk and milk products, and (c) the yield of indian cattle still much lower than other dairy countries.

Policies and Programmes/Schemes for Dairy Development

Government policies that have been implemented over the period have produced major positive impacts on dairy production in India. It is quite oblivious that dairying cannot be expanded easily if related government policies are not supportive of dairy farming. There are plethora of state and

central government schemes that provide forward and backward linkages for promotion of dairying involving milk producers. Apart from the government programs, the state milk federations and the milk unions have evolved a variety of schemes that provide incentives to the milk producers. Given the diversity in social and economic contexts, district level milk unions have drawn up schemes to promote dairy development, which are funded through various ingenious ways (partly through profits generated in milk business, partly through token cess/user fee or through charity (synonymous with welfare). Some anecdotal evidence suggests that the Banaskantha union of Gujarat had evolved some 20 different schemes to their producer members. Needless to say, the schemes are intended to provide impetus for milk production. Convergence of different state and central governments programs in a given geography provide forward and backward linkages to any development program enhancing efficiency in implementation. In view of same, convergence of different programs also enhances sustainability. The milk producers benefit when both state and central government programs converge over a given territory so that linkages among these programs foster speedy realisation of program benefits. The flip side is that if the programs are implemented in isolation, the impact is unlikely to be sustainable, with less economic benefit accrued to the producers. The convergence theory is also desirable from the standpoint of use of scare public resources. Therefore, convergence of all state and central government schemes at the implementation level, in a given territory, would bring about improvement in milk production sector in a manner that will be sustainable, while ensuring social and economic improvements of the dairy farmers. As suggested by Working Group for 12th five year plan (GOI, 2012), all the ongoing schemes should be classified under three mega schemes; a) Animal Production, b) Livestock Health and c) Dairy Development.

Socio-Economic Profile of Selected Sample

Gujarat has varying topographic features though a major part of the state was dominated by parched and dry region. The average rainfall in the state varies widely from 250 mm to 1500 mm across various zones. Out of 8 agro-climatic zones, five are arid to semi-arid in nature, while remaining three are dry sub-humid in nature. As per the sampling framework, four milk unions were selected from four regions of the state, i.e. Mehsana (North Gujarat), Bharuch (South Gujarat), Junagarh (West Gujarat) and Pachmahal (East Gujarat). The selected villages in Dahod and Bharuch districts are with significant population of tribal, while Junagadh and Mehsana has no tribal population. The highest area under irrigation was observed in the villages selected in Mehsana district, while the lowest was in Junagarh district. Despite of tribal nature of Dahod district, relatively better irrigatin than Junagadh was observed. While as compared to state figures, the ratio of irrigated area to total area is very lower in three district, i.e. Bharuch, Junagadh and Dahod. The drinking water facility was available in all villages except on DCS village each in Dahod and Junagarh and one NDCS village in Bharuch.

The selected household average size was 5.8 members which was found almost similar in both categories (DCS- member of dairy cooperative society & NDCS- non member of dairy cooperative society). The family composition indicates that around 38 percent were male, followed by 35 percent female and remaining were children. Most of the respondents were male. The average age of respondents of both categories was between 44-46 years, which was marginally higher in DCS than NDCS respondents. Also, in case of average family age, it was around 31 years in DCS members while same was 29 years in NDCS dairy producers. The figures on average level of education of family indicate that on an average respondent were educated up to 7th standard. Around three members from each family engaged in dairy activity. As dairy business is mostly deal by the females, it was expected that they would the decisions makers. However, field data indicate that about 90 per cent of decisions are taken by the male, while it was mentioned while data collection that female provide the support to the decision taken by the male, as per tradition followed in India everywhere. Out of the selected DCS households, 95 percent were from Hindu religion while about 3 per cent were from Muslim and rest were from Sikh region, while in case of NDCS households, 93 percent were from Hindu religion, 5 per cent were from Muslim and rest were from Christian religion. The distribution of selected DCS households as per social group indicate the dominance of households belongs to other backward class (48 %), followed by General category (30%), Scheduled Tribe (18%) and remaining were from Scheduled Caste (3%). In case of NDCS households, 46 per cent households belong to other backward classes, 27 per cent were scheduled caste while remaining was scheduled tribe households. The main occupation of the selected households was agriculture comprised of cultivation of land as a farmer along with supportive allied activity of animal husbandry and dairying. It was very surprising to note that very few households were engaged as agriculture labour or as a non farm labour. Thus, a number of dairy producers initially became involved in dairy farming as a secondary and supportive activity.

The selected DCS households has 1.8 ha operational land holding, of which 88.9 per cent was irrigated, while same was 1.9 ha in NDCS households with 84 per cent land under irrigation. The selected households in both the group has significant land under irrigation and facility of protective irrigation to save crop in case of less rainfall during kharif or grow more crop during rabi and summer seasons. The DCS households were found more experienced (21.7 years) than NDCS household (19.6 years). Around one third of selected households were below poverty line as per income group category indicates relatively better economic condition of two third households.

Out of total gross cropped area, around 53-55 per cent area was in kharif season, around 36 per cent was in rabi season and remaining was in summer season. Groundnut, cotton, soybean, maize, tur and moog were the dominant kharif crops, while wheat and gram were important crops grown in Rabi season while summer bajra and groundnut were grown. Besides, significant area was allotted to fodder crops as well, due to requirement of fodder for dairy animals. The cropping intensity was found higher in case of DCS households than NDCS households.

Cost of Milk Production & Awareness about the Schemes

All together, every DCS households has the highest share of buffaloes, followed by local cows and then cross bred cows in total heard strength. Out of total heard strength with DCS household, around 55 per cent animals were milch animals, the highest share was of cross breed (78.6%), followed by buffaloes (58.6%) and cows (52.5 %). In case of NDCS households, the dominance of buffaloes can be seen in total heard strength with households, while share of local and cross crossbreed cows was lower than DCS households. In case of share of milch animals to total animal in each species, it was highest in case of buffaloes (61.7%), followed by cross breed cows (56.8%), and local cows (53.6%). At overall level, both the groups (DCS & NDCS) have almost similar herd strength. All the households has at least one cattle shed in both group and costing of same was found lower (around Rs. 3000/-) in case of NDCS households than DCS households (around Rs. 4300).

On an average, in both DCS and NDCS group, the age of local and cross bred cows was around 5-6 years and for buffaloes, it was around 7 years. The age at first calving of local cattle (40-41 months) was found higher than crossbred cows (31-34 days). The average age of first calving ranges from 31-41months in case of cows and 42-44 months in case of buffalos. The lactation order of the milch animal was found to be either 2 or 3. The average level of peak yield recorded during the present lactation was marginally lower than earlier lactation in case of cross breed cows of both groups, and buffalos of DCS households, while same was found marginally higher in local cows of both groups. It was very strange to note that almost in all the species, milk yield during presented and earlier lactation period was found highest in case of LMP followed by MMP and SMP, except few exceptions. Across the group and species, the milk yield of local cows and buffaloes during present lactation was found higher in DCS households, while milk yield of cross breed cows was found higher in NDCS households. However, in both cases, as mentioned earlier, the milk yield of cross breed cows was the highest followed by buffaloes and local cows. The information was also collected on animals covered under insurance scheme and it was observed that some of the DCS households has covered under their few animals under animal insurance program of the Government, wherein the government has paid some amount and dairy producer has deposited his share. The coverage of animals under insurance was relatively better in case of cross bred cows followed by meagre number of buffaloes and almost nil in case of local cows. In fact in case of NDCS households, it was very strange to note that no animal was covered under insurance. It indicates that government should make necessary policy and arrange extension activities to increase the awareness among the dairy producers to cover their animals under insurance scheme. On an average the premium paid per animal ranges between Rs 1500-2500/-. Across the seasons, the milk yield was higher during winter season followed by rainy season and the lowest was in summer season. Overall the large milk producer group dominates the milk yield in all species irrespective of members of DCS or not.

As dairy activities are carried out as complimentary activity to agriculture activities, the labour use pattern by the selected sample households indicate the complete dominance of use family labour who were engaged in both the activities and out of total time worked in a day, about half of the time was spent on dairy and household activities while remaining time was spent on field. Though some of the household had hired casual labour, which were mainly used for agriculture activities, while tendency of having permanent labour was very rare and found with few households only. Thus, activities of dairy were carried out mostly by the household members. The significant involvement of female in dairy activity can be seen from the data which indicate that in all the operations, female are part of that. The same trend has been recorded in case of NDCS.

Except few exceptions, in all the species and across the size groups, the quantity of feed (dry and green fodder) and concentrates was found higher in case of NDCS households, while in case of supplements, except one case, DCS households have feeded more quantity than NDCS households. The selected households used fodder from both sources (self cultivated & purchased fodder). The animals were also feeded with concentrates which were mostly purchased from the market. Besides feeding the animals at stall in shed, the selected households in Surat could graze their animals every day for about 6-8 hours on their own agriculture land or common grazing land of the village. Beside feed and fodder, availability of quality of water also determines growth of dairy activities. Groundwater was the main source of water followed by village talawadi and open well in the village.

It was observed that almost all the animals were given vaccinations (such as FMD, HS, BQ, Deworner, Thailera, Swell in Feet, etc), which was mostly received free of cost. Besides, some of the selected households had incurred expenditure on medicine and doctor as and when some of animals fell sick. On an average DCS household had incurred medicine plus doctor fee cost ranging between Rs. 100-550/- per animal during the year, while corresponding figure for NDCS households was at higher side which ranges between Rs. 280-700/animal. During the visit to the field and discussion with the selected household, it was observed that despite of various efforts made by the government; availability of veterinary doctor is one of the bottlenecks in dairy development. On an average, every year total number of visit of veterinary doctor ranges between 3 to 4 only. Thus, most of the households had either depend on the alternative source of advisory and medical support for their animals.

Though under cooperative dairy sector, member of dairy can register a complaint at dairy society and doctor visit the animals, it sometimes takes long time to get doctor visited and thus delayed visit and prescription of doctor sometime result in extra expenditure on medicine and doctor as well as loss in income due to low milk yield (in case of milch animal). Beside natural service, artificial insemination facility was availed by the selected households for their animals and on an average, rate of conception of AI was less than 2.

There are many government schemes that provide forward and backward linkages for promotion of dairying involving milk producers. Besides, the state milk federations and the milk unions have evolved a variety of schemes that provide incentives to the milk producers. However, proper awareness about the benefit of scheme would not only help in success of aim of scheme but also benefit the dairy producer in many ways. It was observed that on an average, about three fourth of DCS households were aware about different vaccinations schemes/programmes, while in case of NDCS households, awareness about same was very poor (41.7 %). In case of artificial insemination programmes, about 71 per cent DCS households had information while hardly 42 per cent NDCS households were about same. Around 64 percent DCS households were aware about other dairy development programmes, while NDCS houselds were almost unawareness about same. The main souces of information of schemes/programmes for DCS households was cooperative society followed by government animal husbandry department, media and fellow farmers. However, very few of them have benefited with scheme. While in case of NDCS households, they were dependent on media and fellow farmers for same. Thus, it is very much clear from the data that DCS households were well aware about the various programmes may be due to information they receive from the dairy cooperative society and government animal husbandry department. The association of dairy producers with cooperative milk society improve the awareness about the various dairy development schemes. Therefore, in order to make inclusive development of dairy, more efforts should be made by the government to disseminate the information about scheme through distributing pamphlets; organising village awareness programme, etc.

Cost of Milk Production

The cost of production of milk and net returns realised by the sample households indicate that net returns realised by the DCS households was higher than NDCS households all groups and in all species. On an average, net return of about Rs. 32/- was realised by the DCS households as compared to Rs. 14/- realised by the NDCS households. The net return realised by the DCS households was higher by 130 per cent at overall level. The highest net return by DCS households was recorded in case of crossbred cows, followed by local cows and lowest was in case of buffaloes. However, in case of NDCS households, the highest net return per animal was recorded in local cows, followed by cross breed cows and lowest was in buffalos. Low margins for NDCS dairy producers may be due to low milk productivity from animals with low genetic potential, poor health, feeding and husbandry practises low price offered by private agent/agency. Therefore, there is a huge scope to enhance producers' income from dairy by enhancing animals productivity, improving management practise, and ensuing remunerative prices.

Low productivity of milk animals is a serious constraint to dairy development. The productivity of dairy animals could be increased by crossbreeding low-yielding nondescript cows with high-yielding selected indigenous purebreds or suitable exotic breeds in a phased manner. The cattle-breeding policy should not only focus on milk yield but should also

provide for the production of good-quality bullocks to meet the draft-power requirements of agriculture. Upgrading nondescript buffalo through selective breeding with high-yielding purebreds such as Murrah, Mehsani or Nili Ravi should be given high priority in all areas where buffalo are well-adapted to the agro-climatic conditions.

Milk Consumption & Marketable Surplus

As mentioned earlier, more than 62 per cent of the milk produced in the country is marketed by the unorganised sector (private organisations) and less than 38 per cent is marketed by the organised sector (government or cooperative societies). Even though co-operatives provide a remunerative price to the producer, the unorganized sector plays a major role in milk marketing because of three factors. The first factor is the pricing policy of the co-operatives: their purchase price is based on the fat content of the milk, whereas the private sector pays a flat rate per liter of milk. The second factor, which motivates the milk producers to sell milk to private vendors, involves the type of milk reared by the producer. Crossbred cows yield more milk with a lower fat than do buffalo. The crossbred cow population has increased over years because animals of artificial insemination and improvements in management practices. The third factor is payment policy. The private sector can pay their producers everyday, whereas the co-operatives pay weekly or fortnightly. Producers sometimes have to fight with the co-operatives to get their payments. Within the organized sector, the co-operative sector is by far the largest in terms of volumes of milk handled, installed processing capacities, and marketing infrastructure. Cooperatives pay back the highest share of consumer rupee to the milk producer. Besides, input services are also provided to member milk producer..

The data indicate that the small milk producers generally consume larger proportion of milk produced followed by medium milk producer and the lowest was in case of large milk producers. In fact, across the species, households preferred to consume and process the milk of local cows (20.1%), followed by buffaloes (13.1%) and cross bread cows (7.3 %). While the highest preference was given to milk produced by local cows and about 71.4 per cent of total milk produced was consumed or used for processing by small milk producers, followed by 26.0 per cent by medium and 15.5 per cent by large milk producer group. of total milk produced in local cows. Thus the buffalo and cross bred cow milk was sold outside and local cow milk was mostly consumed at the home. In case of NDCS households, though the use of local cow milk was relatively better but was at par with the cross bread cows and marginally higher than buffalo cows. Thus, it indicate that the NCDS households preferred cross bred cow milk in consumption, while no reason was cited for same.

It was observed that on an average, except in case of local cow milk use by small milk producers, more than 70 percent of milk produced had been disposed by the selected households of both groups. The range of milk sale was found to be 70-93 per cent of total. However, across the milch animal holding group, there are variations. Small milk producers have used

more share of milk for the home purpose and used for preparation of further value added products, such as ghee, curd, etc. If we look at the disposal pattern of milk, it can be observed that all the DCS households had sold milk to dairy cooperative societies, where they got weekly payment. Few households from large milk producer group had sold small quantum of milk to consumers on month payment basis. The distance of dairy societies was quite closer and thus very meagre cost was incurred on transportation. The milk rate realised by the milk producer was around 25-27 in case of cow milk and around Rs. 39 in case of buffalo milk.

The opposite picture was seen in case of sale of milk by the NDCS households. NDCS households opted to sale their milk to private milk plant which was maximum 6 kms away from the households for which they incurred around Rs. 6-14 cost as transportation cost. The payment was provided as per requirement and milk rate realised was around same as in case of DCS members. Few of NDCS members has sold the milk to private vendor/shop/middlemen as well as to catering services. Thus, it is clear that unlike of almost 100% sale to dairy cooperative society by DCS households, NDCS households had to sale to variety of customers, where in rates are relatively lower and other facilities may not have available as like in dairy cooperatives.Thus, in case of NDCS households, marketing channels remains traditions and more than 89 per cent of marketable surplus in milk is sold through informal channels, especially private traders in unorganised sector and direct sale to consumer. This is in sharp contrast to sale of milk by DCS households to dairy cooperatives.

In spite of various developments in dairy sector over the period of time, milk marketing in India remains grossly primitive compared to its western counterparts. It begins with the largely unregulated sector, which handles the majority of the milk production, providing ample opportunity for malpractice. Some of the common forms of malpractice include false measurements in the selling of milk and adulteration of milk. Another major impediment to an efficient marketing system. is the presence of numerous intermediaries, which take advantage of producers' weakness. In many cases, intermediaries dictate the price by advancing a loan to the milk producers. Producers' bargaining power is also limited because of perishability and bulkiness of milk. In addition, the lack of proper infrastructure for transportation, distribution, and storage also makes milk procurement difficult.

On the other hand, it will be impossible for most producers to market their milk without the presence of these market intermediaries. The Cooperative Societies Act continues to be restrictive rather than enabling, even though the Anand Pattern milk producers' co-operatives have emerged as the most stunningly effective institutional model for milk marketing. Political and bureaucratic interference, delayed payments to the primary producers, and the decision-making power of the administrators over marketing of milk and milk products by the district-level union and the state-level federation also adversely affect the growth of dairy co-operatives. The cooperative laws in general have inhibited the emergence of true leadership, professional management, and democratic functioning of the co-operatives.

Constrains faced in Production and Marketing of Milk and Suggestions

Efficient input supply and service delivery determines the success of the dairy activity in particular region, whether provided by the government through its department, by dairy cooperative societies or by the private dairy plant/agent. The performance of the dairy sector is depends on many factors includes input supply (particularly feed) and service provision (veterinary service and Artificial Insemination (AI) or breed) or output services. There is a whole range of services that are needed to enhance the capacity of poor households to exploit the full potential of livestock production. These include health and production services such as clinical care, preventive health and provision of pharmaceutical supplies, feed and fodder supply, artificial insemination, livestock research and extension, and other market services such as credit, livestock insurance, delivery of market information, output marketing and milk collection. Good support services are critical for enhancing livestock productivity and for enabling the poor to gain access to expanding markets. This section reviews the status of livestock service delivery system existing in study area and raises some issues for efficient delivery of these services to the dairy producer.

DCS households recorded the adequate supply of cattle feed which was also made available on credit by cooperative society, however most of households mentioned that cost of cattle feed and miner mixtures was high. Though the emergency veterinary services were available, the EVS charges of dairy cooperative were medium as compared to high charges by private agents. Not only the availability of vaccines and semen at the AI centre at dairy cooperatives as well as at private dairy agents was inadequate but also the delivery & applications of quality & requisite quantity of vaccines was very poor. It was observed that there was no provision of loan in society or government for the purchase of cattle and no technical guidance was available to them. Most of the households mentioned that premium for insurance was medium, however, very few dairy producer had taken animal insurance.

In case of output delivery, DCS households mentioned that the milk price received by them was adequate and they get fortnightly payment. Two third of households mentioned that incentives or bonus for supplying milk were adequate, while one fourth of selected households mentioned that cross bred cow milk is not acceptable in family. Dairy cooperatives do not have system of advance payment for milk while agent or private agency has provided this facility in selected area.

In case of NDCS households, these households did not have facility to get any support from the dairy cooperatives existing in their area, they are fully depend on the agent or private agency to get support for input and output service systems. Though the supply of cattle feed and fodder was adequate with agents and private agency, which was available on credit for half of the households. Almost three fourth of households mentioned about non availability of emergency veterinary services and whatever is available was availed at very high charges. The poor availability of vaccines and

semen was also noted by NDCS households. More than 90 per cent of households mentioned that charges for premium are very high and no technical support is available to them. As expected, three fourth of selected NDCS households mentioned that milk price received by them are low. The two third of households received payment after 15 days while one third received within 15 days time after sale of milk. Almost all the selected households mentioned about no incentives or bonus for supplying milk and no advance payment was provided by vendors/private agency. Three fourth of selected households mentioned about non acceptability of cross bred cows milk in home consumption.

The four major infrastructural constraints faced by the selected DCS household were unavailability of emergency veterinary services, infrequent visit of veterinary staff, unavailability of cattle feed and fodder seed on credit, and low average milk yield of the milk animals, while NDCS households faced constrains such as infrequent visit of veterinary staff, lack of training facilities, unavailability of emergency veterinary services and lack of improved equipments.

The four major economic constraints faced were low price of milk offered, high cost of fodder seed, high cost of cattle feed and miner mixtures and high charges of emergency veterinary services. The underlying causes behind the major economic constraints faced by NDCS were high cost of veterinary services, high charges of emergency veterinary services, high cost of cattle feed and mineral mixtures, low price of milk offered, high cost of fodder seed, low provision of loan in society or government for purchasing of cattle and low incentives or bonus for supplying milk and high charges for insurance.

The major economic constraints faced by the selected household were less knowledge about marketing strategies and low risk taking behaviour were constraints faced by DCS households while NDCS households had faced four marketing constraints viz., less knowledge about marketing strategies, no or less advance payment for milk by society/vendors, lack of time for marketing and low risk taking behaviour.

The two main marketing constraints faced by the DCS households were less knowledge about marketing strategies and low risk taking behaviour. The NDCS households has faced four marketing constraints viz., less knowledge about marketing strategies, no or less advance payment for milk by society/vendors, lack of time for marketing and low risk taking behaviour.

The two main socio-psychological constraints reported by DCS as well as NDCS households were lack of purchasing power and lower socio-economic conditions. Lack of time due to busy in domestic/agricultural work was another problems faced by them.

The common constraints faced by the both households were poor knowledge about scientific animal husbandry practises and dairy farming, poor livestock extension services, lack of awareness about quality of milk,

lack of veterinary services in village for quality milk production, and poor housing to milch animals. Besides these constraints, NDCS households faced other constraints such as lack of marketing facility for dairy business, unavailability of chilling facilities at village level for milk preservation, unavailability of medicine and equipments required for quality milk production.

About 48 per cent of DCS households have suggested that veterinary literature should be provided in village, 46 per cent households mentioned that marketing facilities should be provided at village level for the outlet of milk and milk product, while about 41 per cent households suggested that loan sanction procedure should be made easy. Besides, other suggestions were loan amount for the purchase of dairy animals need to ne increased; need to improve service deliver, enhance the milk price for producers, and technical knowledge for management of dairy enterprise. In comparison of suggestions provided by DCS households, the main suggestions made by NDCS households were need to marketing facilities at village level for sale of milk and milk products, improvement in service delivery, need of veterinary literature at village level and need to make easy process of loan sanction.

Constraints faced by PDCS /Private Dairy Units

The constraints (such as milk supply related, infrastructure related and marketing related) faced by the selected primary dairy cooperative societies and private dairy units indicate that in case of milk supply related constraints, top three constraints faced by both the groups are high numbers of small producers, irregular and inadequate supply of milk, unavailability of fodder throughout the years and low average milk yield of milk animals in area. Besides, these DPCS faced problems of not having the provision of advance payment for milk to milk producers, which was sometime available with PDUs. The top two infrastructure related constraints were unavailability of chilling facilities at village level for milk preservation and lack of training facilities. Few of them also faced Lack of necessary space required for dairy operation. While competition from private dairy and Inability to market for value-added products were the major marketing related constraints faced by the both groups. Besides, PDU faced the problem of unstable prices of milk.

Constraints faced by Milk Unions

Out of the four selected dairy milk unions, two are located in developed cities like Mehsana and Bharuch and are located on the main highway of the state. While Panchamahal and Junagadh district milk unions are located in interior regions of the state, that to these areas are not that developed and thus they face some constraints. Panchamahal dairy is located in tribal area thus face the problem of labour and most of the persons do not want to work in interior areas of the district. Besides, during lean season, this dairy faces the problems of working capital. The dairy producers in this area are mostly illiterate and thus do not have much awareness about the schemes. In case of Junagadh dairy, though progress is good but they face the problem of supply of inputs and they are worried about the FTA issue. Overall, all the dairy

unions have bright future subject to no political interfere in the working of unions.

Conclusions and Recommendations

- *Livestock sector occupies a pivotal position in the Indian economy and its contribution to the agricultural sector is the highest, the plan investments made so far do not appear proportionate with its contribution and future potential for growth and development. This suggests that public investment in the livestock sector should be enhanced to help the smallholder livestock producer, which deprives their larger share of income from the livestock sector.*
- *The livestock services like artificial insemination/natural service, vaccination, de-worming, etc are time-sensitive and government institutions are not able to deliver in time due to financial as well as bureaucratic constraints. Therefore, there is a need to re-orient the government policy for delivery of livestock services and involve major stakeholder.*
- *The major constraint in milk marketing is the involvement of the unorganized sector. Changing the dairy-cooperative laws and regulations can reduce the unorganized sector's role in milk marketing. Strengthening the infrastructure for milk collection, transportation, processing, packaging, pricing, and marketing through dairy co-operatives can also change the minds of the milk producers.*
- *Producers are not receiving a remunerative price for their produce because of the presence of middlemen in milk marketing. By reducing the number of middlemen between producer and consumer, the consumers' share to the producer can be increased. In other words, bridging the gap between the producer and the consumer can increase the producer's share.*
- *Shortage of quality fodder and feeds is another major constraint for India's livestock sector growth. The gap between the requirement and availability of feed and fodder is increasing due to decreasing area under fodder cultivations and reduced availability of crop residues as fodder. Also there is continuous shrieking of common property resources leading to over grazing ion the existing grass land. Therefore, there is a need to work out the strategies for sufficient good quality feed and fodder for efficient utilisation of genetic potential; of the various livestock species and for sustainable improvement in productivity.*
- *The awareness about the dairy schemes among selected households was very poor. Therefore, there is a need to increase use advanced technology such as mobile phones in dairying for effective dissemination of livestock related information in general and dairying in particular.*
- *The selected households seldom aware about the livestock insurance. As insurance of livestock is the best safeguard for minimising the risk especially small holder producers, there is a need to increase the*

awareness and mandatory provision of the companies to undertaken livestock insurance of interested milk producers.

- *Though livestock health situation in India is improving, Foot and Mouth Disease remains the issue of concern. There is a serious need for protection of animals against diseases and parasite which is one of the pre-requisites for sustainable livestock production and milk production.*
- *The four major infrastructural constraints faced by selected households were unavailability of emergency veterinary services, infrequent visit of veterinary staff, unavailability of cattle feed and fodder seed on credit, and low average milk yield of the milk animals. Non availability of veterinary services at the village level in time is the major constraints. The animal husbandry departments must be rejuvenated to act as drivers of growth for dairy sector.*
- *Given the fact that stress due to climate variability and availability of feed will be increasing constraints, more emphasis is required in promoting indigenous breeds. The data on animal genetic resources need to be generated and preserved properly for future use.*
- *The role of institutions in dairy farming especially district dairy cooperatives need to be strengthened and there should be less bueorocratic and political interference in managing cooperative run dairies in India.*
- *The environmental security and sustainability must be made integral measures taken in the Indian dairy sector in arena of increase in milk production, storage, value addition, improving the genetics of local breed and reducing the risk in operation.*
- *There is a need of more modern semen stations across India operated by both private and controlled by government agencies. Dairy cooperatives and private players must be allowed too to start their own centers to supply quality semen. Farmers must be educated about the available semen profile which will help them to make informed choice.*
- *The state and Central Governments have initiated various development programmes and policies for promoting livestock sector in the country. However, a number of concerns about effectiveness and impact of these programmes and policies have been raised. The convergence of all state and central government schemes at the implementation level, in a given territory, would bring about improvement in milk production sector in a manner that will be sustainable, while ensuring social and economic improvements of the dairy farmers. As suggested by Working Group for 12th five year plan, all the ongoing schemes should be classified under three mega schemes; a) Animal Production, b) Livestock Health and c) Dairy Development.*
- *The co-operative structure is very weak in Saurashtra and Kachchh regions of the state. Therefore, presence of Milk Producer Company's sales & distribution network is spread across Saurashtra & Kutch region support the dairy development in these regions. Therefore, there is a need to support the MPCs in all the areas for balanced development of dairy sector.*

Chapter I

Introduction

1.1 Introduction

Animal husbandry in India is closely interwoven with agriculture and obviously plays an important role in the national economy and also in the socio-economic development of millions rural households (Vaidyanathan, 1989; Mishra, 1995; Chawla, *et al,* 2004; Sharma, 2004; Birthal, 2016). Livestock rearing is one of the most important economic activities in the rural areas of the country providing supplementary income for most of the families dependent on agriculture. In many cases, livestock is also a central component of small holder risk management strategies (Randolph et al., 2007). Apart from providing a subsidiary income to the families, rearing of livestock such as cattle, buffaloes, sheep, goats, pigs, poultry etc. is a source of protein supplement to the family members of the household in the form of milk, eggs and meat. This sector has created a significant impact on equity in terms of employment and poverty alleviation as well. In fact level of rural poverty is significantly higher in states where livestock sector is underdeveloped (Singh and Meena, 2012). This is the sector where the poor contribute to growth directly instead of getting benefit from growth generated elsewhere.

Importance of livestock in general and dairying in particular hardly needs emphasis in a country like India. It is one of the important sub-sectors of agriculture, next only to field crops (Saxena, et al., 2002). The growth of the dairy sector during the last three decades has also been impressive, at more than 5 percent per annum; although the country has emerged as the largest producer of milk only in the '90s (Jha, 2004). This has not only placed the industry first in the world, but also represents sustained growth in the availability of milk and milk products for the burgeoning population of the country. Most important,

dairying has become an important secondary source of income for millions of rural families and for millions more, has assumed the most important role in providing employment and income.

1.2 Contribution of Livestock Sector to the National Economy

India is endowed with a significant proportion of the world's livestock population (Prabaharan, 2002; Sharma and Sharma, 2002). India stands at first position in terms of cattle and buffalo population in the world. The population of cattle and buffalo in India was 218 million and 115 million in 2012 which accounts for 14.7 per cent and 58 per cent share respectively of world cattle and buffalo population, most of which are milch cows and milch buffaloes (GOI, 2004). This sector provides regular employment to 9.8 million peoples in principal status and 8.6 million people in subsidiary status. More importantly, women constitute 71 percent of the labour force in livestock farming (GOI, 2002).

Livestock sector of India has grown tremendously in the past five decades. From a subsistence activity until 1970s, animal husbandry has grown to emerge as the largest agricultural activity accounting for over one fourth of the agricultural gross domestic product. Its value of output now equals to that of food grains. By controlling 64 per cent of the bovine, 70 per cent of ovine, 73 per cent of caprine and 70 per cent of the poultry population, the small holders make a substantial contribution to livestock production (GOI, 2014). Animal husbandry and dairying sector contributes about 26.9 percent of the gross value added from total agriculture, forestry and fishing sectors and its overall contribution to the total GVA of the country was about 4.4 per cent in 2014-15, at current prices. The share of GVA of livestock sector to total agriculture (crops & livestock) has increased from 23.8 per cent in 2011-12 to 26.7 per cent in 2014-15 at constant prices. At Current prices, same share has increased from 23.8 per cent in 2011-12 to 26.9 per cent in 2014-15 (Table 1.1).

Table 1.1: Percentage contribution of Livestock in total Agriculture GVA

Year	GVA at Constant(2011-12) Basic Prices					GVA at Current Basic Prices				
	GVA-Agriculture		GVA-livestock			GVA-Agriculture		GVA-livestock		
	Rs. In Cr	% to total GVA	Rs. In Cr	% to total GVA	% to Agriculture	Rs. In Cr	% to total GVA	Rs. In Cr	% to total GVA	% to Agriculture
2011-12	982026	12.1	327301	4.0	23.8	982026	12.1	327301	4.0	23.8
2012-13	983873	11.5	344333	4.0	24.6	1090587	11.8	375254	4.1	24.3
2013-14	1025082	11.3	363448	4.0	24.8	1232116	11.9	429662	4.1	24.4
2014-15	992159	10.2	389846	4.0	26.7	1252412	10.9	500405	4.4	26.9

Source: www.dahd.nic.in.

The dairy subsector occupies an important place in the agricultural economy of India as milk is the second largest agricultural commodity in contributing to Gross National Product (GNP), next only to rice. Among the sub-sectors of livestock sector, dairy and meat group (poultry meat) are high growth sectors and is reflected in the growing importance of the contribution of these sub-sectors in the livestock economy. While the two third of total value of output from livestock sector during 2013-14 was accounted by milk group followed by one fifth share by meat group. The use of dung as fuel also significantly contributed in total value of out of livestock sector by 6.64 per cent (Table 1.2).

Table 1.2: Value of Output from Livestock sector (at current prices)

Item	Value of Output from Livestock sector (at current prices)					
	2011-12		2012-13		2013-14	
	Rs. Crore	% to total	Rs. Crore	% to total	Rs. Crore	% to total
1 Milk Group	324895	66.97	368997	66.23	407396	65.30
2 Meat Group	96287	19.85	114402	20.54	132360	21.22
3 Eggs	16470	3.40	19352	3.47	22423	3.59
5 Dung	32754	6.75	36936	6.63	41443	6.64
7 Increment in Stock	9854	2.03	11609	2.08	12964	2.08
Value of Output (Livestock Sector)	485103	100.00	557103	100.00	623861	100.00

Source: www.nddb.coop

1.3 Planwise Outlay and Expenditure under Dairying /Dairy Development Efforts

Animal husbandry and dairying programme have attained considerable importance in various Five Year Plans (FYP) and several schemes/projects have been taken up by the States and the Centre for the development of this sector. Animal husbandry and dairying is a state subject, and bulk of the investment for their development comes from the state governments (GOI, 2012). The central government contributes about 10 per cent to the total investment through central and centrally-sponsored schemes as to supplement state governments' resources. In absolute terms, total outlay for animal husbandry and dairying increased over the plan periods. However, as per cent of the total plan outlay, the share of animal husbandry and dairy development declined from 1.1 per cent during first FYP to 0.4 per cent during VI FYP and further to 0.3 per cent in the subsequent FYPs. As proportion of the total outlay for the agricultural sector, the share of livestock fell from 11.2 per cent in II FYP to 3.6 per cent in IX FYP but increased to 9.3 per cent during XI FYP. The share of livestock in the planned investment has never been commensurate with its contribution to GDP or Ag GDP (Table 1.3).

Table 1.3: Planned and Actual Expenditure on Animal Husbandry and Dairy Development during various Five-Year Plan periods (Rs. Crores at current prices)-All India

Plan	Animal Husbandry		Dairy Development		Total		% AH&D to total agriculture outlay	% AH&D to total outlay
	Planned	Actual	Planned	Actual	Planned	Actual		
First (1950-55)	14.2	8.2	7.8	7.8	22	16	6.2	1.1
Second (1955-60)	38.5	21.4	17.4	12.1	55.9	33.5	11.2	1.2
Third (1960-65)	54.4	43.4	36.1	33.6	90.5	77	8.3	1.1
Fourth (1967-72)	94.1	75.5	139	78.8	233.1	154.3	10	1.5
Fifth (1975-80)	NA	178.4	NA	NA	437.5	232.5	9	1.1
Sixth (1980-85)	60.5	39.1	336.1	298.3	396.6	337.4	7	0.4
Seventh (1985-90)	165.2	102.4	302.8	374.4	467.9	476.8	4.4	0.3
Eighth (1992-97)	400	305.4	900	818.1	1300	1123.5	5.8	0.3
Ninth (1997-2002)	1076.1	445.8	469.5	146.9	1545.6	592.7	3.6	0.3
Tenth (2002-07)	1384	1419.4	361	285.8	1745	1705.2	11.87	0.12
Eleventh (2007-12)	4323	1101.3	580	262.4	4903	1363.7	9.23	-

Source: GOI (2012)

Since IV FYP the emphasis had been on dairy development to support the 'Operation Flood' programme. With the end of Operation Flood program, the allocation to dairy development slowed down, reaching to about 30 per cent in the XI FYP. Animal health and veterinary services now receive about 30 per cent of the total funds. In XI Plan, the centrally sponsored schemes (animal health and disease control and National Project for Livestock Development) accounted for a major share of the outlay for animal husbandry. Small ruminants, piggery, feed and fodder development, research, education and training did not receive adequate financial support. There has been a large gap between planned and actual expenditure in case of animal husbandry in most plan periods, except during Xth FYP (Table 1.4).

Table 1.4: Outlay and Expenditure of Central and Centrally Sponsored Schemes under Animal Husbandry and Dairying Sector from First Plan - All India (Rs. in crore)

Plan/Year	Total Plan	Animal Husbandry		Dairy Development		Total (AH & DD)	
	Outlay	Outlay	Exp.	Outlay	Exp.	Outlay	Exp.
First Plan (1950-55)	1960	14.19	8.22	7.81	7.78	22	16
Second Plan (1955-60)	4600	38.5	21.42	17.44	12.05	55.94	33.47
Third Plan (1960-65)	8576.5	54.44	43.4	36.08	33.6	90.52	77
Annual Plan (1966-67)	6625.4	41.33	34	26.14	25.7	67.47	59.7
Fourth Plan (1967-72)	15778.8	94.1	75.51	139	78.75	233.1	154.26
Fifth Plan	39426.2	-	178.43	-	-	437.54	232.46
Sixth Plan (1980-85)	97500	60.46	39.08	336.1	298.34	396.56	337.42
Seventh Plan (1985-90)	180000	165.19	102.35	302.75	374.43	467.94	476.78
Annual Plan (1990-91)	-	43.71	36.18	79.67	41.43	123.38	77.61
Annual Plan (1991-92)	-	57.97	43.28	97.49	77.99	155.46	121.27
Eighth Plan (1992-97)	434100.1	400	305.43	900	818.05	1300	1123.48
Ninth Plan (1997-2002)	1677.88	772.02	445.84	251.95	146.85	1023.97	592.69
Tenth Plan (2002-07)	2500	1425.87	1421.89	289.54	285.79	1715.41	1707.68
Eleventh Plan	8174	4870.53	2330.8	580	576.31	5450.53	2907.11
2007-08	910	350.92	338.14	88.5	111.5	439.42	449.63
2008-09	1000	481	444.54	98	97.9	579	542.64
2009-10	1100	558.29	435.84	101.1	85.93	659.39	521.77
2010-11	1300	792.15	668.75	87.76	84.77	879.91	753.52
2011-12	1600	874.36	722.88	250.25	196.21	1124.61	919.09
Twelfth Plan	14179	7829	-	3781	-	-	-
2012-13	1910	1063.1	881.45	392	523.51	1455.1	889.61
2013-14	2025	1051.49	917.16	580	501.59	1631.49	1418.75
2014-15	2174	1118.57	768.37	843.99	648.42	1962.56	1416.79
2015-16	1491	400.43	395.35	116.44	119.13	516.87	514.48

Source: GOI (2016a).

However, despite of its rising share in agricultural GDP, the livestock sector has not received as much policy attention as it deserves. Its share in the total public spending on agricultural and allied activities has never been in congruence with its income contribution. In absolute terms, spending on the livestock sector increased by about 27 percent between TE 1992-93 and TE 2008-09, but as a share of the total spending on the agricultural sector it declined continuously, from 13.6 percent in TE 1992-93 to 4.6 per cent in TE 2008-09 (Table 1.5). Livestock expenditure as a proportion of the value of output of livestock also declined from 3.6 per cent to 2.3 per cent during this period. For faster growth and holistic development of the livestock sector, the public spending on livestock has to be raised and prioritised, taking into consideration the emerging challenges and regional imbalances. During the 1990s and also earlier, the allocation of livestock investment was biased towards dairy development, which, however, was corrected to a large extent during the 2000s. The share of dairy development in total livestock expenditure fell from about 40% in the 1990s to 25 per cent towards the late 2000s.

Table 1.5: Public Spending on Livestock Sector in India

Particulars	TE1992-93	TE2000-01	TE2008-09	
Total spending (Rs crore at 2004-05 prices)[a]	3,739.60	4,156.10	4,726.10	
Public spending % of total agricultural spending	13.6	9.9	4.6	
Public spending as % of livestock VOP	3.6	2.8	2.3	
Composition of public spending (%) Dairy development	41.5	38.6	25.0	
Veterinary services and animal health	23.7	24.1	29.1	
Cattle and buffalo development	14.0	11.7	10.5	
Sheep and wool development	2.7	2.4	2.0	
Piggery development	1.8	0.5	0.4	
Poultry development	3.1	2.4	2.4	
Fodder development	0.9	1.0	1.0	
Direction and administration	4.2	8.7	19.1	
Research, education and extension	2.2	3.0	3.0	
Others	5.8	7.6	7.5	

Note: a: Spending includes both revenue and capital expenditure.
Source: Birthal and Negi, 2012.

1.4 Dairy Development in India

Dairy development in India has been acclaimed as one of the most successful development programmes under the world's largest integrated dairy development programme 'Operation Flood' (Shiyani, 1996; NAAS, 2003). India ranks first in the world[1] in milk production, which has increased to 155.5 million tonnes in 2015-16 from 17 million tonnes in 1950-51. Nearly 51 per cent of milk production is contributed by buffalo followed by cow (45%) and goats (4%).

Dairying has become an important secondary source of income for millions of poor and rural families and has assumed the most important role in providing employment and income generating opportunities particularly for marginal and women farmers (Patel, 2003). Most of the milk is produced by animals reared by small, marginal farmers and landless labourers. It has been witnessed over the years that the stability in dairy income is far stronger than the income realised from agricultural activities (Kumar and Shah, 2016). Milk has always played a critical role in addressing hunger and malnutrition (Kumar, 2016). While more than 75 million households in India are engaged in dairy farming, about 15.4 million farmers have been brought under the ambit of 1,60,000 village level dairy corporative societies up to March 2014 (http://dahd.nic.in).

The dairy co-operatives have made good impact on the social and economic life of the people in the state. The impact of the White Revolution can be seen in the villages in the form of generation of funds for community development and social welfare, creation of self-employment opportunities, ensuring distributive justice and removal of the evil of untouchability. This silent social revolution has been relatively smooth and hence even unnoticed by the conservative community. The dairy cooperative movement has been central to the development of dairying in India. The inspiration for this movement

[1] Forecast by FAO indicate that the world's milk production in 2016 would be 817 million tonnes, while that of India would be 160.4 million tonnes (NCAER, 2017).

was the success of the *Khaira* District Cooperative Milk Producers Union known as Amul. Founded in 1946, in response to the exploitation of districts dairy farmers, Amul grew rapidly from its initial base of two societies and two hundred litres of milk. That growth, however, posed a challenge that threatened its existence as flush season production of milk exceeded the demand. Yet the cooperatives success depended on accepting the farmer milk year round. For the dairy development in India, institutions of national Importance i.e. National Dairy Development Board (NDDB) was established by the act of Parliament in 1965 in Anand, Gujarat. Also a Federation of Cooperative Societies (NCDFI) was formed which is located at Anand, Gujarat.

National Dairy Development Board[2]:

The National Dairy Development Board (NDDB) was founded in 1965 to replace exploitation with empowerment, tradition with modernity, stagnation with growth, transforming dairying into an instrument for the development of India's rural people. NDDB began its operations with the mission of making dairying a vehicle to a better future for millions of grassroots milk producers. The mission achieved thrust and direction with the launching of "Operation Flood", a programme extending over 26 years and which used World Bank loan to finance India's emergence as the world's largest milk producing nation. Operation Flood's third phase was completed in 1996 and has to its credit a number of significant achievements.

As per NDDB Annual Report 2015-16, India's 170992 village dairy cooperatives federated into 184 milk unions and 22 federations procured on an average 42.557 million kg of milk every day having 15.835 million farmers presently members of village dairy cooperatives. Since its inception, the Dairy Board has planned and spearheaded India's dairy programmes by placing dairy development in the hands of milk producers and the professionals they employ to

[2] http://www.nddb.coop/about/genesis

manage their cooperatives. In addition, NDDB also promotes other commodity-based cooperatives, allied industries and veterinary biological on an intensive and nation-wide basis.

National Cooperative Dairy Federation of India Limited[3]:

National Cooperative Dairy Federation of India Limited (NCDFI), based at Anand (Gujarat), is the apex body of the dairy and oilseeds growers cooperatives of the country. It has 27 State Cooperative Dairy and Oilseeds Growers Cooperative Federations as its members. The National Dairy Development Board (NDDB) is an institutional member of the NCDFI. The primary objective of NCDFI is to facilitate the working of dairy cooperatives through coordination, networking and advocacy. The objectives of the NCDFI are to promote the dairy and oilseeds/edible oil industry on cooperative lines; and to coordinate, help, develop and facilitate the working of dairy and oilseeds growers cooperatives and affiliated organizations. Important activities of NCDFI includes; coordinating sale of milk and milk products of its members to the Ministry of Defence and other para-military organizations; providing assistance to the members in dealing and negotiations with governments, national and international organizations and private and public undertakings, on behalf of the members. NCDFI annually coordinates the sale of about Rs.800 crores worth of dairy products of leading cooperative brands to the armed forces. NCDFI also functions as C&F agent for Frozen Semen Doses produced by Sabarmati Ashram *Gaushala*, Animal Breeding Centre, Alamadhi Semen Station and Rahuri Semen Station. Recently, NCDFI has launched an eMarket portal "NCDFIeMarket.com" for trading of dairy and agricultural commodities online. During April to November the business transacted was about Rs.380 crores. NCDFI has its head office located at Anand, Gujarat; and offices at Delhi, Ahmedabad, Raibareli and Chennai; The NCDFI is a paperless office with its operations being fully computerized.

[3] http://www.indiadairy.coop/index.html

1.5 Cooperative Dairy Sector in India

Dairy cooperatives[4] have played an important role in improving farmers' access to markets (Birthal and Negi, 2012; Birthal, 2016). During the last two and half decades, the number of dairy milk cooperatives in India has increased significantly. Between 1980-81 to 2015-16, the number of village dairy cooperatives has increased from 13284 to 170992 with an associated increase in dairy members from 1.75 million to 158.35 million and milk procured from less than 1.0 million tonne to 15.53 million tonnes, equivalent to about 10 per cent of the total milk produced in the country (Table 1.6, Fig. 1.1 to 1.3). During 2015-16, there were about 5.01 million women members in dairy cooperatives, while numbers of all women dairy cooperatives have increased to 32092 across the country (18.77 % to total). Out of the total milk procured, about 75.42 per cent milk is sold as liquid and the rest is converted into value added products. The dairy cooperatives are federated into unions[5] at the district level & further into federations at the state level.

Table 1.6: Growth of Dairy Cooperatives Societies in India

Particulars	1980-81	1990-91	2000-01	2013-14	2015-16
Dairy cooperatives (Nos.)	13284	63415	92206	165835	170992
Members (in thousands)	1747	7482	10738	15399	15835
Milk Procurement (000 kg/day)	2562	9702	16504	37953	42557
Milk procured (million tonnes)	0.94	3.54	6.02	13.85	15.53
% of milk output procured	3.0	6.6	7.5	9.5	10.0

Source: NDDB (2016, various issues).

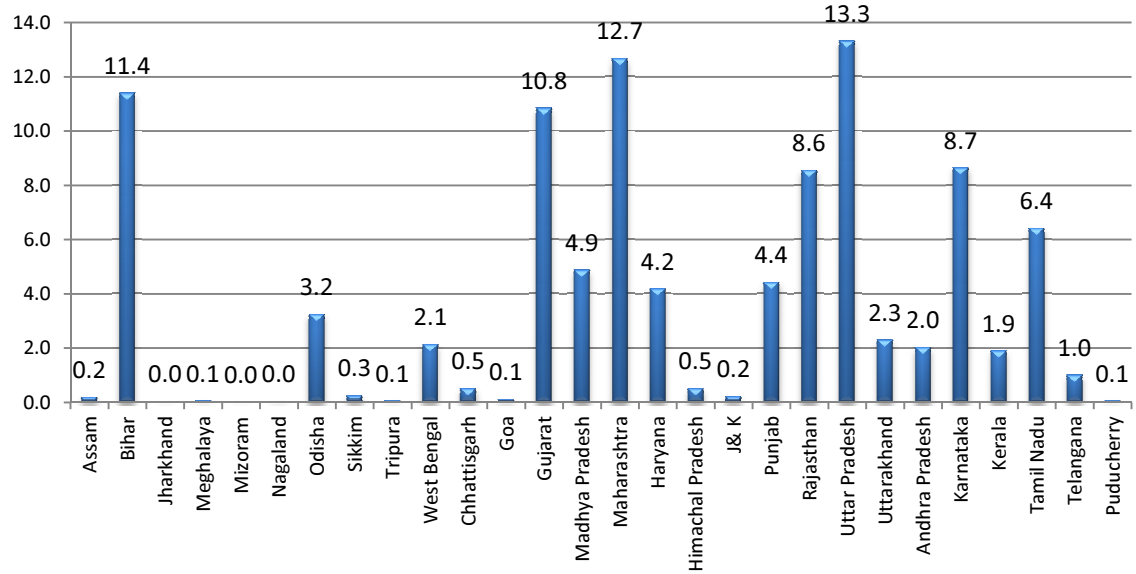
Cooperative sector in dairy production have played on important role in the development of the Indian dairy sector by linking village cooperative dairy producers with the markets and providing fair cost

[4] A Dairy Cooperative Society (DCS) is the grass root/village level cooperative institution where members supply their surplus milk and buy the various services provided by the cooperative.

[5] Milk Producers' Cooperative Unions: A Cooperative Union is the district level institution formed by the union of village level Dairy cooperative Societies for the purpose of collection, processing, marketing of milk and for organising services for the benefit of members.

and quality inputs and services to the farmers. Inter-state comparison indicates that despite of significant growth at National level, cooperatives have remained centred on a few states. Therefore, distribution of benefits has been uneven. Gujarat with the share of 8 per cent in the country's milk production accounts for about 11 per cent the total village level cooperatives, 21.80 per cent of the members and 42 per cent of the milk procurement (2015-16). In terms of procurement, Karnataka stands next (15.23 %) followed by Maharashtra (8.56 %), Rajasthan (6.12 %) and Tamil Nadu (7.14 %). Together, these states including Gujarat accounts for more than three fourth of the total milk procurement, which is more than twice of their share in milk production. These states also account for close to three fourth of the processing capacity in the cooperative sector.

Fig. 1.1: State-wise share in total Dairy Cooperative Societies in India (2015-16)



The 'while revolution' was driven by demand (Delgado et al., 2001); starting with the cooperative milk producers union, Amul (mainly women) in Anand (Khaira district of Gujarat). Dairy cooperatives account for the major share of processed liquid milk marketed in the country. Milk is processed and marketed by milk producer's cooperative unions, which federate into state cooperative milk marketing federations. The Amul model has helped India to emerge as

the largest milk producer in the world. More than 15.8 million milk producers pour their milk in 1.7 lakh dairy cooperative societies across the country. Their milk is processed in 184 District Co-operative Unions and marketed by 22 State Marketing Federations, ensuring a better life for millions. The Amul Model of dairy development is a three-tiered structure with the dairy cooperative societies at the village level federated under a milk union at the district level and a federation of member unions at the state level.

Fig. 1.2: Statewise Share in total milk producer members of Cooperative Societies (2015-16)

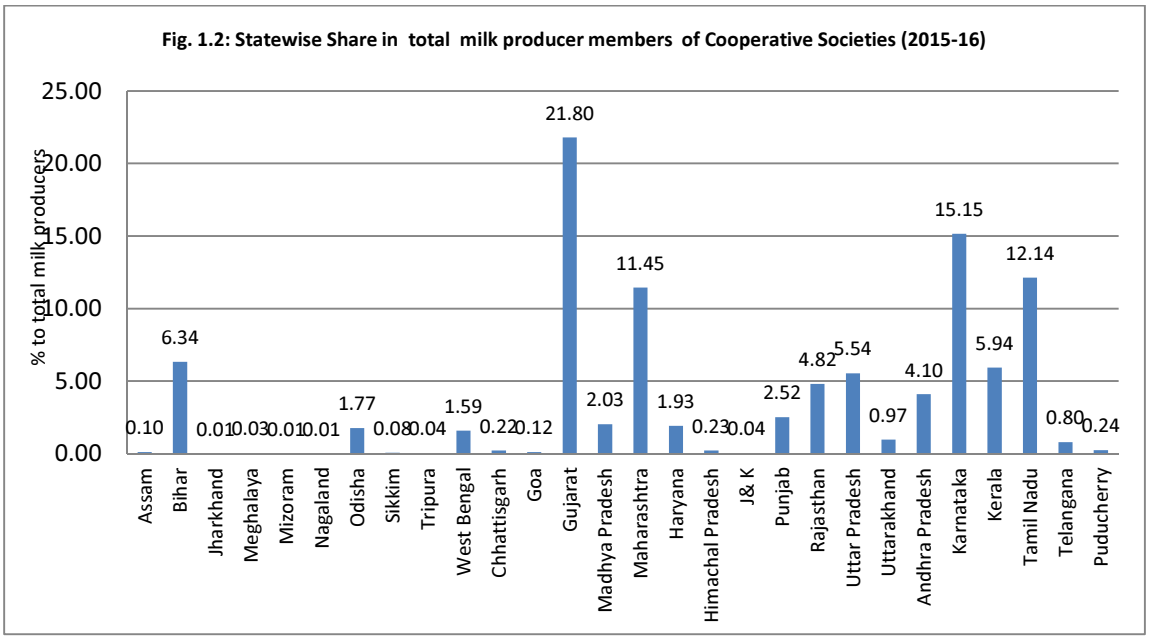
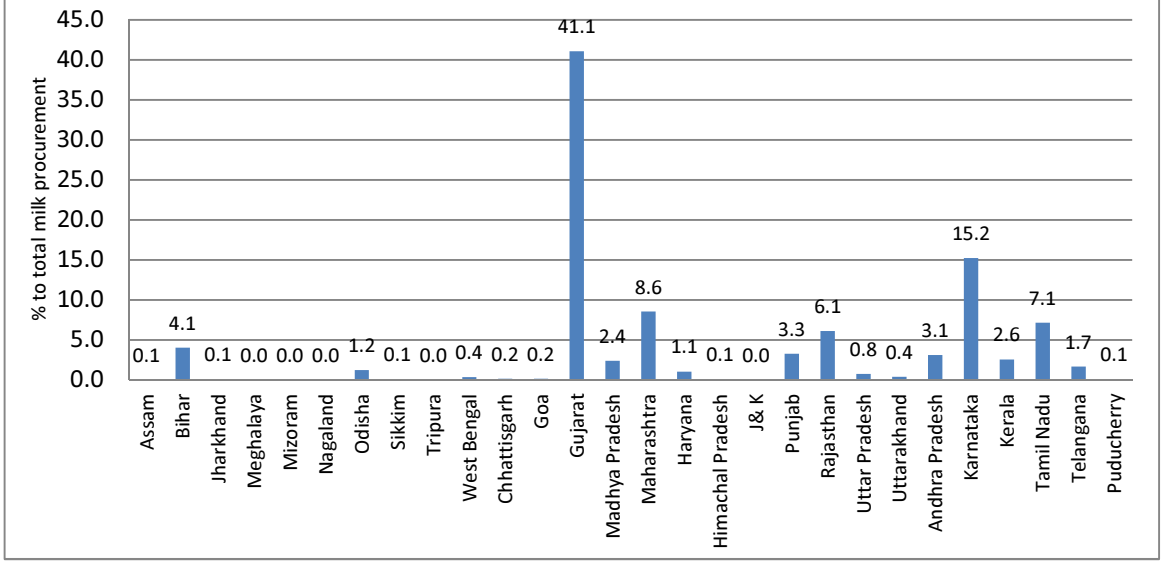


Fig. 1.3: Statewise Share in total milk procurement by Cooperative Societies (2015-16)



Dairy cooperatives are very strong in Gujarat and adjoining regions. Gujarat had recorded the highest share of number of producer members (21.8%) in country followed by Karnataka and Tamilnadu. However, as compared to share of producer members to total in country in 2000-01, share of Gujarat and Tamil had state has declined, while that of Rajasthan and Karnataka has improved in 2015-16 as compared to the year 2000-01 (Table 1.7).

Table1.7: Percentage Share of Major States in Total Milk Procurement by Cooperative sector in India

States/Regions	Percentage Share of Major States in Total Milk Procurement by Cooperative sector in India									
	1980-81	**1990-91**	**2000-01**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Haryana	1.29	0.97	1.67	2.02	1.95	1.86	1.16	1.17	1.15	1.06
Himachal Pradesh	0.00	0.14	0.15	0.21	0.23	0.24	0.22	0.18	0.14	0.13
J & K	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
Punjab	2.93	4.06	5.53	3.68	3.96	3.87	3.75	3.37	3.37	3.27
Rajasthan	5.39	3.75	5.37	6.39	6.22	6.07	5.88	6.57	6.68	6.12
Uttar Pradesh	2.50	3.94	4.79	2.00	1.92	1.73	1.48	1.09	1.06	0.76
Uttarakhand	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.41
North	**12.10**	**12.98**	**17.51**	**14.31**	**14.29**	**13.76**	**12.49**	**12.38**	**12.81**	**11.77**
Assam	0.00	0.04	0.02	0.02	0.02	0.02	0.05	0.07	0.06	0.05
Bihar	0.12	0.98	2.00	2.85	4.16	3.70	3.73	4.35	4.42	4.06
Jharkhand	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.03	0.04	0.14
Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
Mizoram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Nagaland	0.00	0.01	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01
Odisha	0.00	0.42	0.57	0.93	1.05	1.05	1.16	1.14	1.16	1.23
Sikkim	0.00	0.04	0.04	0.05	0.07	0.05	0.04	0.04	0.04	0.07
Tripura	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
West Bengal	1.21	0.54	1.24	1.01	1.04	0.76	0.52	0.47	0.41	0.37
East	**1.33**	**2.06**	**3.89**	**4.92**	**6.38**	**5.61**	**5.53**	**6.11**	**6.19**	**5.99**
Chhattisgarh	0.00	0.00	0.00	0.09	0.10	0.10	0.11	0.13	0.14	0.17
Goa	0.00	0.16	0.19	0.14	0.15	0.14	0.14	0.18	0.17	0.16
Gujarat	**52.46**	**31.97**	**27.67**	**35.00**	**34.97**	**36.40**	**37.91**	**39.68**	**40.30**	**41.07**
Madhya Pradesh	2.65	2.64	1.93	2.03	2.25	2.51	2.43	2.41	2.91	2.42
Maharashtra	6.44	19.29	18.05	12.18	11.59	10.90	10.11	9.02	8.54	8.56
West	**61.55**	**54.07**	**47.85**	**49.45**	**49.04**	**50.07**	**50.70**	**51.43**	**52.06**	**52.39**
Andhra Pradesh	3.08	7.86	5.33	5.58	5.24	5.24	5.94	5.06	3.22	3.13
Karnataka	10.19	9.45	11.43	13.78	14.29	14.90	14.95	15.11	15.44	15.23
Kerala	0.00	1.91	3.91	2.97	2.63	2.79	2.71	2.82	2.68	2.58
Tamil Nadu	11.75	11.40	9.80	8.80	8.01	7.53	7.59	6.98	6.42	7.14
Telangana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	1.67
Pondicherry	0.00	0.27	0.27	0.19	0.13	0.10	0.10	0.11	0.07	0.10
South	**25.02**	**30.89**	**30.75**	**31.33**	**30.29**	**30.56**	**31.28**	**30.08**	**28.94**	**29.86**

Source: NDDB (Annual Reports, various issues).

In case of milk procurement by cooperative societies, share of Gujarat in total milk procurement by cooperative sector was the highest (41.07 %), followed by Karnataka (15.23%) and Maharashtra (8.56%) during the 2015-16. Gujarat has increased its share from 27.67 percent in the 2000-01 to 41.07 percent in 2015-16. Karnataka and Rajasthan have also improved their share while Maharashtra has lost its share between 2000-01 and 2015-16 (Table 1.7).

1.6 Growth and Compositional Changes in Livestock & Bovine Population:

India holds more than a quarter of world's bovine population (Kishore, et al., 2016). The livestock population in the country has increased significantly over the period of time. It has increased from 292.8 million in 1951 to 512.1million in 2012 (Table 1.8), while the total livestock in the country showing overall decrease in 2012 over 2007, i.e. from 529.70 million in 2007 to 512.1 million in 2012. There were some changes in the composition of livestock at national level at broad groups like bovine, ovine and other livestock during the last six decades. The proportion of bovine population (includes cattle and buffalo) declined from nearly 68 per cent in 1951 to 58.5 per cent in 2012, while the proportion of ovines (sheep and goat) increased from about 29.5 per cent in 1951 to 39.11 per cent in 2012. The share of other animals has also decreased from 2.7 per cent to 2.4 per cent during corresponding period. The population of bovine stock consisting of cattle and buffalo increased at zero rate during 1992-1997 and then registered decline in 2003, increase in 2007 and then again declined in 2012. Between the two species, buffaloes stock increased much faster rate than of cattle population indicating the rising importance of buffaloes because of higher price for buffalo milk and substitution of drought animals with mechanical power in the country. The livestock density per hectare of net sown area has increased from 2.45 in 1951 to then 3.42 in 1997 and 3.63 in 2012.

Thus, trends in the composition of bovine and milch animal stock over the years indicate that the breedable cow and buffalo population is important from the milk production point of view. The composition of bovine breeding stock has improved in terms of increased share of in-milk animals in breeding stock as well as in total adult females. While the adult females among cattle account for about 38.4 per cent, while that of buffalo, same was 52 per cent. The rise in buffalo numbers is seen even more clearly in terms of ratio of buffalo to cows in the stock of adult females, or the milch animals. The ratio of milch buffalo to milch cows increased from 0.39 in 1951 to 0.79 in 1997 and then declined to 0.74 in 2012. Thus trends in size and composition of the bovine stock in the country show that the shift is taking place in favour of the bovines as milch animals (Table 1.8).

Table 1.8: Livestock Population in India by Species (1951-2012)

Species	Livestock Population in India by Species (In Million Numbers)												
	1951	1956	1961	1966	1972	1977	1982	1987	1992	1997	2003	2007$	2012
Cattle	155.3	158.7	175.6	176.2	178.3	180	192.5	199.7	204.6	198.9	185.2	199.1	199.9
Adult Female Cattle	54.4	47.3	51	51.8	53.4	54.6	59.2	62.1	64.4	64.4	64.5	73.0	76.7
Buffalo	43.4	44.9	51.2	53	57.4	62	69.8	76	84.2	89.9	97.9	105.3	108.7
Adult Female Buffalo	21	21.7	24.3	25.4	28.6	31.3	32.5	39.1	43.8	46.8	51	54.5	56.6
Total Bovines	**198.7**	**203.6**	**226.8**	**229.2**	**235.7**	**242**	**262.2**	**275.7**	**288.8**	**288.8**	**283.1**	**304.4**	**299.6**
Sheep	39.1	39.3	40.2	42.4	40	41	48.8	45.7	50.8	57.5	61.5	71.6	65.1
Goat	47.2	55.4	60.9	64.6	67.5	75.6	95.3	110.2	115.3	122.7	124.4	140.5	135.2
Horses & Ponies	1.5	1.5	1.3	1.1	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.6	0.6
Camels	0.6	0.8	0.9	1	1.1	1.1	1.1	1	1	0.9	0.6	0.5	0.4
Pigs	4.4	4.9	5.2	5	6.9	7.6	10.1	10.6	12.8	13.3	13.5	11.1	10.3
Mules	0.1	0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2
Donkeys	1.3	1.1	1.1	1.1	1	1	1	1	1	0.9	0.7	0.4	0.3
Yak	NC	NC	0	0	0	0.1	0.1	0	0.1	0.1	0.1	0.1	0.1
Mithun	NA	NA	NA	NA	NA	NA	NA	NA	0.2	0.2	0.3	0.3	0.3
Total Livestock	**292.9**	**306.6**	**336.5**	**344.5**	**353.2**	**369.4**	**419.6**	**445.2**	**470.9**	**485.4**	**485**	**529.7**	**512.1**
Poultry *	73.5	94.8	114.2	115.4	138.5	159.2	207.7	275.3	307.1	347.6	489	648.8	729.2

Notes: NC : Not Collected; NA: Not Available * Includes Chicken, ducks, turkey & other birds; $ Provisional derived from village level totals.
Source: GOI (2016).

Across the India states, livestock population has increased substantially in Gujarat (15.36%), Uttar Pradesh (14.01%), Assam (10.77%), Punjab (9.57%) Bihar (8.56%); Sikkim (7.96%), Meghalaya

(7.41%), and Chhattisgarh (4.34%) in 2012 over 2007. There are significant regional variations in total livestock and bovine population. The highest livestock population was recorded in Uttar Pradesh, followed by Rajasthan, Andhra Pradesh, Madhya Pradesh and Bihar which together accounts for one half of the total livestock in the country. In case of bovine stock, Utter Pradesh accounts for highest share of 18.38 per cent of total bovine stock in India (2012) followed by Rajasthan, Madhya Pradesh, Bihar and Gujarat.

Table 1.9: Milch Animal Population by States (2012)

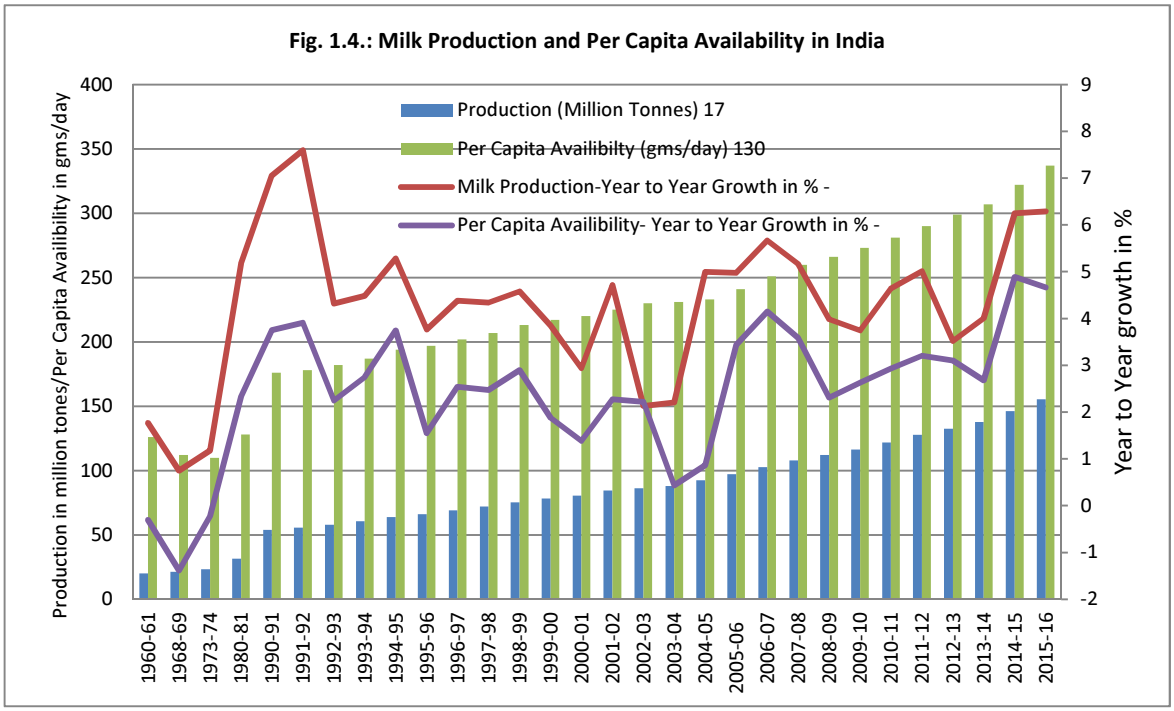
State / UT's	Adult Female Bovine Population by States (2012) (In thousands)						Total Livestock	
	Crossbred Over 2 1/2 years	Indigenous Over 3 years	Total Cows	Female Buffalo >3 years	Total Cows & Buffaloes	% to all India total	(000)	% to all India total
A & N Islands	8	10	18	2	20	0.02	155	0.03
Andhra Pradesh	1251	2228	3479	5763	9241	6.93	56099	10.96
Arunachal Pradesh	11	133	144	1	145	0.11	1413	0.28
Assam	175	3335	3531	157	3688	2.77	19082	3.73
Bihar	2023	3959	5982	4017	9999	7.50	32939	6.43
Chandigarh	5	1	6	10	16	0.01	24	0.00
Chhattisgarh	89	3238	3327	409	3736	2.80	15044	2.94
D & N Haveli	0	9	9	1	10	0.01	50	0.01
Daman & Diu	0	1	1	0	1	0.00	5	0.00
Goa	10	14	25	16	41	0.03	146	0.03
Gujarat	1048	3092	4141	5646	9787	7.34	27128	5.30
Haryana	522	322	844	2914	3758	2.82	8820	1.72
Himachal Pradesh	549	403	952	423	1375	1.03	4844	0.95
J& K	703	525	1228	417	1644	1.23	9201	1.80
Jharkhand	137	2486	2622	398	3020	2.27	18053	3.53
Karnataka	1829	2540	4369	2056	6425	4.82	27702	5.41
Kerala	630	36	666	10	676	0.51	2735	0.53
Lakshadweep	0	2	2	0	2	0.00	50	0.01
Madhya Pradesh	415	6538	6954	4251	11204	8.41	36333	7.10
Maharashtra	2138	3302	5440	3359	8799	6.60	32489	6.34
Manipur	20	77	96	23	119	0.09	696	0.14
Meghalaya	19	333	352	4	357	0.27	1958	0.38
Mizoram	6	10	16	2	18	0.01	312	0.06
Nagaland	52	38	90	9	99	0.07	911	0.18
NCT Of Delhi	32	15	47	95	142	0.11	360	0.07
Odisha	575	2884	3459	250	3709	2.78	20732	4.05
Pondicherry	31	1	32	1	33	0.02	120	0.02
Punjab	1182	115	1297	2805	4101	3.08	8117	1.59
Rajasthan	929	5540	6470	6933	13403	10.06	57732	11.27
Sikkim	57	5	62	0	62	0.05	292	0.06
Tamilnadu	3411	1074	4485	423	4908	3.68	22723	4.44
Tripura	54	289	343	4	347	0.26	1936	0.38
Uttar Pradesh	1828	7241	9069	15432	24501	18.38	68715	13.42
Uttarakhand	259	548	807	582	1389	1.04	4795	0.94
West Bengal	1270	5053	6323	172	6494	4.87	30348	5.93
ALL	21268	55417	76685	56586	133271	100.00	512057	100.0

Source: GOI (2016)

1.7 Growth in Milk Production and Productivity:

The dairy sector has witnessed a quantum jump in all areas, including milk production, processing and/or marketing during the last three decades. Milk production in India increased from 17 million tonnes in 1950-51 to 155.5 million tonnes in 2015-16 and expected to reach 160 million tonnes in 2016-17 (Fig 1.4, Table 1.10). From being a receipt of massive material support from the World Food Programme and European Economic Community in the 1960s & early 1970s, India has positioned itself as the world's largest producer of milk (Sharma, 2004). Milk production was stagnant during the decades of 1950s and 1960s and annual production growth was negative for many years.

Fig. 1.4.: Milk Production and Per Capita Availability in India



During last two years, compensating dairy farmers to some extent from the losses in crop sector and elsewhere due to two consecutive poor monsoon years, India continues to be the largest producer of milk in the world. Milk production has gone up from 11.2 million tonnes during 2008-09 to 146.3 million tonnes during 2014-15, and further to 155.5 million tons in 2015-16 with an annual growth rate of 6.3 per cent achieved over the previous year during the last two years. It has achieved a significant jump in the annual growth rate over

the previous tears from 3.94 per cent during 2008-09 to 6.3 percent during 2015-16.

However, all the states are not doing well and the growth in milk production varies widely in various regions and among states within the regions (Table 1.11). The western and central Indian states have done well in terms of growth in milk production during 2015-16, while the North eastern and eastern states, due to their regional peculiarities, are trying to catch up. Rajasthan (9.25 per cent) and Maharashtra (6.4 per cent) have achieved a higher growth rate during 2015-16 among all the western regional states while Madhya Pradesh has achieved significant higher growth rate (12.7 per cent) in milk production among the two central regional states of Madhya Pradesh and Chhattisgarh during 2015-16. Eastern regions of the country needs special attention as it seems to be lagging behind in dairying states such as Punjab, Gujarat and Karnataka (Kumar, 2016). Bihar (6.6 per cent) in the eastern region and Sikkim (33.5 per cent), Arunachal Pradesh (8.8 per cent), Tripura (7.8 per cent) and Mizoram (7.4 per cent) in the North Eastern region have performed better during the years. Andhra Pradesh (12 percent) in the southern region and Jammu and Kashmir (16.5 per cent), Himachal Pradesh (9.4 per cent) and Haryana (6.1 per cent) among the northern regional states have achieved a growth rate that is higher than the national average during 2015-16. In case of milk procurement, during the period from 2009-10 to 2015-16, the central and western Indian regions have done well in milk production at 8.7 per cent and 7.58 per cent, respectively (Table 1.11, Fig. 1.5). The sector is witnessing more action from private dairies, which are likely to continue, especially in the area of milk procurement. They are now shifting their strategies to source milk directly from farmer and not through contractors. Simultaneously, they are continuing their focus on production and marketing of value added milk and milk products.

Table 1.10: Milk production and Per Capita Availability in India

Year	Production		Per Capita Availability	
	Million Tonnes)	Year to Year Growth in %	gms/day	Year to Year Growth in %
1950-51	17.0	-	130	-
1960-61	20.0	1.76	126	-0.31
1968-69	21.2	0.75	112	-1.39
1973-74	23.2	1.18	110	-0.22
1980-81	31.6	5.17	128	2.34
1990-91	53.9	7.06	176	3.75
1991-92	55.6	7.59	178	3.91
1992-93	58.0	4.32	182	2.25
1993-94	60.6	4.48	187	2.75
1994-95	63.8	5.28	194	3.74
1995-96	66.2	3.76	197	1.55
1996-97	69.1	4.38	202	2.54
1997-98	72.1	4.34	207	2.48
1998-99	75.4	4.58	213	2.90
1999-00	78.3	3.85	217	1.88
2000-01	80.6	2.94	220	1.38
2001-02	84.4	4.71	225	2.27
2002-03	86.2	2.13	230	2.22
2003-04	88.1	2.20	231	0.43
2004-05	92.5	4.99	233	0.87
2005-06	97.1	4.97	241	3.43
2006-07	102.6	5.66	251	4.15
2007-08	107.9	5.17	260	3.59
2008-09	112.2	3.99	266	2.31
2009-10	116.4	3.74	273	2.63
2010-11	121.8	4.64	281	2.93
2011-12	127.9	5.01	290	3.20
2012-13	132.4	3.52	299	3.10
2013-14	137.7	4.00	307	2.68
2014-15	146.3	6.25	322	4.89
2015-16	155.5	6.29	337	4.66

Source: GOI (2016).

Though India stands at first position in terms of cattle and buffalo population in the world, the productivity of dairy animals in India is very low as compared to other countries (Table 1.12). The reason cited for this is inappropriate feeding as well as inadequate supplies of quality feeds and fodder in addition to the low genetic profile of the Indigenous breeds. It is not be possible to achieve higher productivity in a milch animal by merely increasing its genetic potential, due attention needs to be given on proper feeding of milch animal.

Table 1.11: State-wise Milk Production in India

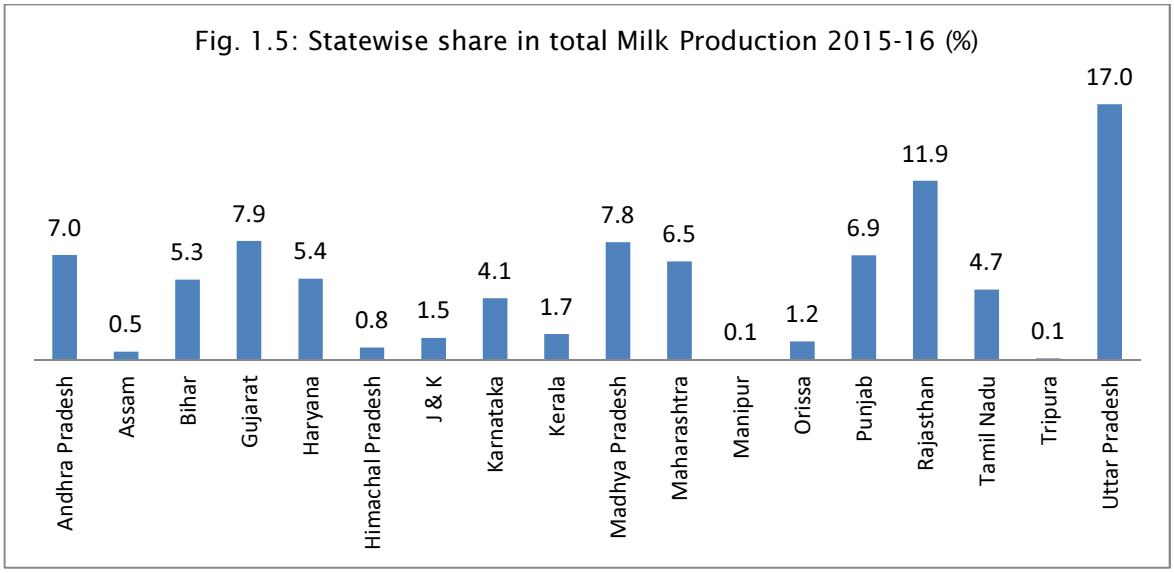
State	Milk Production (000 tonnes)					% to all India Total
	2001-02	2005-06	2010-11	2014-05	2015-16	
Andhra Pradesh	5814	7624	11203	9656	10817	7.0
Arunachal Pradesh	42	48	28	46	50	0.0
Assam	682	747	790	829	843	0.5
Bihar	2664	5060	6517	7775	8288	5.3
Goa	45	56	60	67	54	0.0
Gujarat	**5862**	**6960**	**9321**	**11691**	**12262**	**7.9**
Haryana	4978	5299	6267	7901	8381	5.4
Himachal Pradesh	756	869	1102	1172	1283	0.8
J & K	1360	1400	1609	1951	2273	1.5
Karnataka	4797	4022	5114	6121	6344	4.1
Kerala	2718	2063	2645	2711	2650	1.7
Madhya Pradesh	5283	6283	7514	10779	12148	7.8
Maharashtra	6094	6769	8044	9542	10153	6.5
Manipur	68	77	78	82	79	0.1
Meghalaya	66	73	79	83	84	0.1
Mizoram	14	15	11	20	22	0.0
Nagaland	57	74	76	76	77	0.0
Orissa	929	1342	1671	1903	1903	1.2
Punjab	7932	8909	9423	10351	10774	6.9
Rajasthan	7758	8713	13234	16934	18500	11.9
Sikkim	37	48	43	50	67	0.0
Tamil Nadu	4988	5474	6831	7132	7244	4.7
Tripura	90	87	104	141	152	0.1
Uttar Pradesh	**14648**	**17356**	**21031**	**25198**	**26387**	**17.0**
West Bengal	3515	3891	4471	4961	5038	3.2
A&N Islands	23	20	25	16	15	0.0
Chandigarh	43	46	45	44	43	0.0
D&N Haveli	8	5	11	9	9	0.0
Daman & Diu	1	1	1	1	1	0.0
Delhi	294	310	480	280	281	0.2
Lakshadweep	2	2	2	4	3	0.0
Pondicherry	37	43	47	48	48	0.0
Chhattisgarh	795	839	1029	1232	1277	0.8
Uttarakhand	1066	1206	1383	1565	1656	1.1
Jharkhand	940	1335	1555	1734	1812	1.2
Telangana	-	-	-	4207	4442	2.9
All India	84406	97066	121848	146314	155491	100.0

Source: GOI (2016).

Table 1.12: Milk yield in India and other selected countries (2012)

Country	Yield (kg/animal)	
	Cow	Buffalo
India	1196.0	1709.8
Israel	11579.7	NA
Canada	8816.8	NA
Denmark	8529.3	NA
USA	9841.3	NA
Saudi Arabia	10802.5	NA
South Korea	9895.8	NA
Pakistan	1263.5	1971.0
Sri Lanka	842.9	654.5
World average	2318.7	1612.4

Note: N.A. Not Available
Source: http://www.fao.org/faostat/es/.



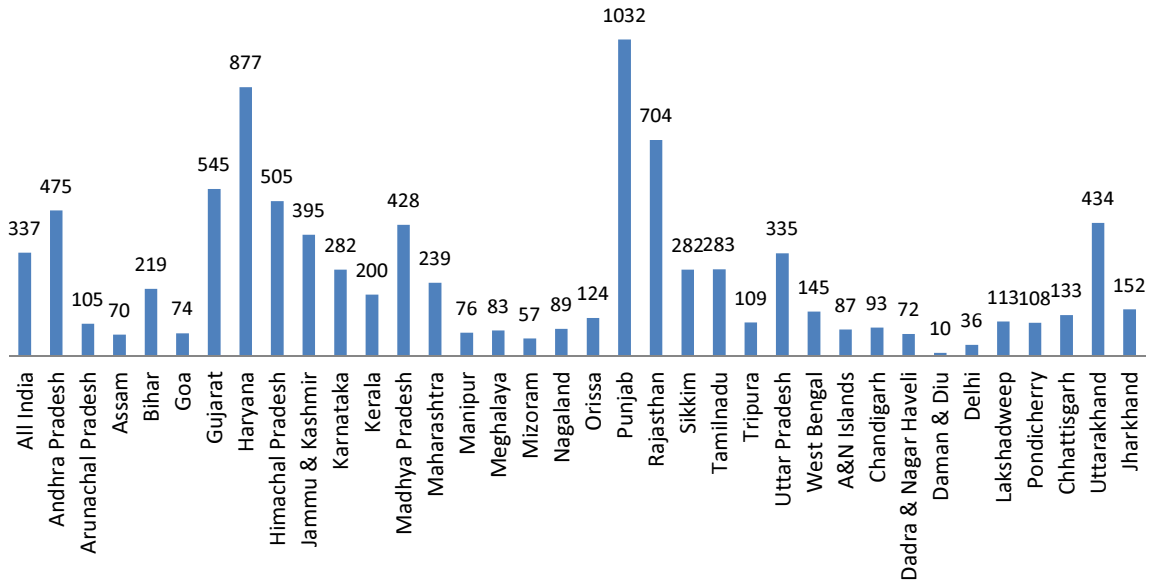
1.8 Per Capita Milk Availability in India:

The per capita availability of the milk in the country has also increased significantly from 130 grams/day in 1950-51 to as increased to 337 gram per day in 2015-16 as against the world average of 294 grams per day during 2013. This represents sustained growth in the availability of milk and milk products for our growing population. However, there are large interregional and interstate variations in milk production as well as in per capita availability in India. The largest producer of milk is Uttar Pradesh which produces 17.0 per cent of the total milk production in the country followed by Rajasthan (11.9) and Gujarat (7.9 %). About 70 percent of national milk production comes from the major eight milk producing states, viz. Uttar Pradesh, Rajasthan, Andhra Pradesh, Gujarat, Punjab, Madhya Pradesh, Maharashtra and Haryana (Fig. 1.5). However, only 9 States were having per-capita availability more than the national average of 307 gm/day in the year 2013-14 (see, Fig. 1.6).

The major milk-producing states in the country have good resource endowment and infrastructure, while eastern states are lagging behind in terms of dairy development. The country's estimated demand for milk is likely to be about 155 million tonnes by 2016-17 and around 200 million tonnes in 2021-22 (NDDB, 2014 & 2014a). To

meet the growing demand, there is a need to increase the annual incremental milk production from 4 million tonnes per year in past 10 years to 7.8 million tonnes in the next 8 years (210 million by 2021-22). To meet the growing demand, it is necessary to maintain the annual growth of over 4 per cent in the next 15 years. It is therefore, imperative to increase productivity of milch animals.

Fig. 1.6: State-wise Per Capita Milk Availability in India 2015-16 (gm/day)



1.9 Status of Availability of Feed and Fodder

Feed accounts for 65-70 per cent of the total cost of production and maintenance of the animals. There is a direct relation between the nutritional status of the animals and the type of feed feeded. For getting the best results, feeding of animal needs planned, scientific, practical as well as economical approach. Livestock feeds are generally classified as roughages and concentrates. Roughages are further classified into green fodder and dry fodder. Green fodder are cultivated and harvested for feeding the animals in the form of forage (cut green and fed fresh), silage (preserved under anaerobic condition) and hay (dehydrated green fodder). The estimates of fodder production in the

country vary widely. Fodder production and its utilization depend on various factors like cropping pattern followed, climatic condition of the area as well as the socio-economic conditions of the household and type of livestock reared. The cattle and buffaloes are normally feeded on the fodder available from cultivated areas, supplemented to a small extent by harvested grasses. The total area under cultivated fodders was 9.19 million hectares in 2012-13, which accounts for hardly 2.8 per cent of gross cropped area (Table 1.13). While share of area under permanent pastures and other grazing land was hardly 3.1 per cent.

The major sources of fodder supply are crop residues, cultivated fodder and fodder from common property resources like forests, permanent pastures and grazing lands. At present, there is huge gap between demand and supply of animal feed and fodder (see, Tables 1.14 to 1.17). The increased growth of livestock particularly that of genetically upgraded animals, has further aggravated the situation. Additionally, the quality of the available fodder is also poor, being deficient in energy, protein and minerals. The pattern of deficit varies in different parts of the country. For instance, the green fodder availability in Western Himalayan, Upper Gangetic Plains and Eastern Plateau and Hilly Zones is more than 60 per cent of the actual requirement. In Trans Gangetic Plains, the feed availability is between 40 and 60 per cent of the requirement and in the remaining zones, the figure is below 40 per cent. In case of dry fodder, availability is over 60 per cent in the Eastern Himalayan, Middle Gangetic Plains, Upper Gangetic Plains, East Coast Plains and Hilly Zones. In Trans Gangetic Plains, Eastern Plateau and Hills and Central Plateau and Hills, the availability is in the range of 40-60 per cent, while in the remaining zones of the country the availability is below 40 per cent. The regional deficits are more important than the national deficit, especially for fodder, which is not economical to transport over long distances.

Table 1.13: State-wise Area under Fodder Cultivation and Permanent Pastures and Other Grazing Lands in India (000 ha)

States/UTs	Fodder Crops (2012-2013)*		Permanent Pastures and Other Grazing Land (2013-2014)	
	(000 ha)	% to GCA	(000 ha)	% to GCA
Andaman and Nicobar Islands		0.0	4	0.5
Andhra Pradesh	87	0.3	212	1.3
Arunachal Pradesh		0.0	18	0.2
Assam	10	0.1	168	2.1
Bihar	24	0.3	15	0.2
Chandigarh		0.0		0.0
Chhattisgarh	1	0.0	882	6.5
Dadra and Nagar Haveli	1	2.0	1	2.0
Daman and Diu	0	0.0		0.0
Delhi	1	0.7		0.0
Goa		0.0	1	0.3
Gujarat	850	4.3	851	4.3
Haryana	432	9.8	26	0.6
Himachal Pradesh	8	0.1	1510	27.1
Jammu and Kashmir	53	0.2	114	0.5
Jharkhand		0.0	114	1.4
Karnataka	33	0.2	906	4.7
Kerala	5	0.1	0	0.0
Lakshadweep	0	0.0		0.0
Madhya Pradesh	406	1.3	1291	4.2
Maharashtra	901	2.9	1242	4.0
Manipur		0.0	1	0.0
Meghalaya		0.0		0.0
Mizoram		0.0	5	0.2
Nagaland		0.0		0.0
Odisha		0.0	524	3.4
Pondicherry	0	0.0		0.0
Punjab	510	10.1	5	0.1
Rajasthan	4853	14.2	1694	4.9
Sikkim		0.0		0.0
Tamil Nadu	179	1.4	110	0.8
Telangana			302	2.6
Tripura		0.0	1	0.1
Uttar Pradesh	800	3.3	65	0.3
Uttarakhand	32	0.6	192	3.6
West Bengal	3	0.0	2	0.0
India	**9188**	2.8	**10256**	3.1

Source: www.indiastat.com

Table 1.14: Supply and Demand of Green and Dry Fodder

(Figures in million tonnes)

Year	Supply		Demand		Deficit as % of Demand	
	Green	Dry	Green	Dry	Green	Dry
1995	379.3	421	947	526	59.95	19.95
2000	384.5	428	988	549	61.10	21.93
2005	389.9	443	1025	569	61.96	22.08
2010	395.2	451	1061	589	62.76	23.46
2015	400.6	466	1097	609	63.50	23.56
2020	405.9	473	1134	630	64.21	24.81
2025	411.3	488	1170	650	64.87	24.92

Source: www.indiastat.com

Table 1.15: Availability, Requirement & Deficit of Crude Protein (CP) & Total Digestible Nutrients (TDN) including CP & TDN from concentrates

Year	Crude Protein CP and Total Digestible Nutrients TDN *(Figures in million tonnes)*					
	Requirement		Availability		Deficit (%)	
	CP	TDN	CP	TDN	CP	TDN
2000	44.49	321.29	30.81	242.42	30.75	24.55
2005	46.12	333.11	32.62	253.63	29.27	23.86
2010	47.76	344.93	34.18	262.02	28.44	24.04
2015	49.39	356.73	35.98	273.24	27.15	23.41
2020	51.04	368.61	37.50	281.23	26.52	23.70
2025	52.68	380.49	39.31	292.45	25.38	23.14

Source: www.indiastat.com

Table 1.16: Availability, requirements and deficit of concentrates for livestock

Particulars	Availability, requirements and deficit of concentrates for livestock *(million tonnes)*				
	2002-03	2003-04	2004-05	2005-06	2006-07
Available	41.96	43.14	44.35	45.63	48.27
Required	117.44	120.52	123.59	127.09	130.55
Deficit (%)	64.27	64.21	64.12	64.10	63.03

Source: www.indiastat.com

Table 1.17: State-wise Availability and Requirement of Fodder in India (2008)

(Dry Matter in Million Tonnes)

States/UTs	Availability		Requirement	
	Crop Residues	Greens	Crop Residues	Greens
Andhra Pradesh	15.69	4.88	31.71	16.91
Arunachal Pradesh	0.47	1.57	1	0.53
Assam	5.82	0.95	12.39	6.61
Bihar	16.23	0.81	23.49	12.53
Chhattisgarh	9.93	2.83	14.93	7.96
Goa	0.13	0.05	0.15	0.08
Gujarat	10.61	14.48	22.32	11.9
Haryana	8.75	6.57	9.95	5.31
Himachal Pradesh	2.3	1.98	4.6	2.45
Jammu and Kashmir	2.53	0.64	6.79	3.62
Jharkhand	4.1	0.88	13.59	7.25
Karnataka	14.59	3.55	20.66	11.02
Kerala	0.71	0.39	2.91	1.55
Madhya Pradesh	24.3	11.65	37.41	19.95
Maharashtra	22.21	25.12	33.68	17.96
Manipur	0.36	0	0.72	0.38
Meghalaya	0.31	0.4	1.17	0.62
Mizoram	0.15	0.5	0.06	0.03
Nagaland	0.56	0.3	0.74	0.4
Orissa	12.25	2.46	22.27	11.88
Punjab	13.71	7.38	10.58	5.64
Rajasthan	21.67	33.53	33.53	17.88
Sikkim	0.23	0.01	0.25	0.13
Tamil Nadu	7.01	3.7	16.46	8.78
Tripura	0.53	0.19	1.09	0.58
Uttar Pradesh	42.07	15.73	57.19	30.5
Uttarakhand	2.05	1.73	4.9	2.61
West Bengal	13.77	0.51	30.3	16.16
A& N Islands	0.02	0	0.11	0.06
Chandigarh	0	0	0.04	0.02
Dadra & Nagar Haveli	0.04	0.2	0.8	0.4
Daman and Diu	0.01	0	0.1	0
Delhi	0.09	0.1	0.43	0.23
Lakshadweep	0	0	0.1	0
Pondicherry	0.06	0.01	0.11	0.06
India	**253.26**	**142.82**	**415.83**	**221.63**

In animal feed supply, coarse cereals have a major role and these account for about 17 per cent of the total cereals (Table 1.18). Production of these cereals is hovering around 40 million tonnes. Maize accounts for around 55 per cent of the total coarse cereals produced in the India. Most of the coarse cereals in the developed countries are mainly used for cattle feed and some of the cereals like barley are used in breweries. However, in India their use is mainly for direct consumption mostly by poor in the villages.

Table 1.18: Production of Coarse Cereals in India

Crops	Production of Coarse Cereals in India *(Figures in million tonnes)*							
	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2015-16
Coarse Cereals	15.38	23.74	30.55	29.02	32.7	31.08	43.4	38.4
Total Cereals	219.9	203.5	226.3	242.2	236.9	185.74	226.25	235.83
Coarse cereals % to total cereals	6.99	11.67	13.50	11.98	13.80	16.73	19.18	16.28
Maize % to total coarse cereals	0.79	2.00	3.31	2.87	3.76	6.48	9.60	8.90

Source: GOI (2015, various issues) Agricultural Statistics at a Glance, GOI.

Compound feed plays an important role in improvement in milk yields of cattle and buffalo by offering balanced diet. Driven by the strong growth in dairy industry, compound feed volumes have increased at an average rate of 6 per cent between 2007-08 to 2012-13. Based on the number of productive dairy animals and the current-requirement (0.5 kg), the current estimated compound feed requirement is 65-70 million tonnes, while current production amounts are sufficient to feed only about 7 per cent of the total breedable animals in India. Current consumption volumes are approximately 7.5 million tonnes. The actual market is much smaller because a large portion of this market is serviced by the unorganized (grazing) sector. The three key types of cattle-feed producers are (a) Home-mixers, (b) Dairy cooperatives; and (c) Private sector manufacturers of compound cattle feed. There would still be a significant gap between market potential and supply. Many of cooperatives have also set up their own

modern computerized feed Plants. They have modern milk processing plants from which they produce and market pasteurized milk, butter, butter oil, chocolate, and other value added products. The feed production from cooperatives is about 2.5 million tonnes per year (Table 1.19).

Table 1.19: Region-wise Cattle Feed Production in India

Region	States	Private Sector (million MT/year)	Cooperative Sector (million MT/year)	Total (million MT/year)	% Share
Western	Gujarat, Maharashtra, Goa, Madhya Pradesh	1.80	1.70	3.50	48%
Northern	Punjab, Haryana, UP, Uttarakhand, Rajasthan	0.80	0.42	1.22	17%
Southern	Karnataka, AP,TN, Kerala, Pondicherry	1.20	1.11	2.31	31%
Eastern	Bihar, Jharkhand, Odisha, WB, Assam	0.20	0.10	0.30	4%

Source: FASR (2015), Yes Bank (*https://www.yesbank.in/.../indian_feed_industry-_revitalizing_nutritional_security.pdf*)

1.10 Veterinary Infrastructure and Manpower[6]:

Improving animal health and veterinary services has been a priority on India's livestock development agenda. As its share in total spending increased gradually, veterinary infrastructure and manpower has grown considerably (see, Birthal and Negi, 2012). Between 1982 and 2010, the number of veterinary institutions (hospitals, polyclinics, dispensaries, stockman centres and mobile dispensaries) increased 1.6 times and the number of field veterinarians by almost three times. The number of livestock units per veterinarian declined from more than 15,540 in 1982 to less than 7,000 in 2010 (Table 1.20).

Table 1.20: Veterinary Infrastructure and Manpower in India

Year	No. of Veterinary Institutions	No. of Veterinarians	Cattle equivalent units per Veterinary Institutions	Cattle Equivalent Units per Veterinaries
1982	33323	18000	8394	15540
1992	40586	33600	7632	9219
1997	50846	37200	6129	8377
2003	51973	38100	5926	8084
2007	52757	40421	6310	8236
2010	54906	50772	6375	6894

Source: Birthal and Negi (2012).

[6] For more details, please see Birthal and Negi (2012).

But there is considerable regional variation in veterinary infrastructure and manpower. Livestock units per veterinary institution are high in some of the poorest states such as Jharkhand, Bihar, Madhya Pradesh and Chhattisgarh. High income states such as Punjab and Haryana, on the other hand, have relatively better infrastructure and less number of livestock units per veterinary institution. The delivery of veterinary services, however, remains weak. Shortage of manpower, poor supplies of medicines, vaccines and equipment are the often-cited reasons for inefficiency in the delivery of services. The focus on animal health has been largely on provision of curative services and not much attention has been paid to preventive mechanisms. The recent emergence of avian influenza has attracted considerable attention to the need for developing an efficient delivery system. Further, with imminent changes in climate, the severity and pattern of animal diseases are likely to be altered, implying a need for preparing the livestock sector to cope with climate change. It, therefore, becomes imperative to emphasise developing early-warning systems and mechanisms for preventive disease management. It may be noted that India could control rinderpest because efforts and investment were effectively targeted. The immunisation programme against foot and mouth disease has been reported to be successful in some states.

1.11 Need of the Study:

In spite of sustained growth in milk production, the demand for milk is outpacing its supply. Gandhi and Zhou (2010) have projected the demand for milk to grow faster than its annual production. The increasing demand-supply gap may lead to sharp rise in the prices of milk. Mishra and Roy (2011) have shown that rising price of milk has been the most important contributor to food price inflation in India since 1998. The demand for milk and dairy products is expected grow at a higher rate compared to the previous decade due to accelerated economic growth. According to various estimates, the demand for milk

and milk products is expected to grow at an annual incremental rate of 8-9 million tonnes, as against the present rise of about 5 million tonnes. Datta and Ganguly (2002) estimated Indian milk demand for 2020 under various GDP growth rates. The study reported that if the current growth continues for the next twenty years (the nation has been growing at a rate between 5 and 7 percent over past five years), milk consumption is likely to more than double by 2020.

To achieve the above growth, it is believed that the growth has to be inclusive and geographically more diffused. Quantum jump in milk production is possible through increase in productivity, and linking small holders to dairy cooperatives/producer groups/SHGs with forward linkages with milk processing. This means that the areas which have low levels of productivity, preponderance of low yielding non-descript animals, but rich in resource endowment and presence of good markets would require attention of the policy makers for initiating a focussed program for the study area. It is well recognised that western, northern and southern parts of India have progressed significantly in dairy development while the eastern part of the country has lagged far behind in dairy development. Therefore, a comprehensive assessment of the present status of dairy development in the study area and potential for growth from the perspective of regional and national consideration needs to be drawn up for dairy development.

Beside, despite of impressive growth in milk production during the past three decades, productivity of dairy animals continues to remain very low and milk marketing system is primitive (Rajendran and Mohanty, 2004; Sarkar and Ghosh, 2010). Currently, more than 80 per cent of the milk produced in the country is marketed by the unorganised sector (private organisations) and less than 20 per cent is marketed by the organised sector (government or cooperative societies). But, both organised and unorganised sectors in the dairy

industry of the country face a lot of constraints. Therefore, it is essential to study the various types of constraints faced by the both cooperative and no cooperative dairy producers.

Besides, the need for ascertaining different program of the central and state government relating to dairying, at the localised level (say, district level), arises from the fact that (i) there is presently no documentation on the different schemes of the state and central governments related to dairying, (ii) how far these schemes are mutually related, (iii) what is the system to converge them at the local level and how is the convergence process is enforced. This need to be studied from the perspective of a district so that the multiplicity of different schemes are known, target population are identified, conditions for their implementation are specified and who are the coordinating and controlling departments of the government. The convergence of all state and central government schemes at the implementation level, in a given territory, would bring about improvement in milk production sector in a manner that will be sustainable, while ensuring social and economic improvements of the dairy farmers. Therefore, the present study was undertaken in the state of Gujarat which is the leading milk producer in the country with cooperative dairy sector well established, but growth in dairy is not uniform in all regions of the state.

1.12 Objectives of the study:

a) To assess the present status of dairying with reference to animal distribution, milk production, consumption and marketable surplus.
b) To identify the constraints in dairy development from supply side, institutional deficiency and processing infrastructure.
c) To identify different central and state government schemes related to dairy development at district level and document technical as well as operational details of the schemes and understand how convergence is ensured.

d) To highlight the facilitating factors that could help promoting dairy development to improve socio economic status of the milk producers.
e) To suggest broad areas for focussed interventions for promoting dairy development in the selected state and the way forward.
f) To suggest suitable policy measures to ensure compliance of effective convergence of various schemes for the benefits of dairy farmers.

1.13 Data and Methodology:

The study is based on both, the secondary and primary level data. The secondary data pertain to dairy development efforts, various schemes implemented and in force, changes in size and composition of livestock population and milch animals as well as milk production across regions, per capita milk availability, infrastructure available, related data will be compiled from the offices of the NDDB and State Department of Animal Husbandry and Dairying as well as from the government publications such as *Livestock Census (Department of Animal Husbandry), Statistical Abstract of the State, Economic Surveys* and related web sites. Besides tabular analysis, annual compound growth rates were calculated to indicate an increase or decrease in livestock populations and other related parameters during inter census periods/years. For the study, primary data were collected from the selected Milk producers, Primary Dairy Cooperative Societies and Milk Unions through structured and pre-tested schedules/questionnaires.

Sampling Framework

The primary data were collected from the sample farmers selected on the basis of the sampling design described below and as presented in Tables 1.21 to 1.23.

I) Selection of Milk Union/District Milk Union/District (MU/DU/D):

- Four milk unions/district milk unions/districts were selected in Gujarat, i.e. one from each region (Map 1.1, Tables 1.21 &1.24).

- It was attempted that the four milk unions/district milk unions/districts were selected from different regions/zones in order to capture holistic macro picture at the state level.
- Accordingly, Mehsana (North Gujarat), Bharuch (South Gujarat), Junagadh (West Gujarat/Saurashtra) and Panchmahal (East Gujarat) districts were selected.
- On the basis of 100 potential districts list prepared by the NDDB, Anand- One milk union/district milk union/district each from three categories i.e. High, Moderate, Low and one from either non-categorized/from region not covered were selected.

Table 1.21: Four Agrarian Socio-ecologies of Gujarat

Regions	Districts	Features
Tribal areas	Dahod, Panchmahal and Dangs	**First or second generation crop and dairy farmers**; low level of economic enterprise; rainfed farming; semi-arid to humid climate.
North Gujarat	Ahmedabad, Gandhinagar, Patan, Mehsana, Banaskantha, Sabarkantha	Enterprising farmers; Groundwater is the main source of irrigation; deep, alluvial aquifer system that is overexploited; **highly developed dairying and dairy cooperatives**.
Canal districts (South and Central Gujarat)	Anand, Kheda, Vadodara, Bharuch, Surat, Narmada, Navsari, Valsad	Humid and water-abundant part of Gujarat; large areas under canal irrigation systems such as Mahi, Ukai-Kakarapar, Karjan, Damanganga, Sardar Sarovar; conjunctive use of groundwater and canal water through farmer initiative; alluvial aquifers that are amply recharged by surface irrigation; enterprising farmers; **strong dairy cooperatives.**
Saurashtra and Kachchh	Amreli, Bhavnagar, Junagadh, Jamnagar, Porbandar, Rajkot, Surendranagar, Kachchh	Arid to semi-arid climate; groundwater the main source of irrigation; hard rock aquifers have poor storativity; open dugwells are the main source of irrigation; feudal culture; **poor dairy cooperatives**. Agriculture dependent mostly on monsoon; early withdrawal of monsoon the bane of kharif crop.

Source: Shah, et al, 2009.

Table 1.22 Sampling Framework

DU/D	District Unions/District DU1/D1				DU2/D2				DU3/D3				DU4/D4			
Rank	High				Moderate				Low				Not Classified/Low			
Villages	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16
Location	close	close	away	away	close	close	away	away	close	close	away	away	close	close	away	away
DC/NDC	DC	NDC	DC	NDC	DC	NDC	DC	NDC	DC	NDC	DC	NDC	DC	NDC	DC	NDC
Small	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Medium	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Large	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total sample	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	60				60				60				60			

Note: DU- District Union; If PDCS (primary Diary Cooperative Society) members are not available, take Non DC. Villages: 16; Milk Producers- 240; PDCS- 08 (or whatever available); Milk Unions-04 (or whatever available).

Table 1.23: Total numbers of selected DCS and NDCS Milk Producers in the Gujarat state

Districts/ Milk Unions	DCS				NDCS			
	Small	Medium	Large	Total	Small	Medium	Large	Total
Junagadh	10	10	10	30	10	10	10	30
Bharuch	10	10	10	30	10	10	10	30
Dahod/PM	10	10	10	30	10	10	10	30
Mehsana	10	10	10	30	10	10	10	30
Gujarat	40	40	40	120	40	40	40	120

II) Selection of Villages:

- From each milk union/district milk union/district, four villages were selected.
    - Two villages nearer to the MU/DU/D place: One village having dairy cooperative and one village without dairy cooperative- both located nearby.
    - Two villages about 25-50 kms away from the MU/DU/D place: One village having dairy cooperative and one village without dairy cooperative- both located nearby.
- Wherever, cooperative union/primary dairy cooperative society was not in existence, data were collected from villages not having primary dairy cooperative society.
- Milk Producer Company/Private Dairy/Agent were treated as non-cooperative agency.
- Total numbers of selected villages in the State were 16 villages.

III) Selection of Milk Producers:

- From each selected village, 15 milk producers were selected randomly. Total sample size of milk producers in State was 240.
- The milk producers were categorized as follows as per holding of number of bovine population (cattle and buffalos)- random selection from total milk producers list (without village census)
    - Small Milk Producers (1-2 Milch animal),

- Medium Milk Producers (3-5 Milch animal) and
- Large Milk Producers (above 5 Milch animal)

- Data on parameters related cost of milk production were collected from 03 milk producers from each village (one each from three categories), thus total 48 milk producers.

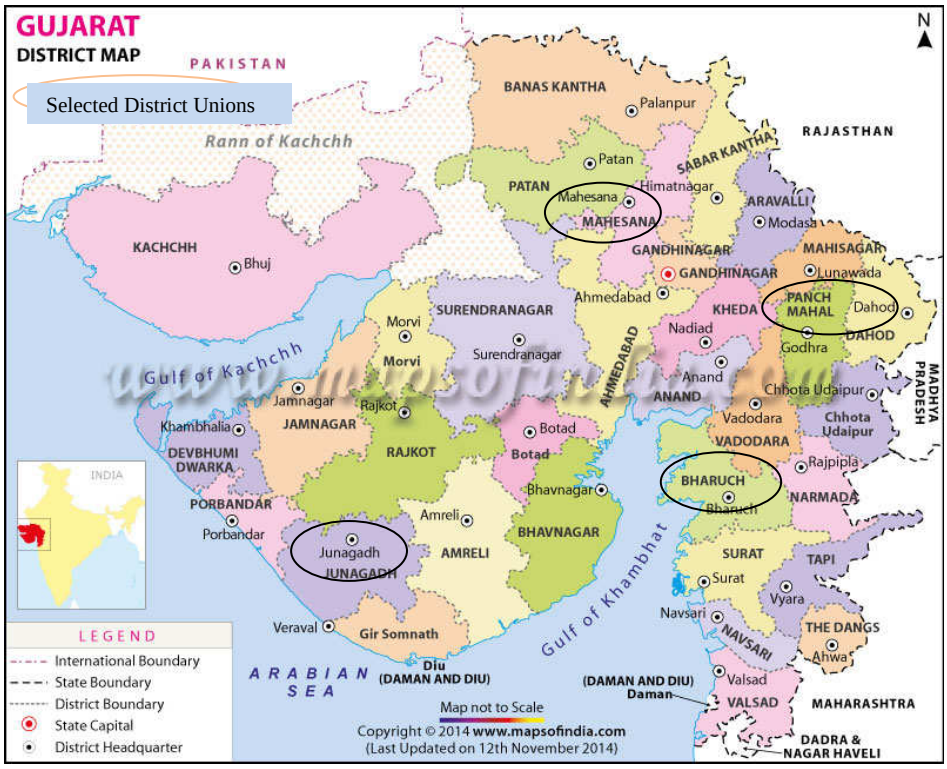
Data collection from District Milk Union & PDCS:

- Officials of every District Milk Union and Primary Dairy Cooperative Society were interviewed and data were collected.

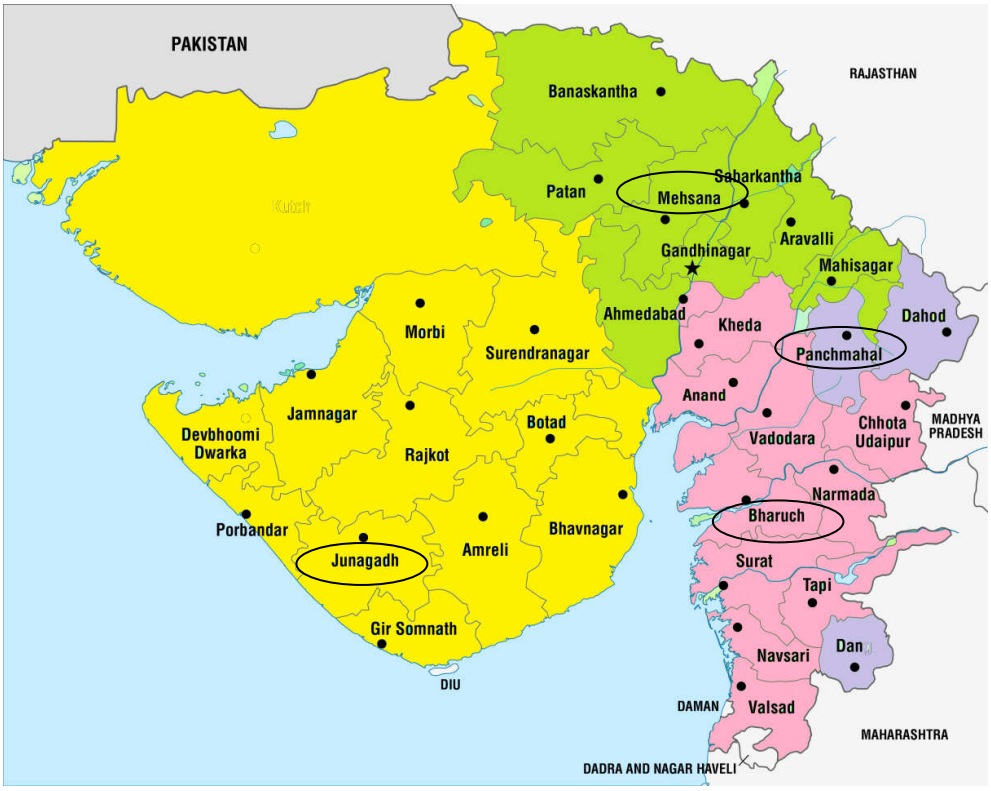
Table 1.24: Selected villages/talukas/districts/Milk unions in Gujarat state

Sr. No.	Region/ Region Name	District Milk Union	Selected district	Selected Taluka	Selected villages (DCS)	Selected villages (NDCS)
1.	South	Panchmahal District Cooperative Milk Producers' Union Ltd., Godhra	Dahod	Jhalod	Raniyar Inami	Varod
				Dahod	Ranakpur Khurd	Kharedi
2.	East	Bharuch District Cooperative Milk Producers' Union Ltd., Bharuch	Bharuch	Bharuch	Tavra	Dabhali
				Waghra	Ora	Tham
3.	West	Junagadh District Cooperative Milk Producers' Union Limited, Junagadh	Junagadh	Manavadar	Koyalana	Nandiya
				Keshod	Manekvada	Sarod
4.	North	Mehsana District Cooperative Milk Producers' Union Ltd, Mehsana	Mehsana	Unjha	AnandPura, Unava	-
				Mehsana	Dholasan	Heduva Hanumat. Ijpura(B)
				Jotana	-	Kanpura

Map 1.1: Location Map of Study Area-District Milk Unions in Gujarat, India



Map 1.2: Four Agrarian Socio-Ecologies of Gujarat



Survey Schedules:

The different survey schedules for the collection of data have been developed. Four types of survey schedules were canvassed in the study area.

- ***Household Survey Schedule 1.0:*** To collect the information from the selected milk producers (covering both those are members of PDCS and non members of such any cooperative society) on structured interview schedules on some selected parameters such as: socio-economic characteristics, cropping pattern of sample household, herd strength & cattle shed, details of breedable animals on survey date, milk production, use and sale , seasonwise milk yield (per day), availability of water for dairy, labour use pattern in dairy/ involvement of rural men and women in dairy activities, feed and fodder per animal at the time of survey (kg/animal/day), veterinary and breeding expenditure during last one year, awareness about the various schemes, service delivery, constraints faced in dairy and suggestion/s for improvement in adoption of dairy schemes, various aspects of rearing of animals and feeding pattern constraints, perception, awareness about RBP, etc. from the sample milk producer.
- ***Household Schedule-Cost of Milk Production 2.0:*** In order to estimate the cost of milk production, this schedule was canvassed among the few selected milk producer households in addition to the information collected in Schedule 1.0.
- ***Primary Dairy Cooperative Society/Private Dairy Unit Schedule/Agent Schedule 3.0:*** The desired information from the respondent society/unit/agent was collected in this schedule on selected aspects such as : total number of members enrolled, availability of some facilities, monthwise milk collection and rate paid, concentrates supplied by the society/firm during last one year, veterinary and breeding services provided by society/firm

during last one year, any outbreak of disease of livestock during the past one year, training arranged/provided by society during last one year, details of development programmes/support, effect of programmes on key variables, general opinion, perception, constraints and suggestions regarding particular program, constraints faced by PDCS/ private firm

- ***Milk Unions 4.0:*** This schedule was designed to collected the information from milk unions on related parameters such as: districts, villages and PDCS covered, details on milk collection/procurement, different programs/ schemes, year wise average cost of processing of milk (Rs/litre) dairy plant, production and marketing of different product, constraints faced, potential for future and suggestions

1.14 Limitations of the Study

The study is based on both primary and secondary level of data and hence the accuracy of results depends on the accuracy with which the data were generated. Due to paucity of decentralized data, certain analyses have been limited to some extent level. For instance, growth in milk consumption or employment related data are truly aggregative and therefore the link with macro observation with that of the primary data could not be established. This apart, to understand the process of industrialization, time series data on milk production and incidence of milch animal holding at either village or district level is not available. Due to unwillingness of the officers of some selected District Milk Cooperative Unions and Milk Producer Company, various aspects such as association of milk producer, purchase of milk, sale of processed product, benefits given to milk producer and constraints faced by them could not be covered.

1.15 Organization of Report

The present study report is divided into nine chapters including this introductory chapter. The introductory chapter presents the introductory notes, need and scope of the study and sets out the main objectives of the study. It is also present the data and methodology used for selection of districts/blocks/sample households, sample size, analytical and conceptual framework and concepts used in the study. Chapter two presents macro overview of dairy development in the state of Gujarat and the selected districts/Milk unions. It also analyse major trends in dairy sector, GDP, livestock production and milk productivity in selected state/districts using secondary data. The review of Milk cooperatives in Gujarat state as well as in selected districts is presented in Chapter III. Chapter IV covers government programmes & policies for development of dairy/ animal husbandry sector in Gujarat. It is also deals with the convergence of the government schemes. Chapter V presents the socio-economic background of surveyed milk producers, selected Milk unions and selected primary dairy cooperative society of the state. Chapter VI covers the issues related to milk production in the selected households, while issues related to marketing of milk is discussed in Chapter VII. Chapter VIII presents the various kinds of constraints faced by selected households in production and marketing of milk and suggestions given and the last chapter presents the conclusions and recommendations emerged from the study.

The next chapter presents the dairy development in Gujarat state.

Chapter II

Dairy Development in Gujarat

2.1 Introduction:

Gujarat has been consistently clocking impressive agricultural growth rates. This has been possible because the government has focused on improving not only irrigation, quality of seeds and power but also tertiary sectors like animal husbandry. The growth of the animal husbandry sector has resulted not only in increased milk production but has also provided a boost to the overall agro-economy of the state[1]. The livestock sector in Gujarat has achieved a remarkable success over the period due to collective efforts of government organisations, non-government organisation and the milk producers. Gujarat is one of the leading states in terms of milk production. The cooperative sector has been the key driver of the tremendous increase in Gujarat's milk production. It is no surprise that Gujarat, the birthplace of India's white revolution, has a thriving milk cooperative sector. The largest dairy co-operative in India, Amul, is based in Anand, Gujarat. "Amul" pattern is well known and accepted by all the states in our country and some of the other countries also[2].

State Profile:

Gujarat with geographical area of 1960924 square kilometres accounts for 6.19 per cent of total geographical area. It has 33 districts, including 7 newly carved out districts and 248 talukas. It falls in 13th Agro climatic zone which is further divided into eight sub zones. Gujarat has the longest coastline of 1600 kilometres which is about 20 per cent of country's total coastline. As per 2011 census, the population of the State was 6.04 crore of which 47.85 per cent population was female population (2.89 crore). Half of the population is

[1] http://gujaratindia.com/media/news.htm?NewsID=OwAhuSgQW4gO/FwV0IqgsQ==
[2] https://doah.gujarat.gov.in/dairy-development.htm

distributed across seven districts, viz. Ahmedabad, Surat, Vadodara, Rajkot, Banaskantha, Bhavnagar and Junagadh. Poverty head-count ratio of the State stands at 23.0 per cent. The literacy rate in the State was 79.31 per cent. As elsewhere, urbanisation is on the rise, with urban areas accounting for 43 per cent of the population. The state contribution to country's GDP at current prices during 2013-14 was 6.75 per cent. The per capita income at current prices in Gujarat during 2013-14 (Rs. 106831/-) was higher than national average (Rs. 80388/-)

2.2 Role of Dairy Sector in State Economy of Gujarat:

Animal husbandry has been playing a significant role in boosting the agrarian economy of the state. It is not only a subsidiary source of livelihood in rural Gujarat, it is a major economic activity, especially in the arid and semi-arid regions of the state. Thus, this sector plays a vital role in the rural economy of the state and has significant impact on employment generation for marginal, sub-marginal and landless farmers. Out of about 102 lakhs total household, about 43 lakh families keep livestock in Gujarat as a primary or secondary source of income.

The dairy sector in India has grown substantially over the past years. Gujarat is the leading milk producer in the country with cooperative dairy sector well established. Dairy industry in Gujarat state is well-established at present and is taken as a model for replicating in other states of the country. The dairy sector in the state assumes key importance as it is a business that helps generate the best alternative additional income and employment for poor, rural farmers. Milch animal-holders feed and nourish dairy animals with crop residuals and agriculture by-products available with them. The pace of dairy development in Gujarat was very fast due to assured market, reasonably good prices for milk supplied to the dairy and easy access to all health care services offered by co-operative dairy sector.

Cattle and especially bullocks are the primary source of draught power required for the agricultural operations as well as rural transportation. Milch animals are the main origin of the milk requirements of the human beings. Thus, cattle and milch animals provide essential foods like milk and meat. Large quantities of animal by-products are also generated by these animals. Bullocks and milch animal are the main support of agricultural operations and also a major source of supplementary income to the marginal and small farmer and landless agricultural labourers. On the other hand, the by-products of agricultural produce happen to be the chief ingredients of food for cattle and milch animals. Farmers are in a position to follow animal husbandry and dairying as an adjunct to cultivation. The requisite labour for keeping dairy animals is also available from within the farmer's family. A very large portion of female labour force of cultivator households which otherwise have suffered from disguised unemployment, gets self-employment in several occupations allied to cattle and buffalo rearing.

2.3 Trend in Contribution of Dairy in GSDP:

Animal husbandry plays a vital role in Gujarat's rural economy, while contributing 5.32 per cent to the state GSDP in 2013-14, while the contribution of agriculture to total GSDP was 16.83 per cent. The contribution of agriculture and livestock to total GSDP was estimated to be 22.15 per cent, while contribution of livestock to agriculture and livestock together was around 24 per cent. Thus, one fourth of the agriculture sector output comes from livestock sector (Table 2.1 & Fig. 2.1). The share of GVO from livestock to agriculture sector has been fluctuating over the last one and half decade and remains between 18-22 per cent. However, the contribution of gross value added from agriculture and livestock to total GSDP has increased from 14.54 per cent in 1999-2000 to 18.57 per cent in 2013-14. Gujarat accounts for

6.53 per cent share in value of output from livestock (at current prices) of country, while its share was 7.98 per cent in total value of output from agriculture and livestock of the country in 2013-14.

Fig. 2.1: Contribution of Gross Value of Output from Livestock sector to Agriculture (At current price) in Gujarat: 2004-05 to 2013-14

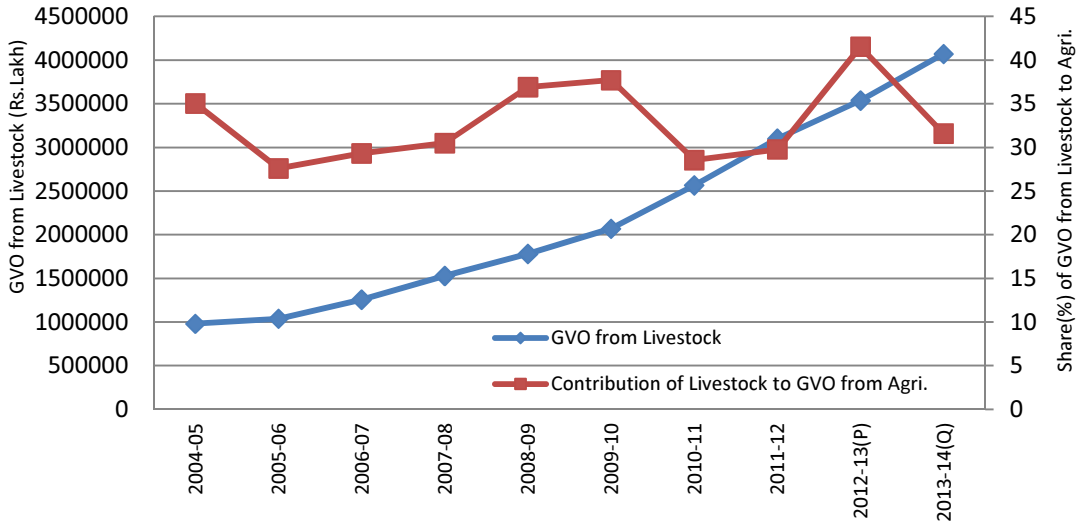


Table 2.1: Contribution of Gross Value of Output and Gross Value Added from Agriculture and Livestock Sector to total GSDP at Current Prices of Gujarat State

Sr. No.	Year	Total GSDP (Rs In Crores)	Contribution of GVO from Agriculture to Total GSDP (%)	Contribution of GVO from Livestock to Total GSDP (%)	Contribution of GVO from Agriculture & Livestock to Total GSDP (%)	Contribution of GVA from Agriculture & Livestock to Total GSDP (%)	Contribution of GVO from Livestock to Agriculture & Livestock sector (%)
1	1999-00	109861	15.4	5.21	20.61	14.54	25.28
2	2000-01	111139	13.14	5.64	18.78	13.28	30.02
3	2001-02	123573	15.11	5.66	20.77	14.74	27.25
4	2002-03	141534	13.39	5.13	18.52	12.79	27.69
5	2003-04	168080	18.03	5.02	23.05	16.44	21.77
6	2004-05	203373	13.76	4.82	18.58	13.15	25.95
7	2005-06	244736	15.37	4.24	19.62	14.43	21.63
8	2006-07	283693	15.11	4.43	19.54	14.83	22.68
9	2007-08	329285	15.23	4.64	19.88	15.51	23.37
10	2008-09	367912	13.11	4.84	17.95	13.89	26.97
11	2009-10	431262	12.73	4.8	17.52	13.61	27.38
12	2010-11	521519	17.23	4.92	22.15	18.03	22.22
13	2011-12	598786	17.38	5.18	22.56	18.53	22.95
14	2012-13	658540	12.93	5.37	18.3	15.41	29.35
15	2013-14	765638	16.83	5.32	22.15	18.57	24.01

Source: GOG (2015).

Milk contributes to around 20 per cent to the agricultural GDP of Gujarat and is one of the biggest sectors for supporting livelihood in the state. Livestock output at constant prices was reported at Rs. 141 billion in 2011-12 (at constant prices), of which milk contributes about 86 per cent or Rs. 122 billion (Table 2.2).

Table 2.2: Value of Output: Agriculture and Livestock

Item	Value of Output: Agriculture and Livestock in Gujarat							
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Value of Output at Current Prices *(Rs. billion)*								
Agriculture & Allied*	448	565	644	735	743	859	1274	1464
Agriculture	278	376	421	492	476	549	898	1030
Livestock	99	106	127	156	178	207	257	310
Share of Value of Output to Agriculture and Allied* *(%)*								
Agriculture	62.1	66.5	65.4	66.9	64.1	63.9	70.5	70.4
Livestock	22.1	18.8	19.7	21.2	24	24.1	20.2	21.2
Value of Output at Constant Prices *(Rs. billion)* (2004-05)								
Agriculture & Allied*	449	430	494	556	526	513	628	647
Agriculture	278	350	307	361	318	312	424	437
Livestock	99	105	112	118	129	133	134	141
Share of Value of Output to Agriculture and Allied* *(%)*								
Agriculture	61.9	81.4	62.1	64.9	60.5	60.7	67.6	67.6
Livestock	22	24.4	22.7	21.2	24.5	25.8	21.3	21.8
Value of Livestock Output at Current Prices *(Rs. billion)*								
Milk	85.8	89.9	107.1	133.1	145.1	169.8	214.4	255.1
Meat	6.4	7.3	10.9	12.1	19.6	18.7	20.3	27.8
Egg	0.8	0.9	1.3	1.6	2.9	3	4	5.1
Dung	4.1	4.6	5	5.3	5.4	5.8	6.1	7.1
Others^	2.5	3	3.4	4.4	5.6	9.6	12	15.1
Share of Livestock Output at Current Prices *(%)*								
Milk	86.2	85.1	83.8	85.1	81.2	82	83.5	82.2
Meat	6.4	6.9	8.5	7.7	11	9	7.9	9
Egg	0.8	0.9	1.1	1	1.6	1.5	1.6	1.6
Dung	4.1	4.4	3.9	3.4	3	2.8	2.4	2.3
Others^	2.5	2.8	2.7	2.8	3.2	4.6	4.7	4.9
Value of Livestock Output at Constant Prices *(Rs. billion)* (2004-05)								
Milk	85.8	89.9	94.9	99.5	105.3	110.4	116	121.8
Meat	6.4	7.1	9	9.6	13.8	11.4	6.6	7.1
Egg	0.8	0.9	1.2	1.4	2.1	2.1	2.2	2.4
Dung	4.1	4.3	4.5	4.4	4.4	2.5	2.5	2.7
Others^	2.5	2.8	3.1	3.4	3.5	6.2	6.7	7.2
Share of Livestock Output at Constant Prices *(%)*								
Milk	86.2	85.6	84.2	84.1	81.5	83.2	86.6	86.3
Meat	6.4	6.7	8	8.1	10.7	8.6	4.9	5
Egg	0.8	0.9	1.1	1.1	1.6	1.6	1.6	1.7
Dung	4.1	4.1	4	3.8	3.4	1.9	1.9	1.9
Others^	2.5	2.7	2.7	2.9	2.7	4.7	5	5.1

Notes: P: Provisional Estimates, Q: Quick Estimates, * Includes Livestock, Forestry & Fisheries, ^ Includes Wool and Hair, Silkworm Cocoons & Honey, Increment in Stock

Source: NDDB (20014), Dairying in Gujarat: A Statistical Profile 2013.

2.4 Composition of Livestock & details on Cow and Buffalo Breeds/Genetic Improvement in the State

Gujarat State possesses a remarkable position in the country so far as livestock wealth and development are concerned. The Nineteenth Livestock Census (2012) of India has placed total livestock population at 512.1 million, out of which, 27.12 million livestock (5.3 %) population was in the state of Gujarat. The state accounts for 5.23 per cent share in cattle population, 9.55 per cent of buffalo population, 2.62 per cent sheep population and 3.67 per cent goat population of the country. The significant share of donkeys (12.18 %) and camels (7.80 %) in national stock has also been recorded (2012). There is an increase in livestock population over 2007 to 2012 from 23.51 million to 27.12 million (excluding 0.29 million stray cattle) registering a positive growth of 15.36 per cent in the total number of animals of various species (Table 2.3). In fact, the share of the Gujarat in all Indian total stock of livestock has also considerably increased by 0.86 per cent in 2012 over 2007.

Table 2.3: Growth of the Livestock in Gujarat and India

Sr. No	Livestock Census Year	Total Livestock (000)		% Share of Gujarat to All India	% Growth of Gujarat State between two Census
		All India	Gujarat		
1	1951	292784	11977	4.09	-
2	1956	306615	13312	4.34	11.15
3	1961	336432	13454	4.00	1.07
4	1966	344111	14338	4.17	6.57
5	1972	353338	15098	4.27	5.30
6	1977	369525	14406	3.90	-4.58
7	1983	419588	18440	4.39	28.00
8	1987	445285	17343	3.89	-5.95
9	1993	470830	19672	4.18	13.43
10	1997	485385	19939	4.11	1.36
11	2003	485002	21671	4.47	8.69
12	2007	529698	23515	4.44	8.51
13	2012	512057	27128	5.30	15.36

Note: Figures without Dog & Rabbit.
Source: GOI (2016) & GOG (2017).

As per Livestock Census 2012, among the species, buffalo contributes highest share (38.28 per cent) in total livestock population followed by Cattle (36.80%), Goat (18.28 %) and Sheep (6.30 %), besides marginal contribution is attributed by other livestock species such as Camel, Mules, Donkeys, Horses and Ponies (Table 2.4). The females among the indigenous cattle, crossbred and buffalo population numbered 5.03 million, 1.73 million and 9.6 million, respectively. There is an increase of 15.36 per cent in livestock population in 2012 over 2007. The highest growth in population was recorded in cattle population (25.18 %) followed buffalo (18.37 %) and goat (6.88 %), while sheep population registered decline (14.69 per %).

Table 2.4: Species-wise Livestock population & its Share in total livestock

Sr. No.	Particulars	Gujarat -2012				India 2012	
		Livestock-2012	% share in India	% share in total Livestock	Rank in All India	Livestock-2012	% share in Total Livestock
1	Cattle	9984	5.23	36.80	9	190904	37.28
2	Buffaloes	10386	9.55	38.29	4	108702	21.23
3	Sheep	1708	2.62	6.30	7	65069	12.71
4	Goats	4959	3.67	18.28	12	135173	26.40
5	Pigs	4	0.04	0.01	29	10294	2.01
6	Horses & Ponies	18	2.88	0.07	9	625	0.12
7	Mules	0	0.0	0.00	-	196	0.04
8	Donkeys	39	12.23	0.14	3	319	0.06
9	Camel	30	7.5	0.11	2	400	0.08
10	Yaks	0	0	0.00	-	77	0.02
11	Mithun	0	0	0.00	-	298	0.06
12	Total Livestock	27128	5.3	100.00	9	512057	100.00

Note: Figures without Dog & Rabbit.
Source: GOI (2016) & GOG (2017).

However, over the period, share of cattle population in total livestock population has declined from 44.6 per cent in 1951 to 36.8 per cent in 2012, while share of buffalo population has increased considerably (21% to 38.3%) during corresponding period. In absolute term, the rate of increase in buffaloes population (313 %) is much faster as compared to rate of increase in cows population (87 %). In case of small ruminants, sheep population has increased by 8.6 per cent while goat population declined by 6 per cent in 2012 over 1951 (Fig. 2.2).

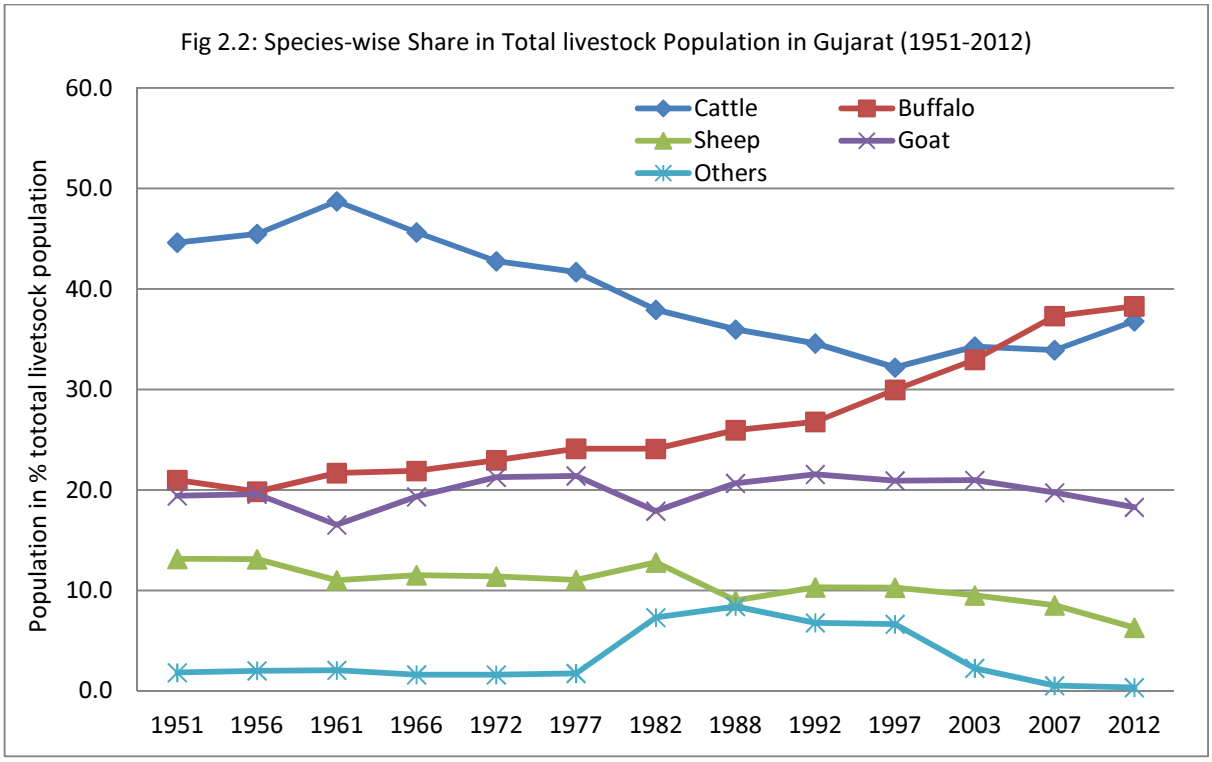
Total livestock population in Gujarat has increased by 127 per cent during last six decades period (Table 2.5).

Table 2.5: Growth in Livestock Population in Gujarat- 1951 to 2012

Sr. No.	Year	Cattle		Buffalo		Sheep		Goat		Total Livestock	
		Nos.	GR (%)	Nos.	GR (%)	Nos.	GR (%)	Nos.	GR (%)	Nos.	GR (%)
1	1951	5345	-	2514	-	1574	-	2326	-	11977	-
2	1956	6055	13.28	2640	5.01	1744	10.80	2606	12.04	13312	11.15
3	1961	6557	8.29	2917	10.49	1481	-15.08	2223	-14.70	13454	1.07
4	1966	6544	-0.20	3140	7.64	1652	11.55	2771	24.65	14338	6.57
5	1972	6457	-1.33	3468	10.45	1722	4.24	3210	15.84	15098	5.30
6	1977	6006	-6.98	3473	0.14	1592	-7.55	3084	-3.93	14406	-4.58
7	1982	6994	16.45	4443	27.93	2357	48.05	3300	7.00	18440	28.00
8	1988	6240	-10.78	4502	1.33	1559	-33.86	3584	8.61	17343	-5.95
9	1992	6803	9.02	5268	17.01	2027	30.02	4241	18.33	19672	13.43
10	1997	6749	-0.79	6285	19.31	2158	6.46	4386	3.42	20970	6.60
11	2003	7424	10.00	7140	13.60	2062	-4.45	4541	3.53	21655	3.27
12	2007	7976	7.44	8774	22.89	2002	-2.91	4640	2.18	23515	8.59
13	2012	9984	25.18	10386	18.37	1708	-14.69	4959	6.88	27128	15.36

Note: GR- Growth rate over previous year.
Source: GOG (2017).

Fig 2.2: Species-wise Share in Total livestock Population in Gujarat (1951-2012)



The district-wise share in total state livestock population figures (Fig. 2.3 & Table 2.6) indicate that Banaskantha (9.38 %) has the highest number of livestock population followed by Panchmahal (7.41%), Kachchh (7.14%), Sabarkantha (6.8%), Dahod (6.41%) and Vadodara (6.13%). These six districts together accounted for 44 percent of total livestock population in the state in 2012 (Fig. 2.3). Banaskantha has the highest number of in-milk buffaloes and cows followed by Sabarkantha and Mehsana district. Sabarkantha has the highest number of in-milk crossbreds and Kachchh, the highest in in-milk indigenous cattle. In-milk indigenous cattle like Gir are predominantly spread across Saurashtra region covering Rajkot, Junagadh and Bhavnagar districts of Gujarat, whereas Kankrej are found mostly in northern Gujarat and Kachchh region. The highest livestock and bovine animal density was recorded in Dahod (Table 2.7).

Fig. 2.3: Districtwise share in total Livestock Population in Gujarat 2012 (%)

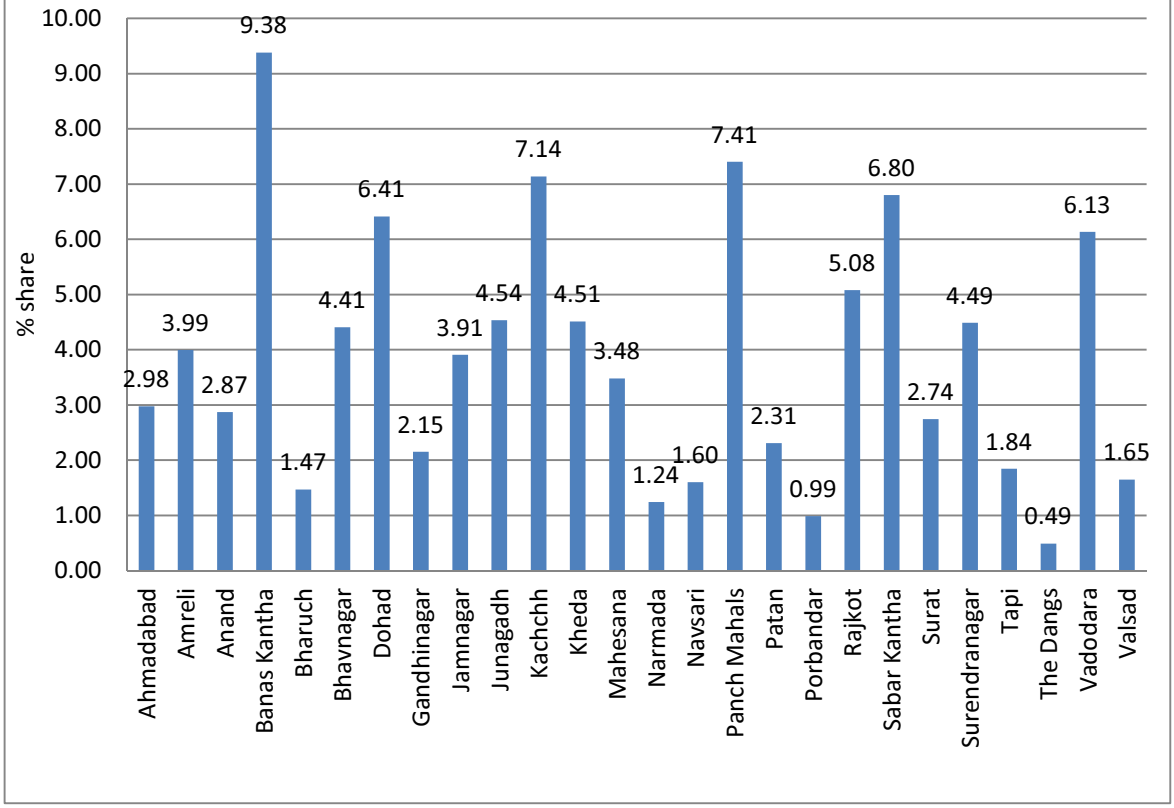


Table 2.6: District wise Percentage share of Animals in Total Livestock Population

District	District wise Percentage share of animals in Total livestock population in Gujarat-2012										
	Crossbred	Indigenous	Total Cow	Buffalo	Total Sheep	Goat	Total Pigs	Horses & Ponies	Mules	Donkey	Camel
Ahmedabad	2.15	28.56	30.71	48.80	2.05	17.83	0.14	0.16	0.00	0.20	0.10
Amreli	0.68	39.09	39.77	30.05	12.95	17.02	0.00	0.16	0.00	0.05	0.00
Anand	13.37	13.79	27.15	62.40	0.65	9.03	0.00	0.03	0.00	0.64	0.10
Banaskantha	15.04	22.48	37.52	46.05	4.55	11.61	0.00	0.04	0.00	0.06	0.17
Bharuch	6.58	25.09	31.67	33.26	0.80	33.52	0.07	0.19	0.00	0.34	0.14
Bhavnagar	0.88	33.86	34.74	33.08	14.61	17.34	0.00	0.14	0.00	0.06	0.03
Dahod	0.30	39.46	39.77	20.80	0.29	39.03	0.00	0.00	0.00	0.11	0.00
Dang	7.50	51.26	58.76	18.62	0.00	22.23	0.35	0.02	0.00	0.01	0.01
Gandhinagar	15.37	12.26	27.63	56.84	2.44	12.71	0.00	0.04	0.00	0.14	0.19
Jamnagar	0.12	34.68	34.81	28.21	20.04	16.60	0.02	0.07	0.00	0.07	0.19
Junagadh	2.22	42.76	44.97	40.21	3.55	11.08	0.00	0.07	0.00	0.04	0.07
Kachchh	0.26	29.74	30.00	19.34	29.48	20.48	0.02	0.11	0.00	0.17	0.41
Kheda	9.87	14.69	24.57	61.95	1.81	10.97	0.00	0.03	0.00	0.55	0.13
Mehsana	17.08	12.90	29.98	57.03	1.33	10.88	0.00	0.10	0.00	0.18	0.50
Narmada	1.37	50.54	51.90	23.67	0.12	24.21	0.00	0.02	0.00	0.08	0.00
Navsari	41.59	11.91	53.50	26.44	0.48	19.43	0.10	0.02	0.00	0.03	0.00
Panchmahal	4.76	28.76	33.52	36.51	0.11	29.74	0.00	0.01	0.00	0.10	0.00
Patan	2.25	18.57	20.82	59.52	6.03	12.84	0.00	0.11	0.00	0.25	0.43
Porbandar	0.17	30.04	30.21	54.08	8.35	7.03	0.04	0.12	0.01	0.01	0.15
Rajkot	2.21	39.50	41.70	31.36	14.24	12.52	0.00	0.10	0.00	0.05	0.02
Sabarkantha	14.41	23.96	38.37	39.91	3.35	18.06	0.01	0.03	0.00	0.17	0.09
Surat	18.67	20.21	38.88	40.34	0.23	20.21	0.07	0.14	0.00	0.11	0.01
Surendranagar	0.32	40.06	40.39	36.65	7.47	15.23	0.00	0.17	0.00	0.07	0.02
Tapi	22.49	24.53	47.02	34.49	0.03	18.44	0.00	0.01	0.00	0.01	0.00
Vadodara	2.17	34.39	36.56	36.40	0.38	26.34	0.04	0.03	0.00	0.24	0.01
Valsad	19.06	35.57	54.63	17.07	0.86	27.40	0.01	0.02	0.00	0.01	0.00
Gujarat State	7.33	28.88	36.21	38.08	6.50	18.87	0.02	0.07	0.00	0.15	0.12

Source: NDDB (2014).

India has a total 137 breeds of domesticated animals, of which about 18 breeds, including some internationally recognised ones, are available in Gujarat. The State has high-quality, high-yielding breeds of cattle and buffaloes (Table 2.8). Gir and Kankrej breeds in cows, and Mehsani, Jafarbadi and Surti breeds in buffaloes were known for their high milk yielding capacity. Gir and kankrej breeds are dual purpose breeds. The Gir breed is found in Amreli, Bhavnagar, Junagadh, Jamnagar, Rajkot and Surendranagar districts. In rest of the districts of Gujarat, Kankrej breed is found along with

a Non-descriptive breed of the total number of buffaloes. The Surti breed is found in Bharuch, Kheda, Surat, Vadodara, Panchmahal etc, whereas the Mehsani breed is found in Mehsana, Sabarkantha, Banaskantha and Ahmedabad. In respect of the population of buffaloes in the state, Kheda district ranks first, followed by Mehsana and Sabarkantha district. With the recognition of the Banni breed by the National Bureau of Animal Genetic Resources (NBAGR), Gujarat is now proud home to four major buffalo breeds of the total 12 recognised breeds in India. The performance of these breeds is presented in Table 2.9.

Table 2.7: District-wise Livestock and Bovine Density (1992-2012)

Districts	Livestock (No. per sq km)					Bovine (No. per sq km)				
	1992	1997	2003	2007	2012	1992	1997	2003	2007	2012
Ahmedabad	89	66	83	89	100	64	50	62	69	79
Amreli	102	110	98	100	147	65	66	58	63	114
Anand			176	222	243			144	188	218
Banaskantha	124	136	162	201	237	70	72	112	150	198
Bharuch	73	65	67	65	61	49	29	42	42	40
Bhavnagar	103	104	118	114	119	53	54	64	68	81
Dahod			307	391	478			199	239	289
Gandhinagar	186	172	233	272	272	156	141	201	237	230
Jamnagar	60	64	70	71	75	33	35	40	43	47
Junagadh	96	88	110	116	139	74	69	86	97	120
Kachchh	31	36	33	37	42	10	12	11	13	21
Kheda	157	175	201	240	309	132	142	163	203	268
Mehsana	130	169	172	205	214	103	142	146	179	187
Narmada			122	99	120			84	73	91
Navsari			176	150	194			127	117	155
Panchmahal	230	201	312	323	384	159	143	223	231	269
Patan			90	116	108			59	86	87
Porbandar			101	105	116			73	82	98
Rajkot	104	102	110	111	123	58	59	64	73	90
Sabarkantha	170	187	227	248	250	121	140	172	189	195
Surat	102	118	137	77	164	80	90	106	62	130
Surendranagar	65	68	77	92	117	38	42	47	61	94
Tapi					159				222	130
The Dangs	71	71	88	77	75	11	11	15	12	58
Vadodara	138	140	159	168	220	144	150	279	311	171
Valsad	163	144	151	186	149	118	99	106	133	107
GUJARAT	94	101	110	112	138	62	66	74	72	104

Source: NDDB (2014).

Table 2.8: Distribution of Gujarat's Cattle Breeds

Breeds	Breeding Tract	Utility	Distribution
A) Cattle			
Gir	Junagadh, Bhavnagar, Amreli, Porbandar and Rajkot districts.	Milch	Rajasthan, Madhya Pradesh and Maharashtra. Exported to Brazil, Mexico, USA and Venezuela.
Kankrej	South-west Rann of Kachchh comprising Mehsana, Kachchh, Ahmedabad, Kheda, Sabarkantha and Banaskantha districts.	Dual	Western Rajasthan. Nomadic herds of this breeds are also found in Madhya Pradesh, Maharashtra, Uttar Pradesh, Haryana.
Dangi	The Dang, Valsad, Panchmahal and Dahod districts. Sizeable numbers of this breeds are also found in Nasik and Ahmednagar districts of Maharashtra.	Draught	Parts of northern Maharashtra
B) Buffalo			
Jaffrabadi	Found in Junagadh, Amreli, Bhavnagar, Porbandar and Rajkot districts.	Milch	Bulls and herds of this breed have been introduced for breed improvement programmes in Maharashtra.
Mehsana	Found in Mehsana, Patan, Banaskantha and Sabarkantha districts.	Milch	Northern Gujarat
Surti	Found in Kheda, Anand, Vadodara, Bharuch and Surat districts.	Milch	In the border districts of Rajasthan.
Banni	Found in Kachchh and Patan districts.	Milch	Kachchh

SOURCE: AE Nivsarkar *et al.,* (2000), Animal Genetics Resources of India, Cattle and Buffalo, ICAR publication, as mentioned NDDB (2014).

Table 2.9: Performance of Cattle and Buffalo Breeds

Parameter	Cattle			Buffalo			
	Gir	Kankrej	Dangi	Jaffrabadi	Mehsana	Surti	Banni
Breed Population ('000)	1,400	2,682	209	1,470	3,370	1,557	525
Lactation Yield(kg)							
Field	2,790 (2,732 to 3,312)	2,396 (2,137 to 2,864)		3,189 (3,047 to 3,639)	3,426 (3,163 to 3,488)	2,405 (2,262 to 2,792)	2,860 (2,770 to 22,950)
Farm	2,125 (1,835 to 2,950)	1,954 (1,271 to 232)	530 (32 to 1,228)	1,967 (1,917 to 2,075)	1,840 (1,774 to 1,904)	1,699 (1,399 to 1,955)	
Lactation Length(days)	305 (302 to 329)	314 (308 to 329)	269 (100 to 396)	325 (316 to 328)	315 (312 to 327)	310 (308 to 323)	300 (296 to 304)
Calving Interval (days)	435 (420 to 480)	424 (312 to 565)	474 (464 to 484)	482 (476 to 494)	394 (385 to 403)	424 (418 to 437)	372
Dry Period (days)	115 (75 to 155)	151 (72 to 173)	190	142 (141 to 143)	128 (120 to 136)	126 (120 to 138)	66
Age at First calving (months)	46 (44 to 53)	51	45 (44 to 46)	53 (49 to 63)	49	46 (43 to 48)	40 (39 to 41)

SOURCE: AE Nivsarkar *et al.,* (2000), Animal Genetics Resources of India, Cattle and Buffalo, ICAR publication, as mentioned NDDB (2014).

Table 2.10: Livestock per 100 Households across Landholding Size: Gujarat

Landholding Size (Ha) No.	Livestock per 100 Households across Landholding Size in Gujarat		
	1982	1992	% Change
I. Landless	229	44	-80.8
II. Up to 0.2	450	532	1.2
III. 0.21 – 1.0	220	223	1.4
IV 1.01 – 4.0	376	297	-21.0
V 4.01 – 10	509	260	48.9
VI > 10.0	883	330	-62.6
All	264	203	-23.1

Source: Shah (2016, NSSO 37th, 48th & 59th Rounds, Reports on Land and Livestock Holding Survey, GOI.)

Shah (2006) observed that livestock population has declined by about 23.1 per cent among all the households taken together (Table 2.10). The decline however, is significantly higher i.e. about 81 per cent among landless households. What is however important is that the livestock population in the first group of landholding size (i.e. up to 0.2 hectare) has declined at a lower rate, though it has increased in the next size class (i.e. 0.21–1.0 hectare). From then, the percentage of decline in livestock population starts rising, reaching a peak at 51.3 per cent among the largest landholding size class (with >10 hectares of land). The pattern therefore depicts a 'U'-shaped curve with respect to percentage decline in the number of livestock across landholding size-classes. The evidence suggests sustained importance of livestock among marginal and small farmers as compared to landless and medium-large farmers.

Among different species of livestock, the steepest decline is observed in the case of cows (48%), followed by bullocks (45%) and then by sheep and goat (40%). The average size of buffaloes possessed by all rural households has increased by 5.9 per cent. It may be noted that the increase in the average size of buffaloes has been observed among all the landholding size classes; the landless, once again, have lost out thus, registering a negative growth (Table 2.11). Table 2.12 presents the number per 1000 of households reporting owing livestock

of different types for each size class of households operational holdings in Gujarat (Rural) as per NSSO -59th round conducted in 2003.

Table 2.11: No of Major Livestock Species per 100 Households across Landholding Size in Gujarat (1982 & 1992)

Landholding Size (Ha) No.	Bullock			Cow			Buffalo			Sheep and Goat		
	1982	1992	% Change	1982	1992	% Change	1982	1992	% Change	1982	1992	% Change
I. Landless	28	02	-92.9	24	5	-79.2	17	14	-17.6	160	23	-85.6
II. Up to 0.2	21	21	0.0	36	46	26.4	22	75	246.5	371	391	5.4
III. 0.2 – 1.0	70	60	-14.3	51	38	-25.5	61	94	54.9	38	31	-19.0
IV 1.01 – 4.0	142	79	-44.6	86	53	-38.6	76	121	59.2	72	44	-39.9
V 4.01 – 10	231	72	-68.8	142	34	-76.1	106	119	12.8	30	35	18.6
VI > 10.0	435	53	-87.8	271	24	-91.1	112	198	76.3	34	55	60.2
All	95	52	-45.3	64	33	-48.4	51	54	5.9	107	64	-40.2

Source: NSSO 37th, 48th & 59th Rounds, Reports on Land and Livestock Holding Survey, GOI.

Table 2.12: Number per 1000 of households reporting owing livestock of different types for each size class of households operational holdings in Gujarat (Rural) 2003

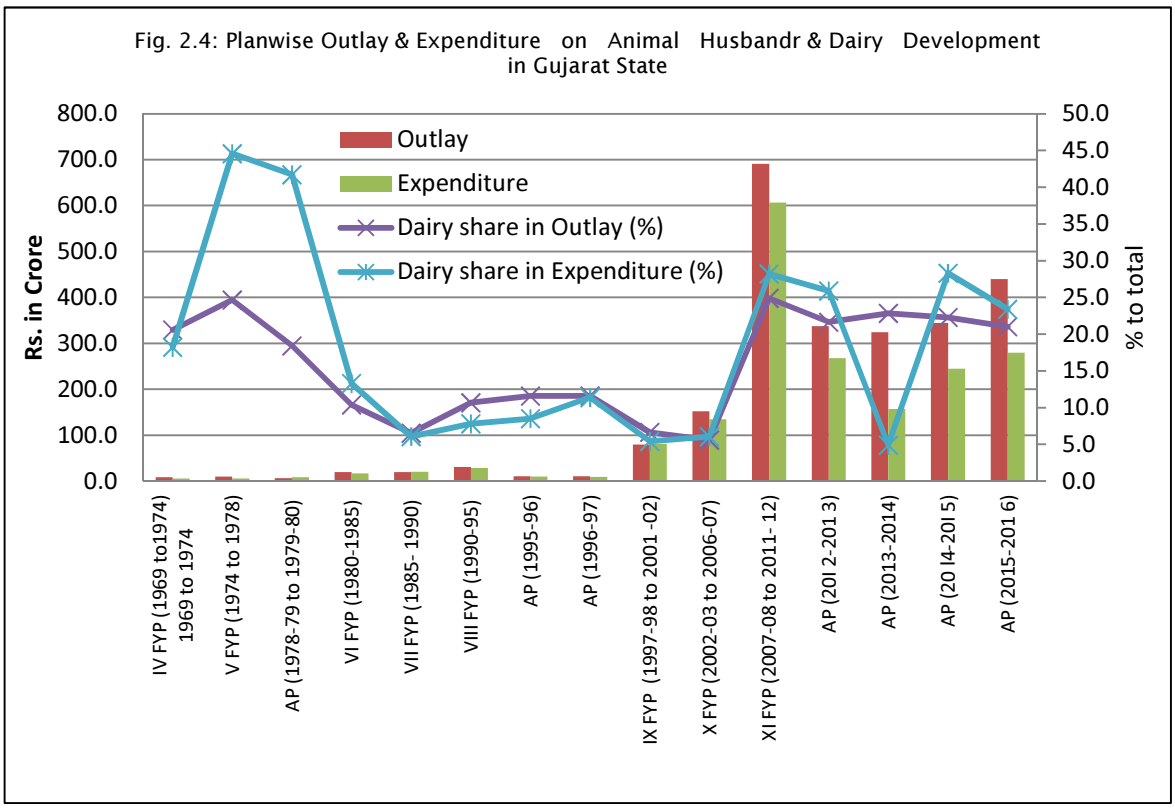
size class of operational holding (ha)	Gujarat (Rural)- No. of households per 1000 households reporting owning of								
	cattle			buffalo	other large heads	sheep, goats	fowl*, duck	other birds	pigs and rabbits
	cross breed	non-descript	all						
nil	0	0	0	0	0	18	9	0	0
≤ 0.002	0	141	141	634	0	263	306	0	0
0.002 - 0.005	3	143	146	557	41	317	29	22	0
0.005 - 0.040	5	5	239	535	39	284	68	51	0
0.040 - 0.5	31	338	369	531	2	125	156	10	0
0.5 - 1.0	24	484	508	557	0	172	99	0	0
1.0 - 2.0	44	512	530	539	24	123	65	0	0
2.0 - 3.0	64	579	631	440	0	102	50	0	0
3.0 - 4.0	49	552	595	531	0	56	58	0	0
4.0 - 5.0	55	629	662	705	7	41	7	0	0
5.0 - 7.5	178	751	787	688	43	83	65	0	0
7.5 - 10.0	95	919	919	506	0	0	8	0	0
10.0 - 20.0	83	578	661	662	0	0	0	0	0
> 20.0	0	0	0	0	0	0	0	0	0
all sizes	26	285	301	362	9	106	60	5	0

Note: *includes hens, cocks and chickens.
Source: Livestock Ownership Across Operational Holding Classes in India, NSS Report No. 493(59/18.1/1).

2.5 Planwise Outlay and Expenditure under Dairy Development

Livestock sector has been making rapid strides and spectacular growth in recent time, with positive impact on the lives of rural people mainly small farmers, marginal farmers and agricultural landless laboures by raising their living standards considerably. The State Government policy has been providing necessary support for dairy development in the state through co-operative sector. Table 2.12 gives details regarding plan-wise outlay and expenditure on animal husbandry and dairy development by the Government of Gujarat (excluding central assistance and fund). This table shows that there has been consistent increase in the plan provision for animal husbandry and dairy development. The proportion of plan expenditure in the plan provision has also been increasing with up and down pattern. This has led to increase in number of milch animals, milk production and qualitative improvement in milch animals.

Fig. 2.4: Planwise Outlay & Expenditure on Animal Husbandr & Dairy Development in Gujarat State



The outlay and expenditure on dairy development has also increased over the period of time. However, percentage share of expenditure on dairy development to total expenditure has declined considerably (Fig. 2.4 & Table 2.12). As compared to around 42-45 per cent share of total expenditure on dairy development during 1974-1980, it has declined to 23-28 per cent during the last one decade. The proportion of expenditure to outlay on dairy development was much better during the corresponding period, which was recorded to be around 70 per cent in 2015-16. During the year 2015-16, out of the total expenditure of Rs. 6534.48 lakh incurred on dairy development, about 96.64 per cent (Rs. 6314.90) was incurred on Direction and Administration head. While out of Rs. 21394.77 lakh expenditure incurred on Animal Husbandry, Rs. 17104.39 was spend together on heads related to dairy animal development (veterinary services and animal health, cattle and sheep development, feed and fodder development). Under non-plan section, total Rs. 26629.12 lakh was spent on animal husbandry and dairy development in the state. Besides, plan and non plan expenditure spending by state government, the additional support has been provided by the Central government under Rastriya Krishi Vikas Yojana and Central sponsored schemes for animal husbandry and dairy development. During 2015-16, Rs. 3745.18 lakh expenditure was incurred under RKVY, while Rs. 3274.77 was spent through various centrally sponsored schemes.

Table 2.13: Plan-wise Outlay and Expenditure on Animal Husbandry and Dairy Development in Gujarat

Sr. No.	Plan Period	Outlay (Rs. In Lakh)			Expenditure (Rs. In Lakh)		
		Animal Husbandry (Revised)	Dairy Development (Revised)	Total	Animal Husbandry	Dairy Development	Total
1	IV FYP (1969 to1974)	675.00	175	850	432.48	96.31	528.79
2	V FYP (1974 to 1978)	755.00	247.00	1002.00	304.57	244.97	549.54
3	AP (1978-79 to 1979-80)	514	116	630.00	496. 14	355.1	851.24
4	VI FYP (1980-1985)	1770.00	205.00	1975	1,432.76	219.70	1652.46
5	VII FYP (1985- 1990)	1820	127	1947	1875.83	121	1997
6	VIII FYP (1990-95)	2720.00	325.00	3045.00	2853.57	241.51	3095.08
7	AP (1995-96)	916	120.00	1036.00	959.22	91.08	1070.30
8	AP (1996-97)	916.00	120.00	1036.00	937.83	120.32	1058.15
9	IX FYP (1997-98 to 2001-02)	7450.00	530.00	7980.00	7655.58	437.81	8093.39
10	X FYP (2002-03 to 2006-07)	14339.84	848.92	15,188.76	12635.53	813.72	13449.25
11	XI FYP (2007-08 to 2011-12)	51898.13	17200	69098.13	43556.56	17110.64	60657.20
12	AP (20I2-2013)	26457.00	7300.00	33737.00	19827.77	6930.00	26757.77
13	AP (2013-2014)	25000.00	7400.00	32400.00	14900.75	765.38	15666.13
14	AP (20 14-20I5)	26777.78	7678.38	34456.16	17552.25	6928.72	24480.97
15	AP (2015-2016)	34753.28	9252.1	44005.38	21394.77	6534.48	27929.25

Source: GOG (2016 & 2017).

2.6 Growth in Milk Production and Productivity (Regional trend)

Gujarat is a leading state in terms of its quality milch animals and milk production. Gujarat ranks third among the milk producing states in India, achieving 122.62 lakh MT in 2015-16, which has increased from the 30.9 lakh tonnes during 1983-84. The numbers of initiatives were taken by the government which could help in improving the milk productivity over the period. A trend showing the increase in milk production over the past three decades is depicted in Fig 2.5. The graph shows there is a consistent increase in the production of milk over the years. The milk production has increased

from 5.32 million tonnes in 2000-2001 to 12.26 million tonnes in 2015-16 registering a growth of 131 per cent over base year. Except for the period of drought from 1986-87 to 1988-89, milk production in the state has been increasing continuously. The milk production declined during 1986-1989 due to the worst drought situation in the state. The rate of increase in milk production was faster than rate of increase in state's human population. As a result, the per capita availability of milk in the state increased from 321gms/day in 2003-04 to 506 gm/day in 2015-16.

Table 2.14: Milk Production in Gujarat: 2000-01 to 2015-16

Sr. No	Year	Milk Production in million tones						Growth of Milk Production (%) over base year	Per Capita availability (gms/ day)
		In milk Cow		In Milk Buffalo	In milk Bovine	In Milk Goat	Total		
		Indi-genous	C.B.						
1	2000-01	1.43	0.26	3.40	5.09	0.23	5.32	-	-
2	2001-02	1.49	0.36	3.80	5.65	0.23	5.88	10.51	-
3	2002-03	1.58	0.38	3.90	5.86	0.23	6.09	14.52	321
4	2003-04	1.63	0.43	4.12	6.18	0.24	6.42	20.75	333
5	2004-05	1.69	0.48	4.32	6.49	0.26	6.75	26.86	344
6	2005-06	1.74	0.52	4.45	6.70	0.26	6.96	30.89	350
7	2006-07	1.80	0.82	4.66	7.28	0.25	7.53	41.67	373
8	2007-08	1.85	0.96	4.86	7.66	0.25	7.91	48.79	386
9	2008-09	1.85	1.19	5.11	8.15	0.23	8.39	57.73	403
10	2009-10	1.91	1.42	5.28	8.61	0.23	8.84	66.30	421
11	2010-11	1.98	1.59	5.51	9.09	0.24	9.32	75.29	437
12	2011-12	2.06	1.79	5.73	9.58	0.24	9.82	84.61	436
13	2012-13	2.18	2.00	5.90	10.07	0.24	10.31	93.98	453
14	2013-14	2.37	2.30	6.18	10.85	0.26	11.11	108.99	476
15	2014-15	2.52	2.48	6.42	11.42	0.27	11.69	119.86	492
16	2015-16	2.81	2.65	6.51	11.97	0.29	12.26	130.61	506

Source: GOG (2017).

Out of total milk production, about 53.11 per cent of the milk production is contributed by Indigenous Buffaloes followed by 22.94 per cent by indigenous cattle. The crossbreed cattle contribute 21.6 per cent of the total milk production in the state whereas Goat contributes 2.36 per cent to total milk production. The productivity

of cows and buffalo in term of daily milk yield is increasing continuously (Fig 2.6). Despite of increase in milk yield, there is still a wide scope for improving milk yield of milch animals.

Fig. 2.5: Trends in Total Milk production in Gujarat state (1983-84 to 2015-16)

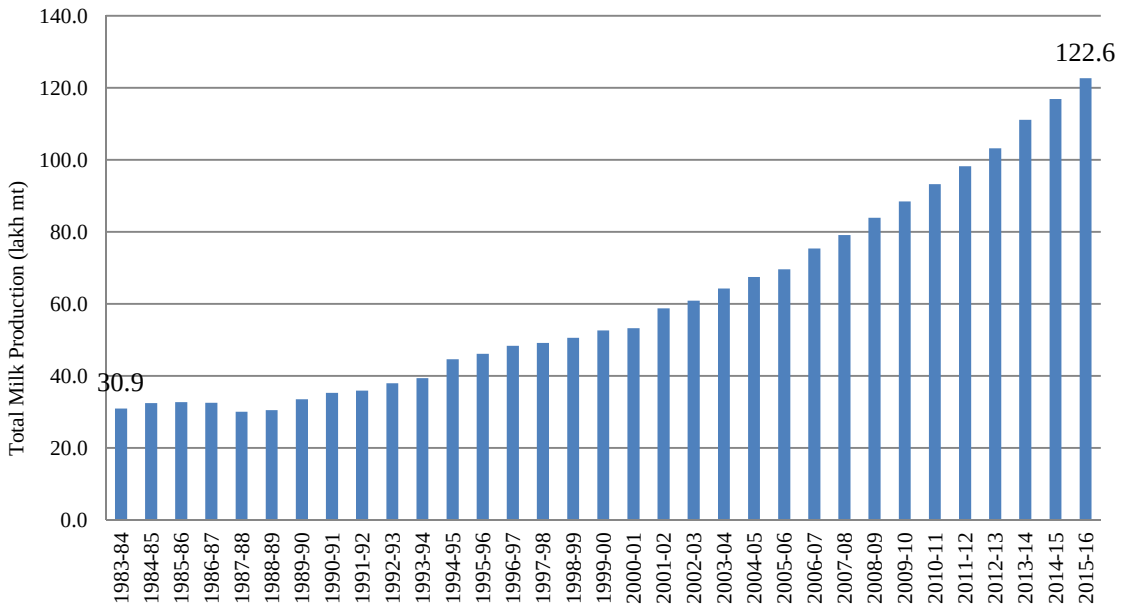


Fig. 2.6: Species wise Trends in Total Milk Productivity in Gujarat state

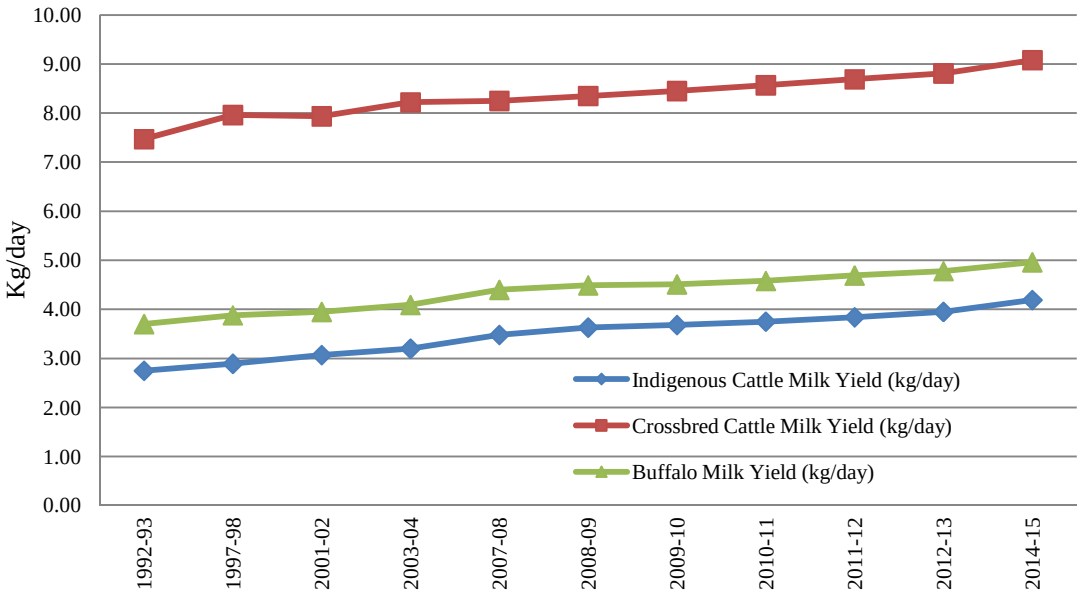
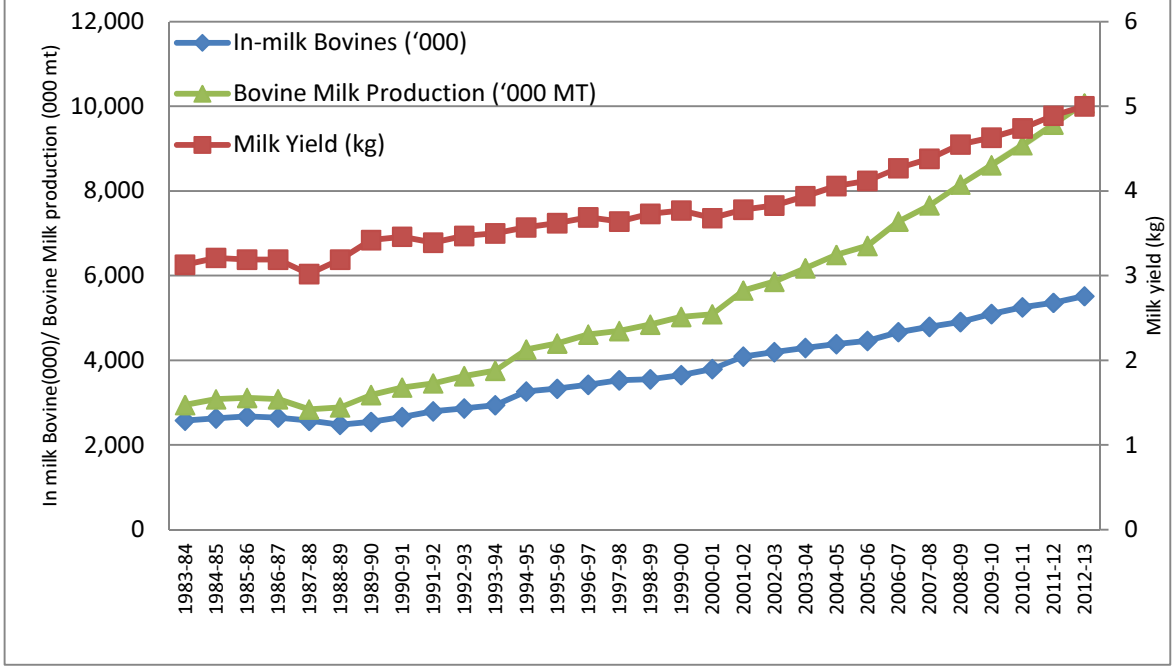


Fig. 2.7: Yearwise In milk Bovine Population, Milk Yield and Bovine Milk Production



Out of total bovine milk production, 55.4 per cent accounts buffalo milk, 23.5 per cent share accounts for indigenous cows and remaining 22.1 per cent was of cross breed cows. The significant growth in population of in milk bovine animals supported by increase in milk yield of bovine animals which has increased (bovine milk production) by 135 per cent in 2015-16 over 1983-84 (Fig. 2.7). The share of cross bread cows in total milk production has increased while share of indigenous cows and buffalo has declined during last one and half decade. The corresponding share was 66.75 per cent, 28.19 per cent and 5.06 per cent respectively in 2000-01.

District-wise milk production in Gujarat state for the year 2015-16 is presented in Fig 2.8. It can be seen that Banaskantha is the highest milk producing district in the state with an estimated milk production of about 1644 thousand tonnes during 2015-16 accounting more than ten percent of total milk production in the state. Sabarkantha is the second largest producer of milk with an estimated

share of about 9 percent, followed by Mehsana (6.51 %) and Kheda (5.57%). The top ten districts together contributes about 62 per cent of milk production of the state, those are Banaskantha, Sabarkantha, Mehsana, Kheda, Junagadh, Panchmahal, Rajkot, Anand, Kachchh, and Surendranagar. Category-wise share of milk production in Gujarat clearly indicate that top ranked milk producer five districts in Gujarat are dominated by the production of milk by cross bred cows, followed by buffalo and goat (Table 2.15).

Fig. 2.8: Districtwise Milk Production in Gujarat (2015-16)

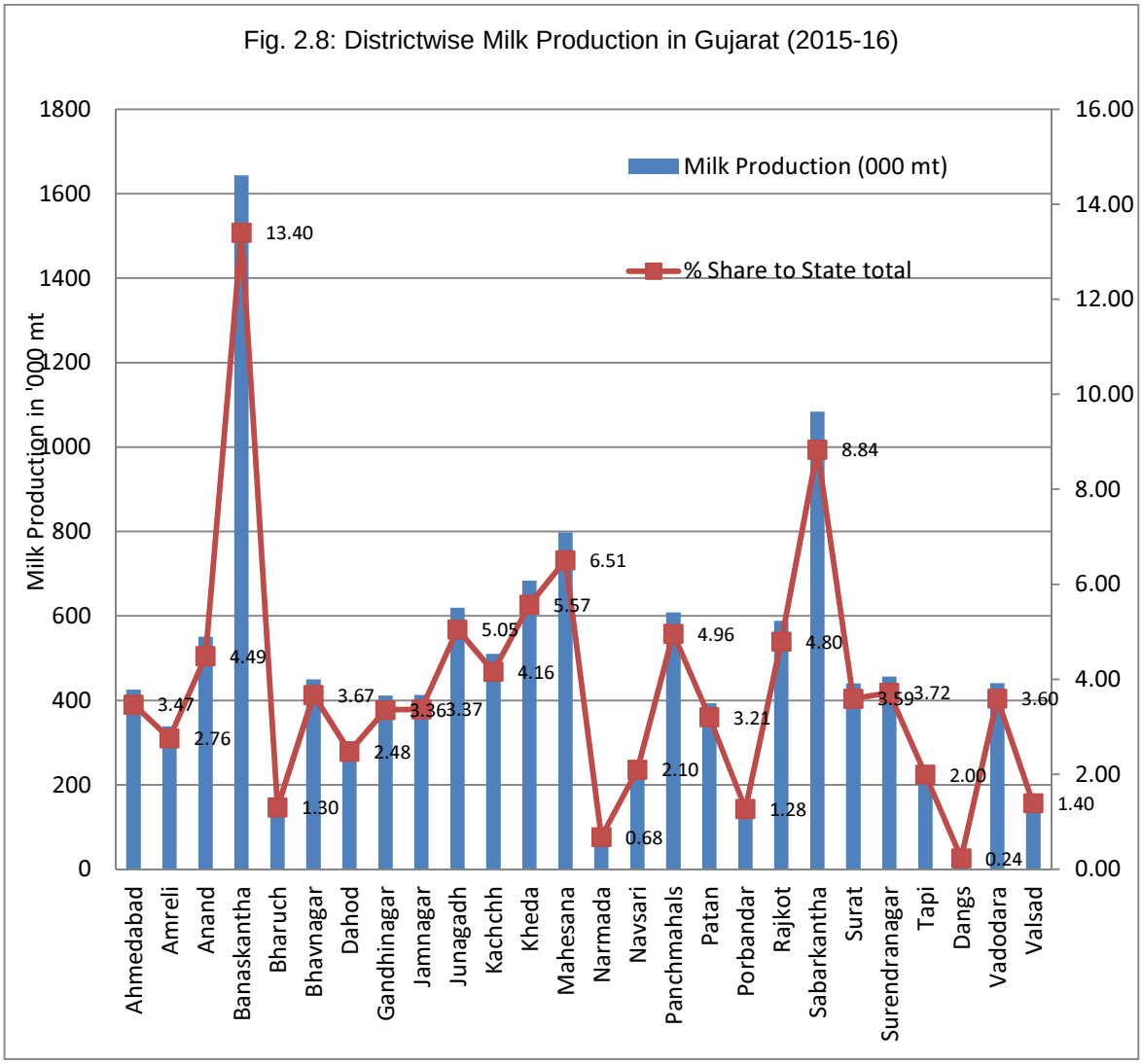


Table 2.15: District wise & category wise Percentage share of Milk Production in Gujarat

Name of the District	District wise & category wise Percentage share of Milk Production in Gujarat (2014-15)					
	% share of Crossbred Cow	% share of Indigenous Cow	% share of Total Cattle	% share of Buffalo	Goat	% share to total Milk Production
Banaskantha	21.1	9.0	15.0	12.0	10.0	13.2
Sabarkantha	16.5	8.8	10.7	8.2	9.1	9.3
Mehsana	11.0	7.9	6.9	7.3	8.8	7.0
Navsari	6.6	7.5	4.8	6.3	8.8	5.3
Surat	6.3	7.2	4.6	5.4	8.5	4.8
Kheda	5.9	6.4	4.4	5.2	6.0	4.8
Anand	5.8	5.0	4.2	4.8	4.3	4.7
Gandhinagar	4.9	5.0	4.2	4.7	3.9	4.5
Tapi	4.0	4.8	4.1	4.5	3.8	3.9
Valsad	3.9	4.8	3.7	4.3	3.6	3.9
Panchmahal	3.7	4.7	3.7	4.2	3.4	3.9
Rajkot	2.1	4.2	3.6	3.8	3.3	3.6
Vadodara	1.5	3.6	3.6	3.6	3.3	3.6
Ahmedabad	1.1	2.9	3.2	3.6	2.9	3.5
Bharuch	1.1	2.7	3.2	3.5	2.9	3.3
Patan	1.0	2.6	3.0	3.3	2.8	3.3
Junagadh	1.0	2.6	2.7	3.2	2.2	3.1
Bhavnagar	0.7	1.9	2.6	2.9	2.2	2.8
Dang	0.6	1.5	2.6	2.5	2.1	2.5
Amreli	0.4	1.4	2.4	1.7	1.9	2.1
Kachchh	0.3	1.3	2.1	1.6	1.5	2.0
Narmada	0.2	1.3	1.9	1.4	1.2	1.5
Surendranagar	0.2	1.2	1.1	0.9	1.2	1.3
Porbandar	0.1	1.1	0.8	0.6	1.1	1.3
Jamnagar	0.1	0.6	0.8	0.6	0.7	0.7
Dahod	0.1	0.2	0.4	0.1	0.3	0.2

Source: GOG (2015a).

The species-wise district wise milk yield data presented in Fig 2.9 & Map 2.1 indicate that among the species, the highest milk yield was recorded in cross breed cows. The highest bovine milk yield is recorded in Mehsana district (6.17 kg/day) and the lowest was in Dahod district (3.0 kg/day). In case of indigenous cows, highest milk yield was recorded in Amreli (4.77 kg/day) and the lowest was in Dangs (1.26 kg/day). Among the species, the highest milk yield was recorded in cross breed cows in Banaskantha district (10.68 kg/day) and the lowest was in Dangs district (7.29 kg/day). Porbandar district was the top rank district in case of buffalo yield (5.69 kg/day) while same was recorded lowest in Narmada (3.28 kg/day). The highest milk density is recorded in Gandhinagar (542 kg/day/sq km), while highest per capita milk availability is recorded in Banaskantha (1060 gm/day) (Fig. 2.10).

Fig. 2.9: Specieswise Districtwise Milk Yield (kg/day) 2012-13

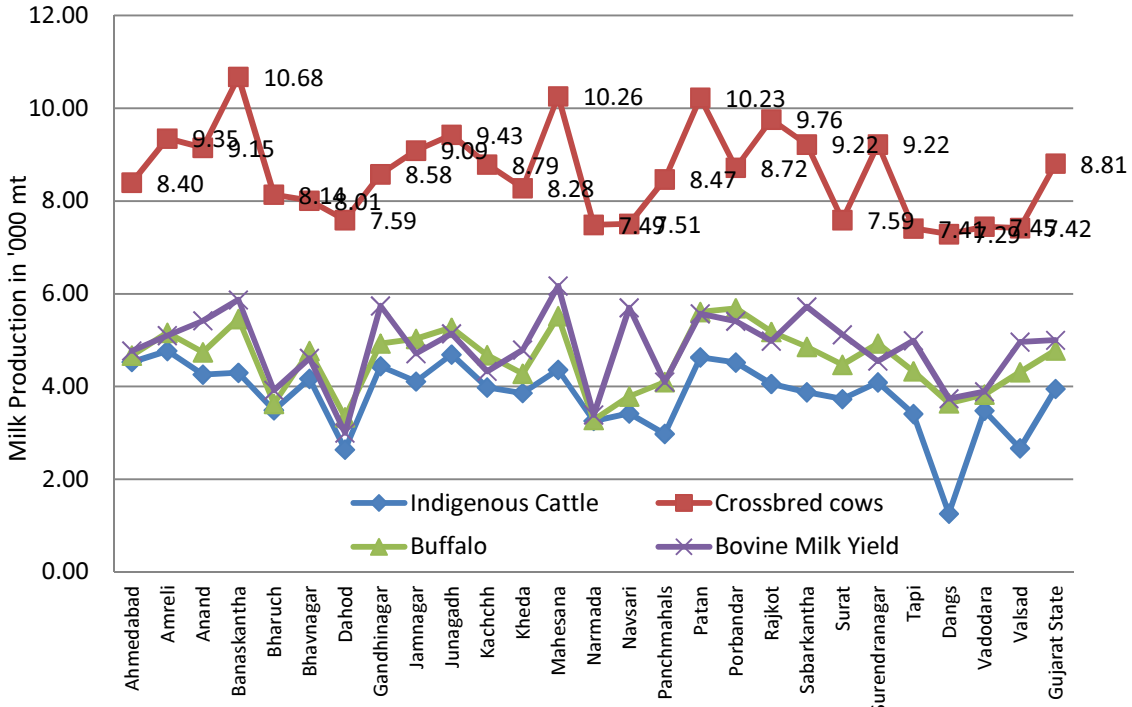
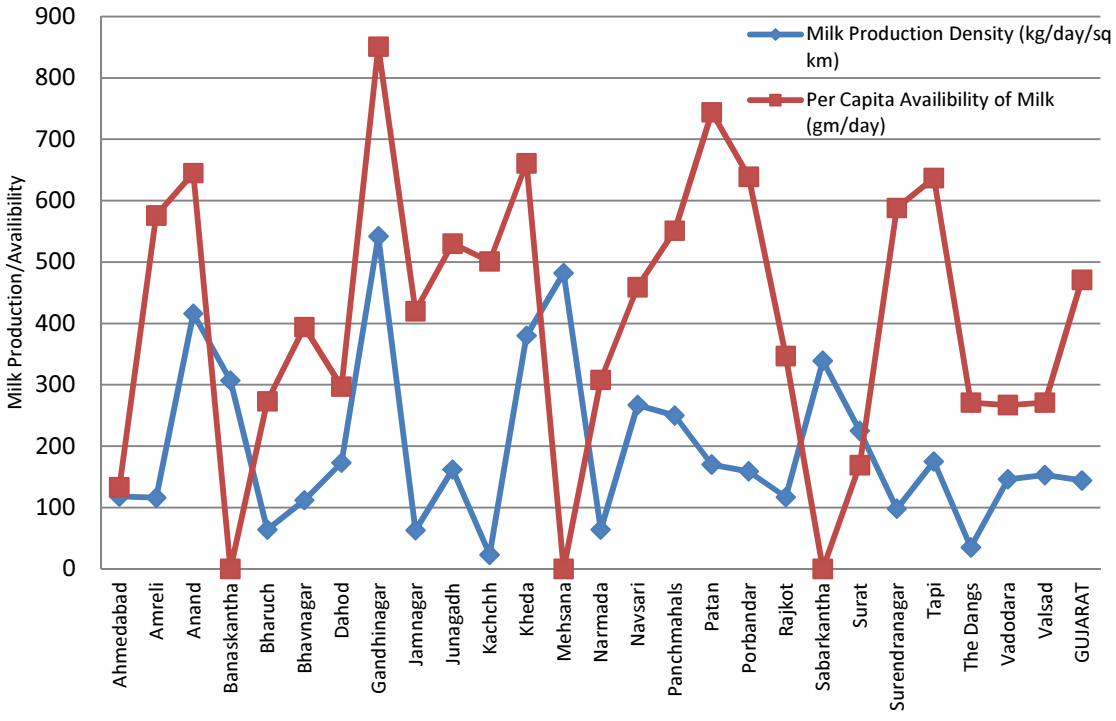
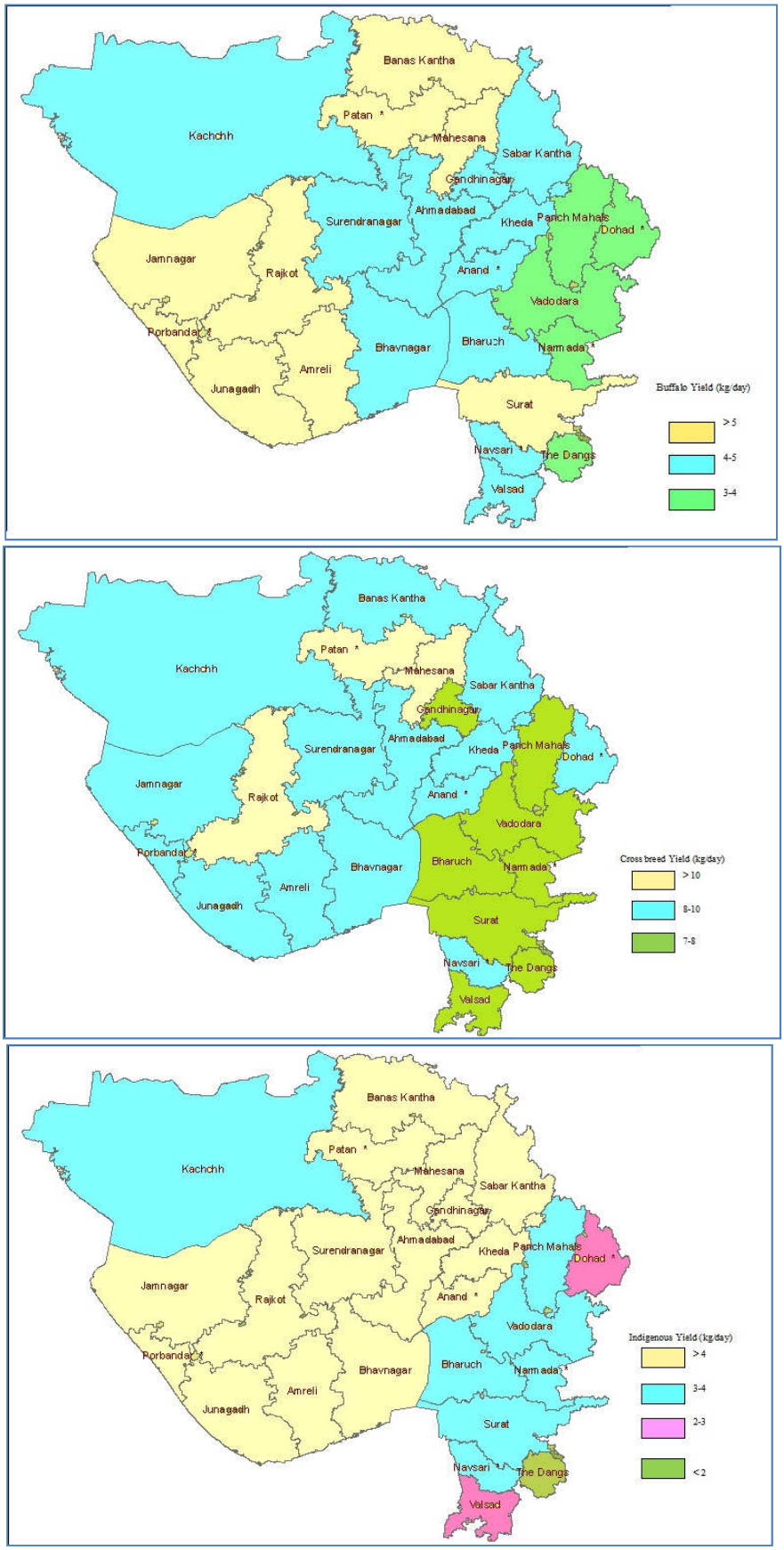


Fig. 2.10: Districtwise Milk Production Density and Per Capita Availibility of Milk (2012-13)



Map 2.1: Districtwise Yield of Species



2.7 Milk Consumption and Marketable Surplus

The data on milk utilisation pattern in Gujarat indicate that out of the total production of milk at the home, about 77.6 per cent was sold, while 17.7 per cent milk was consumed at the home and remaining 4.7 per cent milk was converted into milk products in 2015-16 (Table 2.16). The share of quantity sold in total production has been increased by 25.4 percent points in 2015-16 over 197-98, while consumption of milk share declined by 17.4 percent points and share of converted into milk products declined by 8.1 per cent points during corresponding years. The breed wise milk utilisation shows that goat milk was preferred for consumption during monsoon and summer season, while during winter, it is used for conversion into milk products (Table 2.17).

Table 2.16: Milk Utilisation Pattern in Households in Gujarat (1997-98 to 2015-16)

Item	Milk Utilisation Pattern in Households in Gujarat (1997-98 to 2015-16)											
	1997-98	2000-01	2003-04	2006-07	2007-08	2008-09	2009-10	2011-12	2012-13	2013-14	2014-15	2015-16
Production in Selected Households (000'kg)	36.0	106.5	114.3	127.7	133.6	150.6	157.2	142.8	117.3	122.4	133.5	319.7
Purchased												
Quantity	57.0	114.5	55.7	71.6	29.2	24.0	34.0	18.0	22.5	32.5	15.5	123.4
Avg. rate of purchase (Rs. per kg) sold	8.9	11.6	13.1	15.2	14.4	14.4	19.9	30.3	30.3	39.0	41.6	45.5
Sold												
Quantity (000'kg)	18.8	55.5	64.6	73.5	79.0	91.0	99.6	94.6	77.3	80.8	94.0	248.1
Avg. rate of selling (Rs. per kg)	8.8	10.3	12.3	13.0	14.1	17.4	17.7	24.6	26.4	30.7	30.2	32.1
Converted into Milk Products (000'kg)	4.6	11.4	11.6	14.6	14.5	14.1	13.4	8.3	6.1	6.3	5.7	15.0
Consumed at Home (000'kg)	12.6	39.6	38.3	39.8	40.1	45.5	44.2	39.9	33.9	35.3	33.8	56.7
Quantity sold (%)	52.2	52.1	56.5	57.6	59.1	60.4	63.4	66.2	65.9	66.0	70.4	77.6
Converted into milk products (%)	12.8	10.7	10.1	11.4	10.9	9.4	8.5	5.8	5.2	5.1	4.3	4.7
Consumed at home (%)	35.1	37.2	33.5	31.2	30.0	30.2	28.1	27.9	28.9	28.9	25.3	17.7

Source : GOG (2017), Directorate of Animal Husbandry, Govt. of Gujarat.

Table 2.17: Season-wise breed wise Utilization Pattern of Milk in Gujarat (2015-16)

Items	Summer			Monsoon			Winter			Grand Total
	Cow/ Buffalo	Goat	Total	Cow/ Buffalo	Goat	Total	Cow/ Buffalo	Goat	Total	
MILK										
1 Production in selected HHds(Kgs.)	105518	2654	108172	100156	2040	102196	106774	2563	109338	319705
2 Purchased										
(a) Quantity (Kgs.)	0.00	0.00	0.00	29.00	0.00	29.00	94.40	0.00	94.40	123.40
(b) Average rate of purchase (Rs.per Kg.)	0.00	0.00	0.00	48.28	0.00	48.28	44.60	0.00	44.60	45.46
3 Sold										
(a) Quantity (Kgs.)	83848	1140	84988	78539	506	79045	83236	837	84073	248106
(b) Average rate of selling(Rs.per Kg.)	32.74	20.70	32.58	32.81	20.85	32.73	31.10	20.49	30.99	32.09
4 Converted into Milk Products (Kgs.)	4227	34	4261	4364	23	4387	4750	1647	6397	15045
5 Consumed at home (in Kgs.)	17443	1480	18923	17282	1511	18792	18882	80	18962	56677
% Milk Sold to total production	79.46	42.97	78.57	78.42	24.82	77.35	77.96	32.66	76.89	77.60
% Milk converted	4.01	1.27	3.94	4.36	1.13	4.29	4.45	64.24	5.85	4.71
% Milk consumed	16.53	55.76	17.49	17.25	74.05	18.39	17.68	3.11	17.34	17.73

Source : GOG (2017) Directorate of Animal Husbandry, Govt. of Gujarat.

2.8 Status of Availability of Feed and Fodder

As against the estimated animals' requirements, feed resources available in Gujarat are lower. In the last decade (2003 to 2011), shortage of dry matter in the State reduced from 137 per cent of the requirement to 66 per cent; total digestible nutrients from 200 per cent to 73 per cent while the crude protein availability increased from -98 per cent to a surplus of 19 per cent (Table 2.18). Eleven cattle feed factories, in the cooperative sector and spread across the State, produced about 2.6 million tonnes of concentrated cattle feed for bovines during 2012-13 and was sold at prices ranging from Rs. 11.9 to 14.3 a kg. The usage of concentrate increased from 2.1 kg to

2.7 kg per in-milk cattle, while for buffaloes, it declined from 3.0 kg to 2.7 kg during the same period.

Table 2.18: Feed Nutrients Availability, Requirement & Surplus/Deficit in Gujarat

Year	Feed Nutrients Availability, Requirement and Surplus/Deficit in Gujarat (000 MT)								
	Dry Matter			Crude Protein			Total Digestible Nutrients		
	Availability	Requirement	Deficit/ Surplus	Availability	Requirement	Deficit/ Surplus	Availability	Requirement	Deficit/ Surplus
1992	15,900	-	-	1,682	-	-	8,312	-	-
1997	24,164	34,013	-9,848	3,158	3,023	135	12,925	21,781	-8,856
2003	18,940	44,897	-25,957	2,033	4,027	-1,994	9,562	28,740	-19,77.8
2007	24,517	50,242	-25,726	4,761	4,593	168	14,769	32,082	-17,313
2008	30,710	51,533	-20,824	5,736	4,732	1,005	18,101	32,878	-14,777
2009	26,297	52,991	-26,694	4,625	4,887	-262	14,376	33,786	-19,411
2010	22,586	54,633	-32,046	4,189	5,060	-871	12,303	34,817	-22,514
2011	33,971	56,479	-22,508	6,533	5,252	1,281	20,767	35,985	-15,218

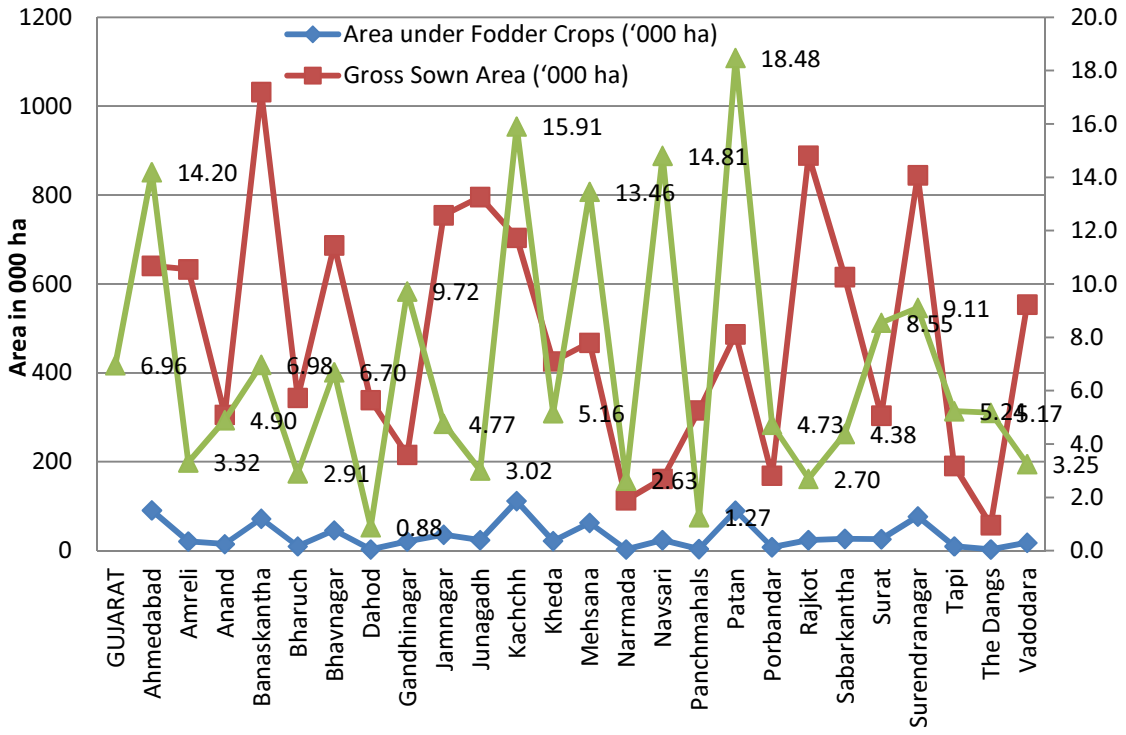
Source:www.indiastat.com

Green fodder is a comparatively economical source of nutrients. However, the availability of green fodder is lower than estimated requirement. In Gujarat, the area under fodder crop has fallen over the last eight years, viz. from 10.47 per cent of the gross sown area in 2000-01 to 6.96 per cent in 2007-08 (Fig. 2.13). Patan district had the largest area under fodder crops (18.48%) followed by Kachchh, Navsari, Ahmedabad and Gandhinagar district (Fig. 2.11).

In Gujarat, there is absence of regulated and organized fodder market. Small scale marketing of fodder exists in all rural areas of the state where fodder are sold by producers to traders or directly to the consumers. In rural areas, farmers having surplus fodder sell some quantity to needy cattle owners. Generally, demand for green and dry fodders in a village is met from within village. While green fodder is available from crops like Lucerne, bajra, maize and sorghum, the sources of dry fodder are crop-residues and by-product of cereals and pulses crops. Farmers bring head loads or cartloads of fodder from their fields to the village. Normally, surplus green fodder is sold as

standing crop on area basis. Surplus dry straw is sold either in bundles or weight basis in the village to needy cattle owners. Natural grass is abundantly available from during the month of September to October when grass is harvested. Generally, grass producers sell their grass soon after the harvest to needy farmers. Grass being a bulky and less remunerative product, producers sell it just after harvest.

Fig. 2.11 Districtwise Area under Fodder Crops in Gujarat 2007-08



2.9 Infrastructure Development

Gujarat is third largest producer of milk in our country. This could happen because of strong network of milk cooperatives and development of infrastructure at the village as well as district level. The co-operatives have developed modern systems of veterinary care and artificial insemination and provide these services to a large number of milk producers at very low prices. The district co-operatives have vans equipped with a trained veterinary surgeon and medicines stationed in different centres to cater to the needs of the members of the co-operatives. The special emphasis on development was dairy infrastructure was given during the Operation Flood movement.

The animal health care is more important for all over economic growth in Gujarat state. For veterinary Services 675 Veterinary Dispensaries, 45 Mobile Veterinary Dispensaries, 27 Branch Veterinary Dispensary, 552 First aid veterinary Centers, 23 Veterinary polyclinics and One Biological Product Station-Gandhinagar are working at present. Still these facilities are not available in the interior villages, 120 Mobile Animal Disease Diagnostic Laboratory Ambulance Van cum Veterinary Dispensaries are established and attached with veterinary Dispensary. A New Scheme of "Mobile Veterinary Dispensary per 10 Villages" was established in the year 2015-16. Under this scheme 115 M.V.D. were came into existence. The objective of this scheme is to provide veterinary services at village level through mobile vehicle in each 10 villages of respective Veterinary Dispensary by different prescribed route. The coverage of livestock unit per institution is around 13771. For the control of emerging diseases of livestock and poultry, 17 Diseases Diagnostic Units, 2 Epidemiology Units and one Foot and mouth typing unit are working in the State. There are number of emerging and re-emerging livestock diseases like P.P.R (goat plague), Brucellosis, Leptospirosis and Blue tongue.

The details about the veterinary infrastructure and Manpower available in Gujarat state is presented in Table 2.19, growth in infrastructure facilities for animal Husbandry in Gujarat is presented in Table 2.20 and districtwise number of veterinary institutions in Gujarat during 2015 – 2016 is presented in Table 2.21.

Table 2.19: Veterinary Infrastructure and Manpower in Gujarat state

Year	No. of Veterinary Institutions	No. of Veterinarians	Cattle Equivalent Units Per Veterinary Institution	Cattle Equivalent Per Veterinarian
2010-11	1232	NA	14330	-
2011-12	1232	733	14330	24085.0
2012-13	1282	684	13771	25810.4
2013-14	1322	720	13354	24519.9
2014-15	1322	801	16093	26560.3

Source: GOG (2014b, 2017).

Table 2.20: Growth in Infrastructure facilities for Animal Husbandry in Gujarat

Year	Growth in Infrastructure facilities for Animal Husbandry in Gujarat (Nos)							
	Veterinary Polyclinic	Veterinary Hospital VD/ BVD	Mobile veterinary Dispensaries	First Aid Veterinary Centre	Animal Insemination Centre/ SubCentres	Sheep & Wool Extension Centres	Breeding Farms	
							Cattle	Poultry
1960-61	-	189	NA	344	41	6	3	NA
1970-71	-	216	NA	428	861	30	5	10
1980-81	-	220	113	512	2106	115	4	11
1990-91	13	349	31	557	3485	53	12	6
2000-01	14	478	37	553	3693	94	9	6
2010-11	23	622	35	552	6581	159	8	11
2012-13	23	672	35	552	7145	159	5	12

Source: GOG (2014), Statistical Abstract of Gujarat State.

Table 2.21: Districtwise Number of Veterinary Institutions in Gujarat (2015 – 2016)

Sr. No.	District	Polyclinic	VD/BVD	FAVC	MVD	MVD/10 Village	Total Vet. Insti.	ADIO
1	Ahmedabad	1	27	17	1	4	50	1
2	Amreli	1	33	24	0	6	64	1
3	Anand	1	20	20	0	0	41	0
4	Aravalli	0	21	15	0	0	36	0
5	Banaskantha	1	62	27	3	0	93	1
6	Bharuch	1	19	25	1	9	55	1
7	Bhavnagar	1	27	19	1	10	58	1
8	Botad	0	10	6	0	2	18	0
9	Chhota Udepur	0	10	14	0	0	24	0
10	Dahod	1	19	23	3	0	46	1
11	Dangs	0	6	9	1	5	21	0
12	Devbhumi Dwaraka	0	13	6	0	4	23	0
13	Gandhinagar	1	23	13	0	0	37	0
14	Gir Somnath	0	19	5	0	3	27	0
15	Jamanagar	1	20	17	0	8	46	1
16	Junagadh	1	30	7	1	6	45	1
17	Kachchh	1	32	29	6	13	81	1
18	Kheda	1	17	18	0	0	36	0
19	Mahesana	1	33	20	0	0	54	1
20	Mahisagar	0	19	17	0	0	36	0
21	Morbi	0	15	8	0	1	24	0
22	Narmada	0	14	16	4	10	44	0
23	Navsari	1	17	15	2	6	41	1
24	Panchmahal	1	23	21	2	0	47	0
25	Patan	1	29	15	2	0	47	0
26	Porbandar	1	11	7	1	2	22	0
27	Rajkot	1	28	18	0	11	58	1
28	Sabarkantha	1	24	22	7	0	54	1
29	Surat	1	18	25	2	8	54	1
30	Surendranagar	1	28	14	0	0	43	1
31	Tapi	0	10	26	2	0	38	0
32	Vadodara	1	15	17	4	0	37	1
33	Valsad	1	10	17	2	7	37	1
Total		**23**	**702**	**552**	**45**	**115**	**1437**	**17**

The details on cattle and development programme 2015-16 are presented in Table 2.22. Gujarat has 23 Intensive Cattle Development Projects (ICDP) with 1,078 Breeding Centres in the state which are aimed at improving the breed of cattle and buffaloes.

Table 2.22: Infrastructure Development under Cattle & Buffalo Development programme 2015-16

Particulars	**Item**	Nos.
Cattle Breeding Farm	(i) Under Gujarat Livestock Development Board	4
	(ii) Under State Agricultural University	0
Buffalo Breeding Farm	(i) Under Government of Gujarat	1
	(ii) Under Indian Dairy Development	0
	(iii) Under State Agricultural University	0
	(iv) Under National Dairy Development Board	0
Gaushala	(a) Religious Institutes	243
	(b) Educational Institutes	65
	(c) Others	359
Panjarapoles		269
Intensive Cattle Development Programme	(ii) Blocks	23
	(ii) Sub-Centres	965

Source: GOG (2017).

Over the period, as production of milk increases, numbers of milk processing dairies were build up (Fig. 2.12). Eighteen Co-operative Dairy Unions have total 140.50 Lakh Liter per Day milk processing capacity and they procured 125.75 LLPD milk. During the year 2012-13, these Eighteen dairy union have 73 chilling center also having capacity of 57.19 LLPD of milk. The details on number of societies with bulk milkcooler (BMC), automatic milk collection System (AMCS) and number of chilling centre with installed capacity (1000 litres/day) is presented in Table 2.23. Banaskantha, Mehsana and Sabarkanta district have these infrastructure available on larger number than other districts in the state. Nine District Co-operative Unions have established 12 Cattle Feed Factories to produce and supply cattle feed to their members at village level at no profit no loss basis. To help and to enhance cattle feed production state government is also helps them by providing Rs.45 lakh as revolving fund in the state. Total production of

cattle feed is 1299608 MT by above nine factories (Table 2.24). However, still Gujarat state is deficit in availability of feed nutrient.

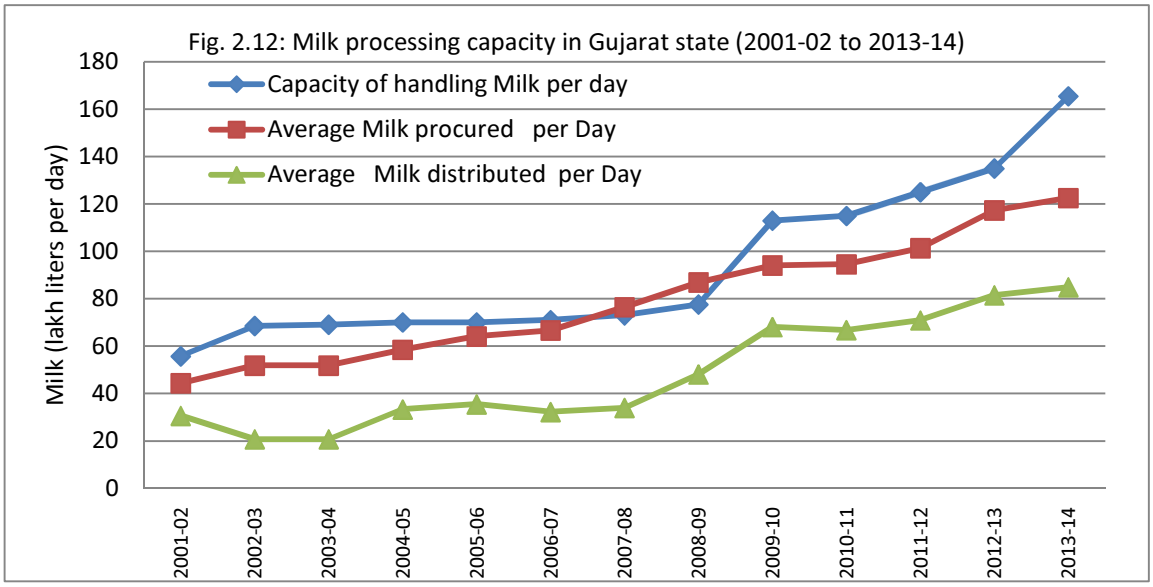


Table 2.23: Details about Bulk Cooler, Automatic Milk Collection Systems and Chilling Centres facility with Dairy Cooperative Societies in Gujarat

Sr. No.	Name of Milk Producers' Co- op. Union Ltd.	No. of Societies with		No. of Chilling Centre- Installed Capacity (1000 litres/day)
		Bulk Milk Cooler (BMC)	Automatic Milk Collection System (AMCS)	
1	Ahmedabad	47	364	130
2	Amreli	0	537	100
3	Banaskantha	1067	1562	625
4	Bharuch	152	408	90
5	Bhavnagar	0	496	600
6	Gandhinagar	4	99	-
7	Jamnagar	0	0	
8	Junagadh	6	312	1350
9	Kachchh	0	503	398
10	Kheda	1187	1179	240
11	Mehsana	747	1504	1400
12	Panchmahal	255	1150	460
13	Porbandar	0	191	125
14	Rajkot	75	683	250
15	Sabarkantha	383	1649	600
16	Surat	482	1263	550
17	Surendranagar	93	726	735
18	Vadodara	223	979	270
19	Valsad	72	628	335
Total		**4793**	**14233**	**8258**

Table 2.24: Details about Cattle Feed Production Capacity and Price 2014-2015

Sr. No.	Cattle Feed Factory	Cattle Feed Brand	Production Capacity (MTPD)	Price/ M.T.(Rs.) as on Mar-14
1	Ahmedabad –Sarkhej	Uttamdan	100	14000
2	Banaskantha – Palanpur	Banasdan	1600	13421
3	Boriyavi, Mehsana	Sagardan	450	14857
4	Ubakhal, Mehsana	Sagardan	450	-
5	Jagudan, Mehsana	Sagardan	1000	-
6	Sabarkantha – Himmatnagar	Sagardan	450	12857
7	Itola – Vadodara	Barodadan	140	14500
8	Kanjari- Kheda	Amuldan	1050	13500
9	Khandheri – Panchmahal	Panchamrutdan	100	14327
10	Chalthan- Surat	Sumuldan	300	13384
11	Sagbara- Valsad	Vasudhara-dan	50	13900

Source: GOG (2017).

Animal hostel:

Milk Production depends on the well-being of the cattle. The Government of Gujarat has focused on providing adequate cattle-care facilities to the people of Gujarat. India's first animal hostel was inaugurated in Akodara village of Sabarkantha district. The animal hostel aims to provide shelter to the animals in villages and is based on a public-private partnership model. The animal hostel is not only boost milk production, but it also lessen the stress on the women of the village, as they do not need to remain engaged with their cattle for the whole day.

2.10 Chapter Summary

The review of dairy development in Gujarat indicate that one fourth of the agriculture sector output comes from livestock sector and milk contributes to around 20 per cent to the agricultural GDP of Gujarat and is one of the biggest sectors for supporting livelihood in the state. Gujarat State possesses a remarkable position in the country so far as livestock wealth and development are concerned. The State

has high-quality, high-yielding breeds of cattle and buffaloes. Gir and Kankrej breeds in cows, and Mehsani, Jafarbadi and Surti breeds in buffaloes were known for their high milk yielding capacity. The State Government policy has been providing necessary support for dairy development in the state through co-operative sector. Gujarat ranks third among the milk producing states in India, achieving 122.62 lakh MT in 2015-16, which has increased from the 30.9 lakh tonnes during 1983-84. Out of total milk production, about 53.11 per cent of the milk production is contributed by Indigenous Buffaloes followed by 22.94 per cent by indigenous cattle. The crossbreed cattle contribute 21.6 per cent of the total milk production in the state whereas Goat contributes 2.36 per cent to total milk production. The productivity of cows and buffalo in term of daily milk yield is increasing continuously. Despite of increase in milk yield, there is still a wide scope for improving milk yield of milch animals. The highest milk yield was recorded in cross breed cows. However, as against the estimated animals' requirements, feed resources available in Gujarat are lower. The co-operatives have developed modern systems of veterinary care and artificial insemination and provide these services to a large number of milk producers at very low prices. The district co-operatives have vans equipped with a trained veterinary surgeon and medicines stationed in different centres to cater to the needs of the members of the co-operatives.

The next chapter presents the status of dairy development institutions in Gujarat.

Chapter III

Status of Dairy Development Institutions in Gujarat

3.1 Introduction:

Various types of institutional and infrastructure supports are required in order to facilitate growth in dairy sector. These include credit institutions, farmer training facilities, milk collection centres, processing and marketing facilities, dairy farmer co-operatives of groups, and research extension services. Without these support dairy development programmes can face serious constraints. As cited by many researchers, most of the dairy farmers are resource poor smallholders who mainly depend on bank loans for farm investment. Most of these farmers have little formal education and only a limited knowledge of dairy husbandry; consequently at least two or three months of intensive practical training are required to provide them with a reasonable background in dairy farming. Once dairy production begins, a milk collection and cooling centre is required to collect milk from the dairy farms and then to transport the milk to a milk processing plant for processing and packaging, as well as marketing of the products. Farmers constantly require dairy extension service to provide AI, as well as animal health care (such as vaccination) and other services to improve their farming efficiency. Research on various aspects of dairy production, including socio-economic and policy studies, is required in order to find solutions to various problems. Government departments and universities need to be well equipped in dairy research. There is a need for facilities capable of conducting research to identify appropriate scientific and technological interventions for the improvement of local dairy production. The lack of effective dairy extension services and inadequate research support

appear to be major constraints to the efficiency of dairy production in different parts of India.

3.2 Dairy Development Institutions:

Dairy industry in Gujarat state is well-established at present and it was taken as a model for replicating in other parts of the country. The dairy sector in the state is a key importance as it generates the best alternative additional income and employment for poor, rural farmers, landless workers. The pace of dairy development in state was very rapidly due to well organised and assured market agency, reasonably good prices for milk supplied to the dairy and easy access for all veterinary and health care services offered by the co-operative dairy sector at village level. However, the State Government policy is to support the dairy development through co-operative sector. The co-operative dairy structure is very sound is central, north and partially in the southern region of the state. Majority of milk producers of these regions sell their milk through milk co-operative societies. The dairy development was also driven by the establishment of producer organizations such as MAHI. Few producers sell milk either directly to consumers or to milk vendor/middlemen or Mahi. The exploitation of milk producers by milk vendor/ middlemen is low due to the existence of co-operative societies in the village. Milk producers have easy access to all types of veterinary and health care services available in co-operative milk producers union and in nearby Government veterinary clinic.

3.2.1 Dairy Development Boards/ Corporations/Cooperative Federations:

As mentioned earlier, the institutions of national Importance such as National Dairy Development Board (NDDB) and National Cooperative Dairy Federation of India Limited (NCDFI) are established and located in

Anand district of Gujarat. Though the area coverage of these institutions is all India level, but it helped the Gujarat state is developing its dairy sector. Gujarat is now the leading milk producer in the country with cooperative dairy sector well established. The State Government established Gujarat Dairy Development Co-operation (GDDC) in 1973 with a view to supporting dairy development programme for the districts which lagged behind. By the end of 2015-16, 19 out of 33 districts had been covered under the co-operative milk producers union. Out of 18 dairy plants, 12 dairy plants are under Gujarat Cooperative Milk Marketing Federation (GCMMF) and 6 dairy plants viz. Jamnagar, Surendranagar, Amreli, Bhavnagar, Junagadh and Kachchh are under GDDC. The average capacity of these dairies is to process around 30 lakh liters of milk per dairy. Factories for milk products have been producing products per day on an average 24 lakh liters of milk. There are 10 cattle feed factories under GCMMF/GDDC with production capacity of 1800 MT per day. There are 35 chilling cooling centres with a capacity to hold 14.82 lakh liters milk. GCMMF markets milk products under brand names like “AMUL”, “SAGAR” and “SUGAM” These brand names are household names throughout India. GCMMF has been leading the way in milk production and distribution. Tremendous success has been achieved through Amul brand. Today GCMMF has around 2 lakh retail outlets in India.

AMUL Anand Model

The Amul Model[1] has helped India to emerge as the largest milk producer in the world. More than 15.83 million milk producers pour their milk in 1.7 lakh dairy cooperative societies across the country. Their milk is processed in 184 District Co-operative Unions and marketed by 22 State Marketing Federations, ensuring a better life for millions. The Amul Model of dairy development is a three-tiered structure with the dairy cooperative societies at the village level

[1] http://www.amul.com/m/about-us

federated under a milk union at the district level and a federation of member unions at the state level. The three tire model (Fig. 3.1) help in

- Establishment of a direct linkage between milk producers and consumers by eliminating middlemen;
- Milk Producers (farmers) control procurement, processing and marketing;
- Professional management.

The Three Tier Structure:

1. **The First Tier - Primary village Co-operative Society:** An Anand Pattern village dairy cooperative society (DCS) is formed by milk producers. Any producer can become a DCS member by buying a share and committing to sell milk only to the society. Each DCS has a milk collection centre where members take milk every day. Each member's milk is tested for quality with payments based on the percentage of fat and SNF. At the end of each year, a portion of the DCS profits is used to pay each member a patronage bonus based on the quantity of milk poured. This also acts as a vital link for various productivity enhancement and development programmes of farmers programmes.
2. **District Union the 2nd Tier:** A District Cooperative Milk Producers' Union is owned by dairy cooperative societies. It is a Union of primary village co-operative societies within a district. The Union buys all the societies' milk, then processes and markets fluid milk and products. Union also provides a range of inputs and services to village co-operative societies and their members: feed, veterinary care, artificial insemination to sustain the growth of milk production and the cooperatives' business. Union staff train and provide consulting services to support village co-operative society leaders and staff.

3. **The State Federation – 3rd Tier:** The cooperative milk producers' unions in a state form a State Federation which is an apex marketing body responsible for marketing of milk and milk products of member unions. The Federation also plays a role in the overall development of the district unions federated to it.

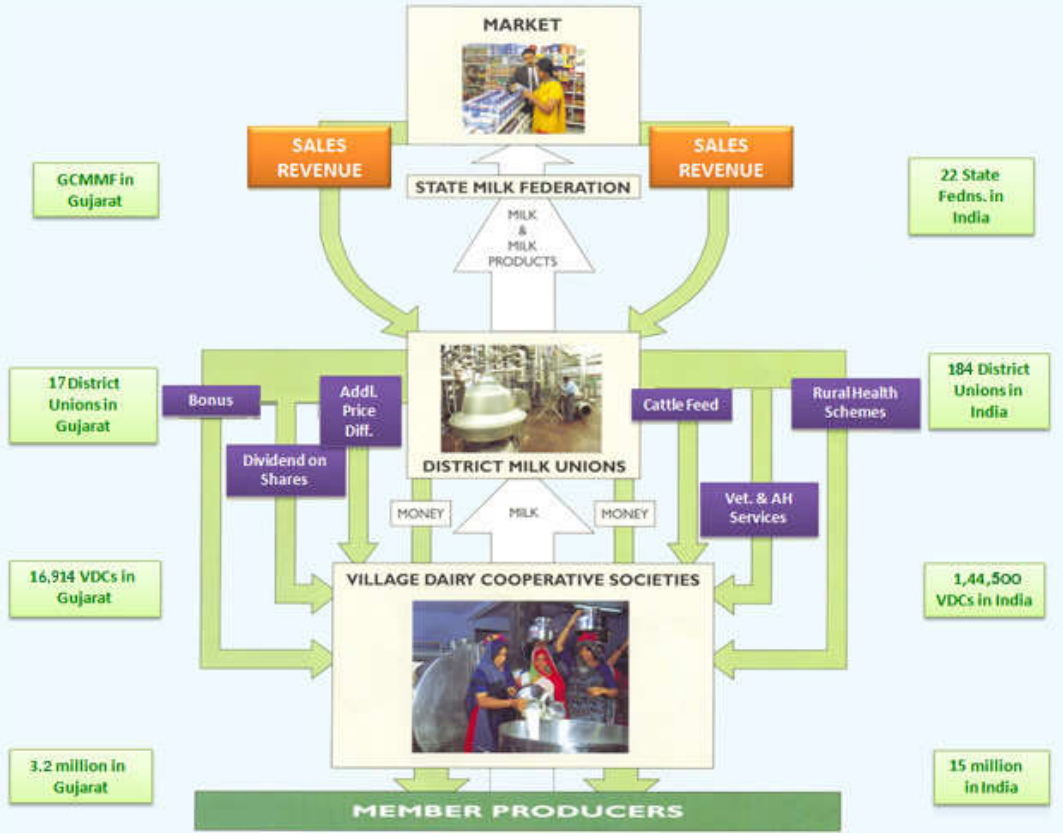
Fig. 3.1: Three Tire Structure of AMUL

The Anand Pattern is essentially an economic organizational pattern to benefit small producers who join hands forming an integrated approach in order to economy of a large scale business. The whole operation is professionally managed so that the individual producers have the freedom to decide their own policies. The adoption of modern production and

marketing techniques helps in providing those services that small producers individually can neither afford nor manage.

The Anand Pattern succeeded because it gave a fair price to the farmer and high - quality milk and milk products to the consumer. What would have been middlemen's profits in the earlier system got absorbed into development projects for primary producer or lower cost for the consumer. In short, the Anand Pattern meant the utilization of resources in the most profitable manner at grass-root level (Fig. 3.2).

Fig. 3.2: Structure of Milk Collection and Marketing in Gujarat

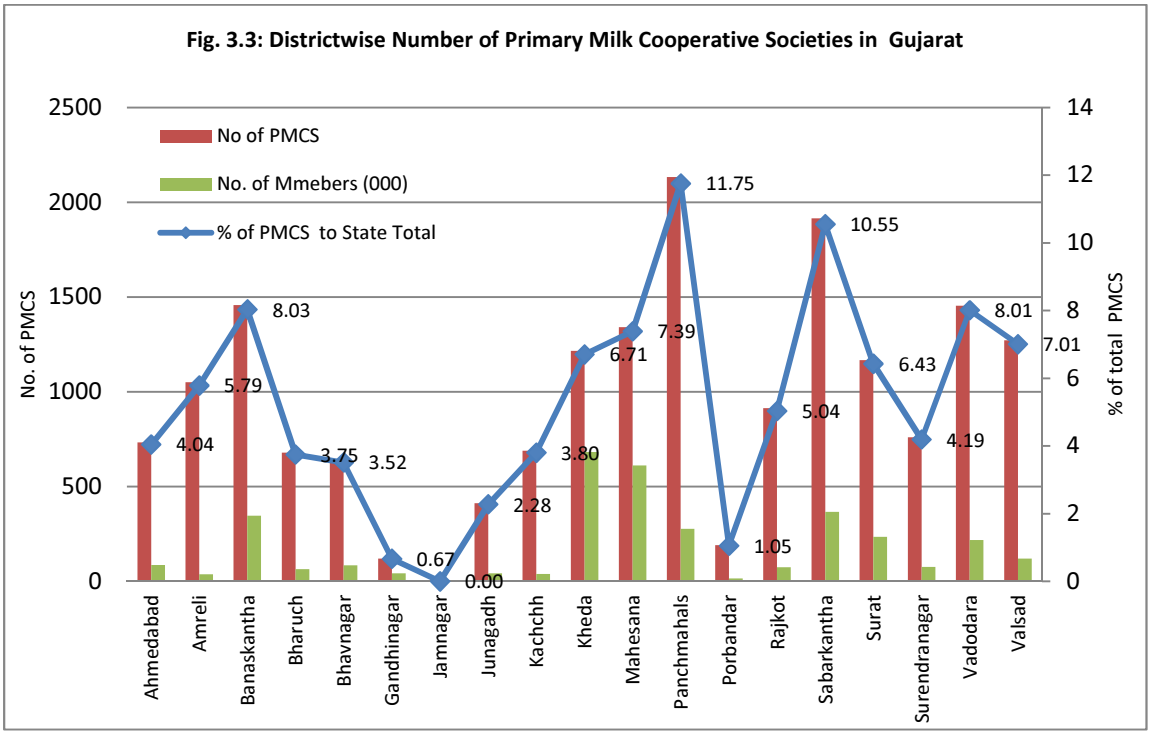


3.2.2 Primary Dairy Cooperative Societies:

The milk cooperative sector in Gujarat started in 1942 with one milk cooperative union and only two producers. Today, it has grown impressively and includes 18149 milk cooperative societies attached to 18 district level milk unions with 3.42 million milk producers (2015-16) contributing milk twice a day. About 17 per cent primary cooperative dairy societies in five districts of Gujarat (Banaskantha, Mehsana,

Kheda, Sabarkantha and Surat) are ISO certified. More than 70 per cent of the members are small or marginal farmers and landless labourers including a sizeable population of tribal folk and people belonging to the scheduled caste. Nearly 11 lakh cattle owners in Kathiawar and Kutch region are a part of this cooperative sector. Furthermore, women, have played an integral part in ushering in this white revolution. The number of milk societies formed and run by women has jumped from 800 to 3867. In the last ten years, the milk pouring of cooperatives has increased from 46 lakh litres to 174 lakh litres per day. Because of Government efforts[2], Gujarat today is not only self sufficient but Gujarat's dairies send 20 lakh litres of milk to Delhi, 8 lakh liters to Mumbai and 5 lakh liters to Kolkata, along with supplying milk powder to our armed forces. Over the last five and a half decades, dairy cooperatives in Gujarat have created an economic network that links more than 3.4 million village milk producers with millions of consumers in India.

Fig. 3.3: Districtwise Number of Primary Milk Cooperative Societies in Gujarat



[2] http://gujaratindia.com/printpreview.aspx?id=163&lg=en&NewsID=OwAhuSgQW4gO/FwV0IqgsQ==

The districtwise distribution of primary dairy cooperative societies in the State indicate that the highest number of village level cooperative milk societies are in Panchmahal district (11.8 % to state total) followed by Sabarkantha (10.6%), Banaskantha (8.0%), Vadodara (8.0%), Valsad (7.0 %), Mehsana (7.4%), Kheda (6.7%) and Surat (6.4%).These eight districts together accounts for two third of total primary cooperative milk societies in the state (Table 3.1 & Fig. 3.3). Out of the total 18149 cooperative milk societies in the state, about 21 percent are female cooperative milk societies. The proportion of female cooperative milk societies to total societies in each district was found highest in Bhavnagar district (82.3 %), followed by Valsad district (72.4 %) and Rajkot district (53.6%).

Table 3.1: Districtwise Cooperative Societies in Gujarat (2015-16)

Sr. No	Name of Milk Producers' Co-op. Union Ltd.	Total No of Societies	ISO Certified Societies	No. of Members (000)	No. of Female Cooperative Society	**No. Of Female Members**
1	Ahmedabad	734	0	86	157	28528
2	Amreli	1050	0	38	20	16837
3	Banaskantha	1458	1060	346	96	103993
4	Bharuch	680	0	65	155	25000
5	Bhavnagar	638	0	84	525	51956
6	Gandhinagar	121	0	43	32	8750
7	Jamnagar	0	0	0	0	0
8	Junagadh	413	0	43	218	14190
9	Kachchh	690	0	39	33	12532
10	Kheda	1217	1050	683	23	113000
11	Mehsana	1341	500	612	170	330257
12	Panchmahal	2133	0	277	429	55428
13	Porbandar	191	0	16	13	4345
14	Rajkot	914	0	74	490	32367
15	Sabarkantha	1915	274	367	135	106121
16	Surat	1167	149	235	149	66000
17	Surendranagar	761	0	76	171	21605
18	Vadodara	1454	0	218	130	57187
19	Valsad	1272	0	121	921	73690
Total		**18149**	**3033**	**3422**	**3867**	**1121816**

Source:

3.2.3 Gujarat Cooperative Milk Marketing Federation Ltd.:

Gujarat is known for its marketing institutions like farmers' cooperatives and other organisation. The most successful institution in farmers' cooperative is Gujarat Cooperative Milk Marketing Federation (GCMMF) that covers 3.2 million farmers. GCMMF has 18 district unions as members (Box 3.1). GCMMF is the apex marketing agency of the dairy network in the state of Gujarat and it is manages the physical delivery and distribution of milk and dairy products from all the Milk Unions to the end users. GCMMF is also responsible for all decisions related to market development and customer management. GCMMF also plays a key role in working with the different Milk Unions to coordinate the supply of milk and dairy products.

GCMMF Coverage

Gujarat Cooperative Milk Marketing Federation Ltd. (GCMMF) is India's largest food product marketing organization with annual turnover (2015-16) US$ 3.5 billion (Table 3.2). Its daily milk procurement is around 16.97 million lit per day from 18545 village milk cooperative societies, 18 members of Milk unions covering 33 districts, and 3.6 million milk producer members in Gujarat state. It is the apex organization of the dairy cooperatives of Gujarat, which aims to provide remunerative returns to the farmers and also serve the interest of consumers by providing quality products which are good value for money. Its success has not only been emulated in India but serves as a model for rest of the World. It is exclusive marketing organization of 'Amul' and 'Sagar' branded products. It operates through 56 Sales Offices and has a dealer network of 10000 dealers and 10 lakh retailers, one of the largest such networks in India. Its product range comprises milk, milk powder, health beverages, ghee, butter, cheese, Pizza cheese, Ice-cream, Paneer, chocolates, and traditional Indian sweets, etc.

Box 3.1: District Milk Unions in Gujarat

1. Kaira District Cooperative Milk Producers' Union Ltd., Anand
2. Mehsana District Cooperative Milk Producers' Union Ltd, Mehsana
3. Sabarkantha District Cooperative Milk Producers' Union Ltd., Himmatnagar
4. Banaskantha District Cooperative Milk Producers' Union Ltd., Palanpur
5. Surat District Cooperative Milk Producers' Union Ltd., Surat
6. Baroda District Cooperative Milk Producers' Union Ltd., Vadodara
7. Panchmahal District Cooperative Milk Producers' Union Ltd., Godhra
8. Valsad District Cooperative Milk Producers' Union Ltd., Valsad
9. Bharuch District Cooperative Milk Producers' Union Ltd., Bharuch
10. Ahmedabad District Cooperative Milk Producers' Union Ltd., Ahmedabad
11. Rajkot District Cooperative Milk Producers' Union Ltd., Rajkot
12. Gandhinagar District Cooperative Milk Producers' Union Ltd., Gandhinagar
13. Surendranagar District Cooperative Milk Producers' Union Ltd., Surendranagar
14. Amreli District Cooperative Milk Producers Union Ltd., Amreli
15. Bhavnagar District Cooperative Milk Producers Union Ltd., Bhavnagar
16. Kutch District Cooperative Milk Producers' Union Ltd., Anjar
17. Junagadh District Cooperative Milk Producers' Union Limited, Junagadh
18. Porbandar District Cooperative Milk Producers' Union Ltd, Porbandar

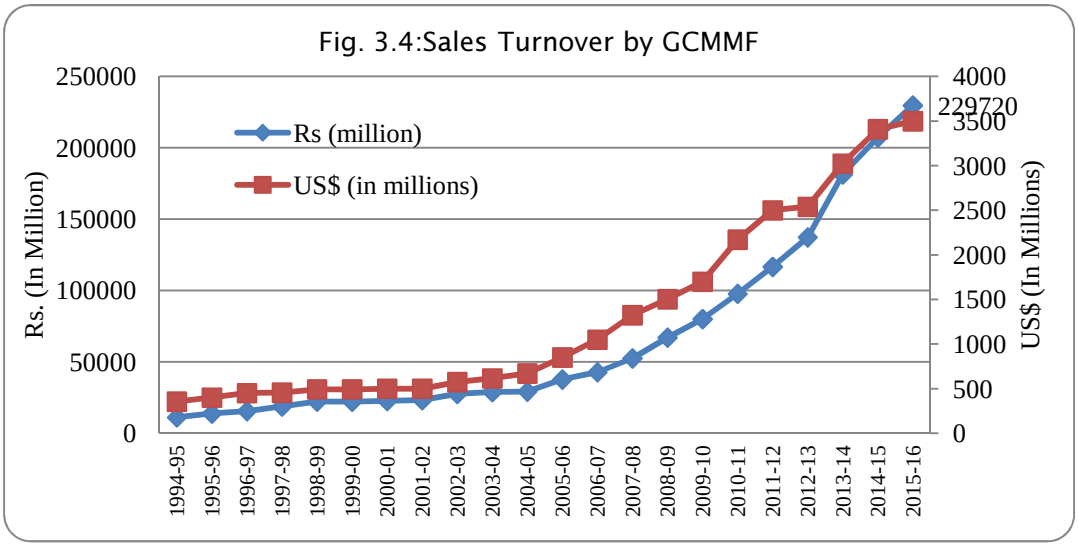
GCMMF is also India's largest exporter of dairy products. It has been accorded a 'Trading House' status. Many of our products are available in USA, Gulf Countries, Singapore, The Philippines, Japan, China and Australia. GCMMF has received the APEDA Award from Government of India for Excellence in Dairy Product Exports for the last 16 years. The Amul brand is not only a product, but also a movement. It is in one way, the representation of the economic freedom of farmers. It has given farmers the courage to dream.

Table 3.2: Overview of GCMMF

Year of Establishment	1973
Members	18 District Cooperative Milk Producers' Unions
No. of Producer Members	3.6 Million
No. of Village Societies	18545
Total Milk handling capacity per day	28 Million litres per day
Milk Collection (Total - 2015-16)	6.2 billion litres
Milk collection (Daily Average 2015-16)	16.97 million litres
Cattle feed manufacturing Capacity	7800 Mts. per day
Sales Turnover -(2015-16)	Rs. 22972 Crores (US $ 3.5 Billion)

During the last six years, sales of Federation have registered remarkable growth of 187 per cent which implies an impressive cumulative average growth rate of 19.2 per cent (Fig. 3.4). During 2015-16, Federation has registered an impressive growth of 11 per cent, to reach Rs. 22972 crores.

Fig. 3.4:Sales Turnover by GCMMF



3.2.3 Milk Producer Company Limited (MAHI)

Maahi Milk Producer Company Limited was incorporated on June 7, 2012, as a Producer Company under the provisions of Part-IXA of the Companies Act, 1956, in the State of Gujarat, to undertake the business of pooling, purchasing, processing of milk and milk products primarily of the Members and also of others, marketing of the same and to deal in activities that are part of or incidental to any activity related thereto. The Company commenced its commercial operations from 18th March 2013 with its milk procurement operations extending to the then seven districts of Saurashtra and Kutch region of Gujarat covering 2066 villages and 2,296 MPPs (Milk Pooling Points) and with shareholders' base consisting of 85,194 members, who were milk producers. Even though a Producer Company is a company there are certain features which differentiate it from other companies. The silent features of producers companies and cooperatives are presented in Box 3.2.

Box 3.2: Salient Features of Producer Companies and Cooperatives

Features	Producer Company	Cooperative
Legal Framework	Central Act and enabling in nature	State Act and restrictive in nature
Area of operation	Not restricted	Restricted
Share holders	User members only to hold shares	Non users can also hold shares
Voting rights	One member one vote, but PCs having only Producer Institutions as its members shall have patronage based voting rights	one member one vote for all types of cooperatives
Active members	PC legislation has explicit active members provision. Removal of inactive member is easier.	No provision of active members
Audit	Regular audit by a Chartered Accountant	Audit by Cooperative audit department or govt empanelled auditors and often audit is delayed.
Professional management	Explicit provision in Act for experts on Board	No provision for experts on board
Govt. Nominee on Board	No provision for Govt. nominee	Explicit Provision for Govt. nominee

Producer Company	*Other Companies*
Only producers can be members/ shareholders	Anyone can be a shareholder
Owned by user members	Owned by investors
One member, one vote or patronage- based voting	Voting rights based on shareholding
No trading of share is permitted. However transfer of shares among members is permitted.	Trading of shares is permitted
Limited dividend	No limit on dividend
Patronage-based returns	Capital-based returns

Source: Tikku (2017).

Presently, the Company's milk procurement operations continue to remain extended in Saurashtra and Kutch region of Gujarat in eleven districts (i.e., Junagadh, Gir Somnath, Amreli, Botad, Bhavnagar, Surendranagar, Morbi, Jamnagar, Dev Bhumi Dwarka, Kutch and Porbandar), and in several cases, reaching to the remotest villages in these areas, where competitors have not made any breakthrough.

The Company's current kitty of products consists of poly packed milk, butter milk, skimmed milk powder, white butter, ghee and curd having different variants in different consumer pack sizes, which also

include sweets. The Company continues selling poly packed milk and butter milk under co-branding with `Mother Dairy™', whereas other products of the Company are being sold under the solo brand 'Maahi™'. Presently, the company's sales and distribution network is spread across Saurashtra & Kutch region and in Ahmedabad and Surat cities of Gujarat. All endeavours are being made to expand the presence of Maahi's products in other prominent cities of Gujarat along with enlarging the Company's basket of products. The Company foresees big potential in tapping of new markets in the eastern/southern Gujarat, and is actively considering these options. The Company is constantly thriving to spread out its reach and product portfolio by adding new products and facility. In this direction, the Company has first time successfully launched Skimmed Milk Dahi (Lite Dahi) in the market. Few other new milk products are also proposed to be launched shortly during the current year.

The Company is also an End Implementing Agency (EIA) under the National Dairy Plan-I (NDP-I) for the implementation of four Sub-Project Plans (SPPs) of NDP-I [Ration Balancing Programme (RBP); Fodder Development Programme; Pilot Model for Viable AI Delivery; and Village Based Milk Procurement System (VBMPS)] over a span of five years from 2012-2013 to 2017-2018 and all above four plans are being implemented in Company's operational districts viz., Amreli, Bhavnagar (excludes AI Delivery), Jamnagar Junagadh, Kutch, Porbandar and Surendranagar.

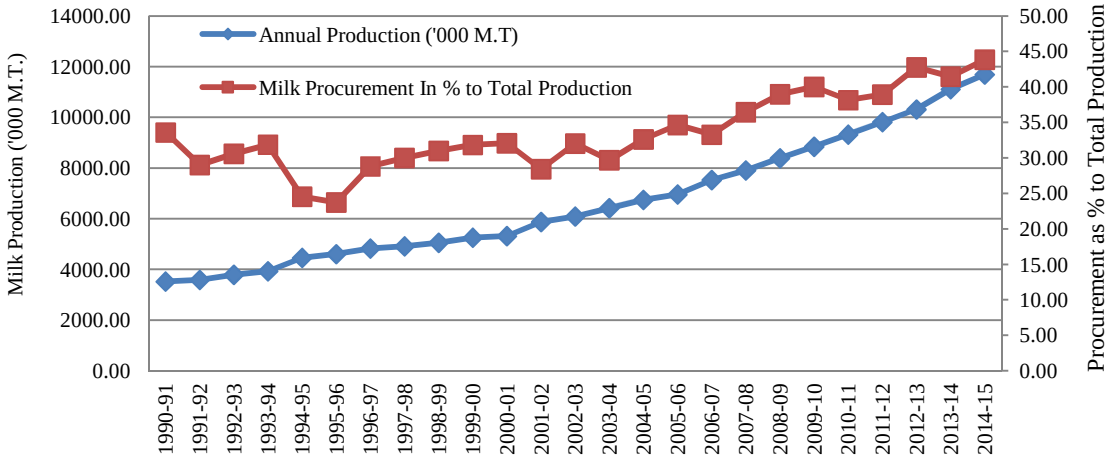
3.3 Institution's Role in Milk Collection, Milk Pricing and Marketing

3.3.1 Milk Collection through Dairy Cooperative Societies

Milk procurement by co-operative movement is the basic theme and success of growth of dairy sector in Gujarat. Dairy cooperative are strong in Gujarat and adjoining regions. The share of Gujarat in total milk procurement by cooperative sector in our country was the highest

(41.1 %), followed by Karnataka (15.2%) and Maharashtra (8.6%) during the 2015-16. Gujarat has increased its share from 27.7 percent in the 2001-02 to 41.1 percent in 2015-16 (Fig. 3.5). Karnataka and Rajasthan have also improved their share while Maharashtra has lost its share between 2000-01 and 2015-16 (declined from 18.1 % to 8.6 %). The co-operative sector has a dominant market share in milk and milk products, and has maintained it even in the face of competition from the private sector.

Fig. 3.5:Trends in Milk Production and Procurement by Cooperative sector in Gujarat during the 1990s and 2000s

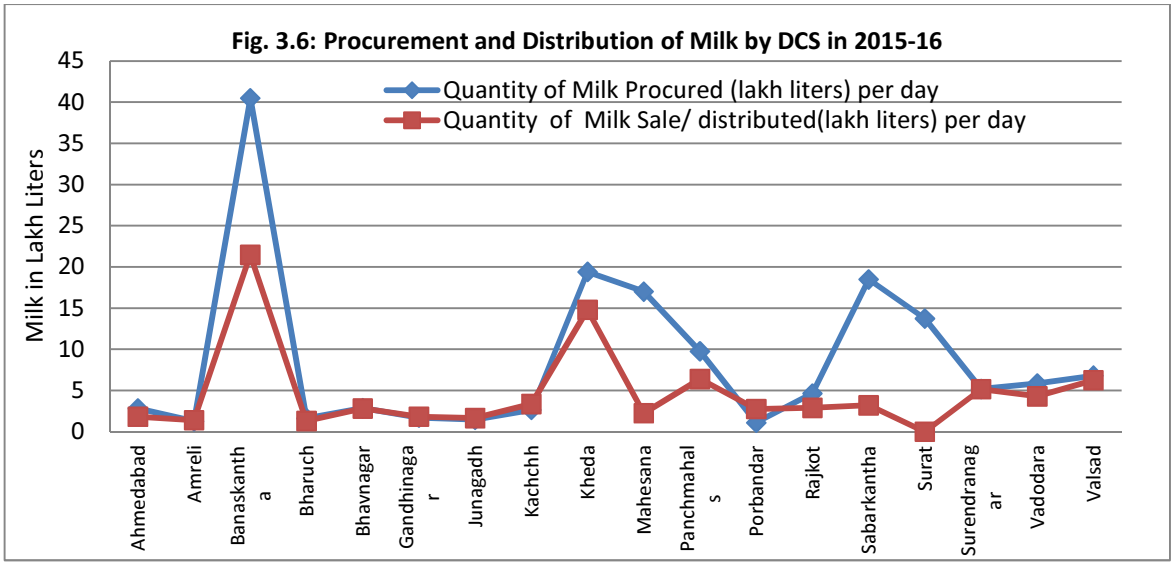


As noted earlier, there are 18149 village level milk co- operative societies, 89 chilling centers and 18 district level milk unions are in functioning in state. They collect total milk 125.75 lakh Liters per day (LLPD) and process it. In case of district-wise milk procurement by the cooperative milk societies during 2014-15, Banaskantha, Sabarkantha, Mehsana, Kheda and Surat are the top five districts having highest procurement of milk (Fig 3.6, Table 3.3). The figures on season-wise utilization pattern of milk in Gujarat indicate that out of the total milk procured, around 70 per cent in sold in the market as liquid milk, around 5 percent is processed and 20 percent is consumed at household level.

Table 3.3: Procurement and Distribution of Milk by DCS in 2015-16

Sr No	District	No. of Co-op. Dairies	Installed Capacity per day (Lakh Liters)	Quantity of Milk Procured (lakh litres) per day	Quantity of Milk Sale/ distributed per day (Lakh Liters)	Rate of Distribution per Liter (Rs.)				
						Whole Milk	Tonned Milk	Standard Milk	Double Tonned Milk	Skim Milk
1	Ahmedabad	1	2.5	2.81	1.82	46	34	42	32	-
2	Amreli	1	2	1.26	1.4	NA	NA	NA	NA	NA
3	Banaskantha	1	48	40.49	21.48	48	36	44	34	16.24
4	Bharuch	1	2	1.62	1.3	48	36	30	34	44
5	Bhavnagar	1	5	2.85	2.81	45	34	41	33	28
6	Gandhinagar	1	2	1.72	1.83	24	7.5	22	-	-
7	Junagadh	1	2.00	1.46	1.65	*	*	*	*	*
8	Kachchh	1	2	2.65	3.36	44.8	33.1	40.65	-	-
9	Kheda	1	26	19.4	14.8	48	36	44	34	-
10	Mehsana	1	25	17.01	2.25	24	-	22	-	-
11	Panchmahal	1	10	9.76	6.4	48	36	44	34	-
12	Porbandar	1	NA	1.1	2.76	NA	NA	NA	NA	NA
13	Rajkot	1	6	4.65	2.89	50	38	46	NA	40
14	Sabarkantha	1	16	18.49	3.2	35.37	25.68	-	22.76	16.4
15	Surat	1	12	13.73	-	40	40	40	40	40
16	Surendranagar	1	6.47	5.18	5.17	NA	NA	NA	NA	NA
17	Vadodara	1	8.7	5.85	4.3	40	40	44	36	NA
18	Valsad	1	3	6.81	6.25	50	34	42	35	38
	TOTAL	18	175.67	156.84	83.67	-	-	-	-	-

Note: * - As per GCMMF.



3.3.2 Milk Procurement by Mahi

During the year, the milk acquisition operations of company has been extended to 2296 milk collection centres (M.P.P. Milk Pooling Unit) of 2066 villages of 11 districts of Saurashtra and Kutch region of Gujarat and the company has acquired on an average 572745 liters milk per day annually by regular acquisition of salvable quality milk produced by all the

milk producers associated with the company. The company succeeded in decreasing last year's 0.34 per cent average sour milk up to 0.24 per cent during the current year by various programmers organised by the company such as modernization of chilling centre and BMC, interaction with the members, required modifications in the time and vehicles of milk pulling route and providing training to all the personnel/officers of the company related to various aspects of milk business

3.3.3 Pattern of Pricing and Marketing

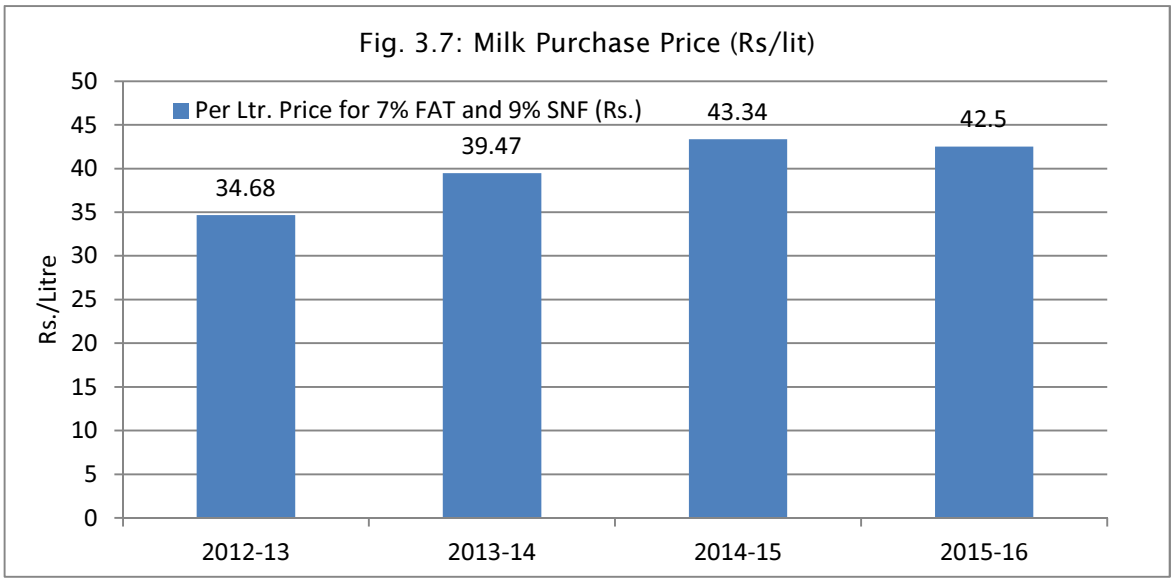
GCMMF, being the apex marketing federation of the unions as part of the cooperative structure, has strong control over its procurement cost, and the flexibility to adjust procurement cost at the year-end based on the marketing surplus earned for the year. Total milk procurement by member unions during the year 2015-16 averaged 174.81 lakh kilograms (17.48 million kg) per day, representing growth of 14.3 per cent over 152.90 lakh kilograms (15.29 million kg) per day achieved during 2014-15. The highest procurement was recorded during February 2016 at 220.00 lakh kilograms (22.00 million kg) per day. During the last six years, milk procurement has witnessed phenomenal increase of 87 per cent. This enormous growth in milk procurement was a result of high milk procurement price paid to members which has increased by 90 per cent during last six years (Table 3.4 & Fig. 3.7).

Table 3.4: Details on GCMMF turnover, Milk Procurement and Milk Price

Year	Turnover (In crores)	Milk procurement (In crore kg.)	Milk price (Per kg. fat)
2006-07	821	32.44	234.02
2007-08	1077	40.17	280.13
2008-09	1377	48.86	297.76
2009-10	1695	49.80	334.25
2010-11	2111	51.59	390.60
2011-12	2466	56.00	452.00
2012-13	2850	61.70	475.00
2013-14	3441	66.80	512.00
2014-15	4142	63.60	626.00
2015-16	4825	71.00	661.00

High remunerative milk procurement price to farmers has helped farmer's interest in milk production occupation. Better returns from dairying have obviously motivated farmers to enhancement their investments in increasing milk production. Federation's initiative in promoting the concept of commercial,scientific, cooperative dairy farming is also helping to attract next generation of dairy farmers to remain in the business.

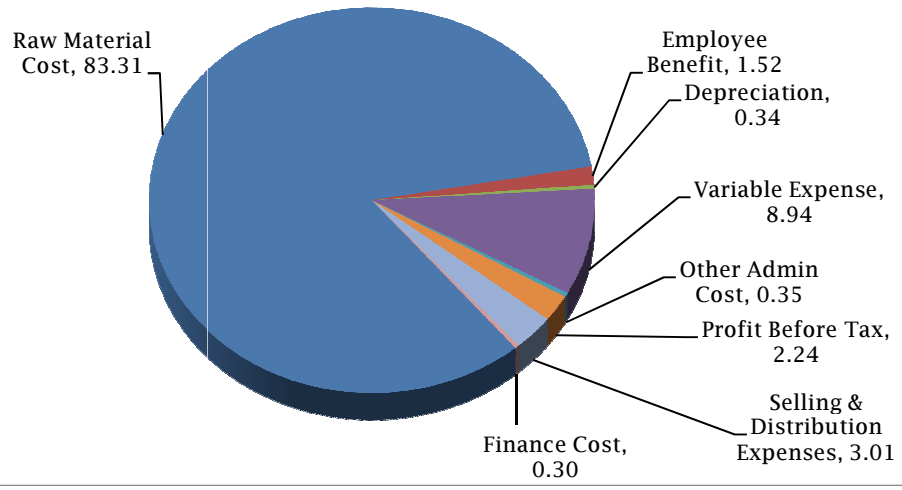
Fig. 3.7: Milk Purchase Price (Rs/lit)



3.3.4 Mahi Sale & Marketing:

Maahi brand of products today extend to poly packed milk, butter milk, curd, cow and buffalo ghee, sweets, skimmed milk powder and white butter, masala chhas, cow milk in different packing size. The company is continued to sell poly packed milk, butter milk in Gujarat. The sale of poly packed milk and butter milk were 329000 LPD (avg.) and 55200 LPD (avg.) respectively. Annual sale of Dahi, ghee was 473 MT and 1134 MT respectively, whereas the sale of white butter was 553.96 MT. 75 new distributors, 1779 new retailers and 950 Maahi shops were added during the year for strengthening of sales and distribution networks. Maahi will be introducing a range of value added dairy products as a part of its endeavour to increase its product portfolio and give the consumers the entire basket of products ensuring best value of their money spent and help the distributors, retailers to increase their returns (Fig. 3.8).

Fig. 3.8: MAHI-Consumer Rupee Distribution (%): FY2015-16



3.4 Institutional Weakness/Deficiency/Inefficiency

A cooperative is an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise. However, over the years, cooperative societies have failed to develop competitive competence, interference of political leaders have increased and thus its autonomy is almost withdrawn. Despite of significant growth in the various parametres of dairy, cooperative sector in Gujarat, there are few weaknesses in the present milk cooperative structure, as follows:

- Strong dependency on weak infrastructure & completely dependent on villages for its raw materials.
- Poor raw milk quality, poor veterinary services, lack of good dairy practice, low dairy plants efficiency , inappropriate milk collection system in some area
- Low Compitative Competatnce
- Availibility of less staff as wellas as frequent transfer of staff
- Inadequate avaialibility of feed and fodder

- Risk of highly complex supply chain system.
- Short of its product.
- Increasing Political interefence

Besides the present dairy cooperativs have threats as floows:

- There are many competitors in dairy product, mainly chocklate and ice cream market -Hindustan Unilever, nestle, Britannia, Mother Dairy and local players.
- Stiff competition from MNCs in butter, growing price of milk and milk products.
- The yield of indian cattle still much lower than other dairy countries.

3.5 Chapter Summary

It is noted that dairy industry in Gujarat state is well-established at present and it was taken as a model for replicating in other parts of the country. The State Government policy is to support the dairy development through co-operative sector. The co-operative dairy structure is very sound is central, north and partially in the southern region of the state. The milk cooperative sector in Gujarat has grown impressively and today includes 18149 milk cooperative societies attached to 18 district level milk unions with 3.42 million milk producers (2015-16) contributing milk twice a day. Out of the total, about 21 percent are female cooperative milk societies. GCMMF is the apex marketing agency of the dairy network in the state of Gujarat and it is manages the physical delivery and distribution of milk and dairy products from all the Milk Unions to the end users. Besides cooperative network, Maahi Milk Producer Company Limited was incorporated on June 7, 2012, as a Producer Company under the provisions of Part-IXA of the Companies Act, 1956, in the State of Gujarat, to undertake the business of pooling, purchasing, processing of milk and milk products primarily of the Members and also of others, marketing of the same and to deal in

activities that are part of or incidental to any activity related thereto. Presently, the Company's milk procurement operations continue to remain extended in Saurashtra and Kutch region of Gujarat in eleven districts (i.e., Junagadh, Gir Somnath, Amreli, Botad, Bhavnagar, Surendranagar, Morbi, Jamnagar, Dev Bhumi Dwarka, Kutch and Porbandar), and in several cases, reaching to the remotest villages in these areas, where competitors have not made any breakthrough. Milk procurement by co-operative movement is the basic theme and success of growth of dairy sector in Gujarat.

GCMMF, being the apex marketing federation of the unions as part of the cooperative structure, has strong control over its procurement cost, and the flexibility to adjust procurement cost at the year-end based on the marketing surplus earned for the year. High remunerative milk procurement price to farmers has helped farmer's interest in milk production occupation. Better returns from dairying have obviously motivated farmers to enhancement their investments in increasing milk production. Federation's initiative in promoting the concept of commercial,scientific, cooperative dairy farming is also helping to attract next generation of dairy farmers to remain in the business. Despite of significant growth in the various parametres of dairy, cooperative sector in Gujarat, there are few weaknesses in the present milk cooperative structure.

The next chapter presents the policies and programmes/schemes for dairy development in Gujarat and possible convergence of schemes.

Chapter IV

Policies and Programmes/Schemes for Dairy Development & Convergence of Schemes

4.1 Introduction:

Government policies that have been implemented over the period have produced major positive impacts on dairy production in India. It is quite oblivious that dairying cannot be expanded easily if related government policies are not supportive of dairy farming. There are plethora of state and central government schemes that provide forward and backward linkages for promotion of dairying involving milk producers. For dairy development, department of Animal Husbandry and Dairying is the parent department, mandated to implement different schemes and programs of the governments. The resources to implement different schemes and programs are provided through state budgets and central grants. Many government welfare schemes are implemented for dairy development which is funded through budgetary previsions of multiple departments. For instance, departments of Rural Development and Panchayat Raj, Agriculture and Cooperation, Scheduled Caste and Scheduled Tribe Finance Corporation, Tribal Welfare, Women and Child Welfare beside the parent department are engaged in the promotion of various welfare schemes to promote dairying. The aforesaid departments have their own mandates and thus schemes are promoted in consonance with departments' targets and demands.

Apart from the government programs, the state milk federations and the milk unions have evolved a variety of schemes that provide incentives to the milk producers. Given the diversity in social and economic contexts, district level milk unions have drawn up schemes to promote dairy development, which are funded through various ingenious ways (partly through profits generated in milk business,

partly through token cess/user fee or through charity (synonymous with welfare). Some anecdotal evidence suggests that the Banaskantha union of Gujarat had evolved some 20 different schemes to their producer members. Needless to say, the schemes are intended to provide impetus for milk production. Convergence of different state and central governments programs in a given geography provide forward and backward linkages to any development program enhancing efficiency in implementation. In view of same, convergence of different programs also enhances sustainability. The milk producers benefit when both state and central government programs converge over a given territory so that linkages among these programs foster speedy realisation of program benefits. The flip side is that if the programs are implemented in isolation, the impact is unlikely to be sustainable, with less economic benefit accrued to the producers. The convergence theory is also desirable from the standpoint of use of scare public resources.

Therefore, convergence of all state and central government schemes at the implementation level, in a given territory, would bring about improvement in milk production sector in a manner that will be sustainable, while ensuring social and economic improvements of the dairy farmers. NDDB had documented[1] the outlining all schemes of the central government have been documented. This chapter attempts to present the various schemes in operation in the study area.

4.2 Regulatory Framework for the Dairy Processing Sector:

Food processing industry is of enormous significance for India's development as it has linked economy, industry and agriculture in India, efficiently and effectively. Different laws govern the food processing sector in India. The prevailing laws and standards adopted

[1] http://www.dairyknowledge.in/article/compendium-documents-dairy-development-and-animal-husbandry-schemes-10-sep-2014.

by the Government to verify the quality of food and drugs is one of the best in the world. Different laws govern the food processing sector in India. The prevailing laws and standards adopted by the Government to verify the quality of food and drugs is one of the best in the world. Multiple laws/regulations prescribe varied standards regarding food additives, contaminants, food colours, preservatives and labelling. The food laws in India are enforced by the Director General of Health Services, Ministry of Health and Family Welfare, Government of India (GOI). There are various food laws applicable to food and related products in India (Box 4.1).

Box 4.1: Food laws applicable to food and related products in India

- Prevention of Food Adulteration Act (PFA), 1954 and Rules (Ministry of Health & Family Welfare).
- The Standards of Weights and Measures Act, 1976, and Standards of Weights and Measures (Packaged Commodities) Rules, 1977
- Agriculture Produce (Grading & Marking) Act (Ministry of Rural Development).
- Essential Commodities Act, 1955(Ministry of Food & Consumer Affairs).
- Fruit Products Order (FPO), 1995.
- Meat Food Products Order, 1973 (MFPO).
- **Milk and Milk Products Order, 1992.**
- The Infant Milk Substitutes, Feeding Bottles and Infant Foods (Regulation of Production, Supply and Distribution) Act, 1992 and Rules 1993.
- The Insecticide Act, 1968.
- Export (Quality Control and Inspection) Act, 1963.
- Environment Protection Act, 1986.
- Pollution Control (Ministry of Environment and Forests).
- Industrial Licenses under Industries (Development & Regulation) Act, 1951 for liquor manufacture.
- Bureau of Indian Standards Act, 1986 which is the largest body for formulating standards for various food items
- Vegetable Oil Control Orders 1998
- The Solvent Extracted Oil, Deoiled Meal and Edible Flour (Control) Order ,1967

Milk is an important food for households - both in rural and urban areas, even though consumption levels vary across income classes and regions. Milk and dairy foods are healthy foods and considered nutrient-rich. The dairy industry handling the marketable surplus of the milk can be broadly divided into the organized sector

and the unorganized sector. The organized dairy sector refers to the dairy units registered under the Milk and Milk Products Order, 1992, rev. 2002 (MMPO). These dairies have each capacity of handling over 10,000 litres of milk per day[2]. These organized dairies are under co-operative, private or other (like government dairies) sector. As per the Annual Report 2007-08 of the Department of Animal Husbandry, Dairying and Fisheries, Government of India, there were 818 MMPO registered units with a combined processing capacity of 953 lakh litres a day as on 31 March 2007. Many of these are however not functional. These dairy plants are supplied milk by over 1 lakh collection centres. The organized dairy sector has a good share in milk products market. But the products manufactured are mostly western-type in nature like table butter, cheese and different types of milk powders. Even though the organized sector has entered the market of indigenous milk products like *ghee, shrikhand* and *paneer*, these markets are mostly controlled by un-organized sector. The organized sector, especially co-operative dairy sector, disposes large portion of milk as processed liquid milk and only surplus is converted into products. The unorganized dairy sector comprises numerous, small and/or seasonal milk producers/traders (popularly known as '*halwai*') that are not registered under the MMPO. They handle 10,000 litres of milk per day or less. They are involved in selling raw liquid milk, boiled liquid milk as well as manufacturing and selling mainly indigenous milk products like *peda, barfi, rasgulla, khoa, paneer, ghee* etc., usually at the local level, but have a major share in these milk products. There are no official records on number of such unorganized dairy units. The organized dairy sector handle around 38 per cent of the marketable surplus (884 lakh kg/day) while the unorganized sector handles ((1416 lakh kg/day) about 62 per cent of the marketable milk (NDDB, 2017). In the organized dairy sector, equal share of 50 per cent each is

[2] http://old.fssai.gov.in/Portals/0/Baseworkingpaper_june2009.pdf

accounted by the co-operative with government dairies and private dairies. The organized dairy sector has been paying increasing attention, though not adequate, on improving quality of products. Enforcement of rules is also concentrated mostly on this sector, while the unorganized dairy sector largely remains unattended. As a result business operators in the unorganized sector pay little importance to quality, except some reputed sweetmeat shop owners who maintain relatively good quality standards.

Milk and Milk Product Order 1992[3]

The Government of India had promulgated the Milk and Milk Product Order (MMPO) 1992 on 9/6/92 under the provisions of Essential Commodities Act, 1955 consequent to de-licensing of Dairy Sector in 1991. As per the provisions of this order, any person/dairy plant handling more than 10,000 liters per day of milk or 500 MT of milk solids per annum needs to be registered with the Registering Authority appointed by Central Government. The objective of the order is to maintain and increase the supply of liquid milk of desired quality in the interest of the general public and also for regulating the production, processing and distribution of milk and milk products.

Recognizing the necessity suitable amendments in Milk and Milk Product Order-1992 for faster pace of growth in dairy sector, Government of India has amended milk and milk product order-92 from time to time in order to make it more liberal and oriented to facilitate the dairy entrepreneurs (Box 4.2). The Government of India has notified the last amendment proposals in the official Gazette on 26/3/02. Now there is no restriction on setting up of new milk processing, while noting that the requirement of registration is for enforcing the prescribed Sanitary, Hygienic Conditions and Quality and Food Safety Measures as specified in the Vth Schedule of MMPO-1992.

[3] http://dahd.nic.in/related-links/milk-and-milk-product-order-1992

Box 4.2: **Silent features of the new amendments made**

- The provision of assigning milkshed has been done away with.
- The registrations under MMPO-92 will now cover sanitary, hygienic condition, quality and food safety measures as specified in Vth Schedule of MMPO-1992.
- The provision of inspection of dairy plant has been made flexible.
- The provision to grant registration in 90 days has been reduced to 45 days subject to submission of application in complete form.
- The power or registration of State Registering Authority has been raised from 1.00 lakh liters per day to 2.00 liters per day.
- Altogether the Central and the State Registering Authorities have registered 818 units with combined milk processing capacity 952.93 lakh litre per day in Co-operative, Private and Government Sector as on 31.3.2007.

It can be seen from the Table 4.1 that all together 53 dairy units are registered. As per NDDB (2017), the cooperative sector in Gujarat handles about 74 per cent of marketable surplus, which is the highest among Indian states.

Table 4.1: Dairy units registered under "MMPO 1992" in Gujarat State

(up to the end of year 2010-2011)

Sr. No.	Agencies	No. of Registration	Under Govt. of Gujarat	Under Govt. of India
	District Co-op. Milk Union			
2	G.D.D.C.*	7	6	1
3	Private Sectors	26	3	23
4	Others	5	4	1
Total		53	25	28

Notes: * Dairies under G.D.D.C. are closed. As per the instruction of Government of India the power of registration under MMPO-Act 1992 delegated to Food & Drug Control Authority under the rule " Food Safety & Standard Rules, 2011" from 5August 2011.
Source: GOG (2016).

National Livestock Policy 2013[4] has been formulated by Central Government in order to have a policy framework for improving productivity of the livestock sector in a sustainable manner, taking into account the provisions of the National Policy of Farmers, 2007 and the recommendations of the stakeholders, including the States. The National Livestock Policy aims at increasing livestock productivity and production in a sustainable manner, while protecting the environment, preserving animal bio-diversity, ensuring bio-security & farmers' livelihood.

[4] http://dahd.nic.in/sites/default/files/NLP%202013%20Final11.pdf

4.3 Impact of Operation Flood and Reasons for failure, if any

Gujarat has witnessed the impressive growth in milk production during the operation flood programmes (OF). Operation Flood was implemented in different parts of the country in three phases, Phase I (1970–1980), Phase II (1981–1985) and Phase III (1985–1996). The summary of operation flood achievement in the major states of India is presented in Table 4.2. The growth in production of milk during the three phases and thereafter is presented in Table 4.3. The milk production in Gujarat and India had registered significant rate of growth during second phase of operation flood programme. The rate of growth of milk production was recorded higher in Gujarat than all India figure during second phase and post OF period.

Table 4.2: Salient Features of Operation Flood in India

Features	OF-I	OF-II	OF-III
Period	July 1, 1970 to March 31, 1981	October 2, 1979 to March 31, 1985	April 1, 1985 to April 30, 1996
Number of Milk sheds covered	39	136	170
Number of Anand Pattern DCSs set up ('000)	13.3	34.5	72.7
Number of Members (in millions)	1.8	3.6	9.3
Average Milk Procurement (Million Kg Per Day)	2.6	5.8	10.9
Processing Capacity in Rural Dairies (Million Ltrs Per Day)	3.8	8.8	18.1
Drying Capacity (Metric Tons Per Day)	261	508	842
Liquid Milk Marketing (Million Ltrs Per Day)	2.8	5	9.9

Source: http://www.amuldairy.com/index.php/white-revolution.

Table 4.3: Growth in Production of Milk during Operation Flood Programme in Gujarat and India

Period/ Operation Flood (OF) Programme	Gujarat	India
1970-71 to 1979-80- OF Phase I	1.36	3.37
1980-81 to 1984-85- OF Phase II	**8.51**	5.60
1985-86 to 1995-96- OF Phase III	3.17	3.78
1995-96 to 2015-16- Post OF	4.77	4.15
1980-81 to 1989-90	5.28	5.62
1990-91 to 2000-01	3.81	4.21
2000-01 to 2015-16	5.36	4.19

Source: Computed.

4.4 Government Policies on Quality Semen Import, Export of Meat & Milk Products

There are many success stories in genetic improvement in advanced dairy producing countries. Remarkable increase in average lactation yields has been achieved. Thus there is a need to breed the farmer's heard with superior germplasm. The import and export of the cattle/ buffalo germplasm[5] is under the restricted list and is allowed against license(s) issued by the Directorate General of Foreign Trade, Ministry of Commerce on the recommendation of the Department of Animal Husbandry dairying & Fisheries. There is a definite demand for the germplasm of Indian breeds of cattle and buffaloes in South America, South Asia and other countries. Towards conservation of the rich diversity of indigenous breeds, it is important to broadly identify germplasm of cattle and buffalo meant for breeding purposes and for the export. As introduction of temperate dairy breeds in the country for crossbreeding indigenous non - descript cattle has been accepted for quite some time and need was felt by a number of State Governments/ Organisations to import exotic germplasm to produce quality cross -bred animals, Central Government issued guidelines (Guidelines for export /import of bovine germplasm (Revised April 2016) for processing such applications for import and export of bovine germplasm, in order to streamline procedures and ensure efficient and transparent processing.

Recently Gujarat government[6] has decided to import from Brazil 10,000 doses of Gir bull semen as the cow population of this prestigious breed has declined in Gujarat. Interestingly, the bulls whose semen are to be imported are descendants of those gifted to Brazil as a goodwill gesture by the maharaja of Bhavnagar before Independence.

[5] Guidelines for export /import of bovine germplasm (Revised April 2016)- http://www.dahd.nic.in/sites/default/files/Guidelines%20for%20Import%20and%20Export%20of%20Bovine%20Germplasm%2C%202016.pdf

[6] http://timesofindia.indiatimes.com/city/ahmedabad/Govt-to-import-Gir-bull-semen-from-Brazil/articleshow/50924556.cms

Gir cows have long been the pride of Gujarat with their very high milk yield. The obsession with Jersey cows and indiscriminate breeding has led to the decline of Gir cow population in the state to nearly seven lakh out of the two crore milk-giving breeds. Brazil, on the other hand, was careful to preserve the breed and now has a sizable population of Gir breed cows and bulls. The government has also granted Rs 50 lakh for this project. Ironically, the move has not gone down well with the state's own *Gau Seva Ayog* (Cow Welfare Commission) that suspects Gir cows and bulls of Brazil may no longer be a pure breed.

India moves fast in exports of livestock products. The total exports recorded a whopping around 60 per cent growth during the last three financial years and buffalo meat covered 89 per cent of the total exports during 2014-15 and India stands tall as the largest exporter country[7]. India is considered as world's 5th largest meat producer with 6.3 million tonnes which account for 3% of world meat production of 220 million tonnes. The support from the Government helps boosting the meat industry. A grant of up to Rs 15 crore is still offered to set up new abattoirs or modernize existing ones. New players enter the field and *India Mart*, an online B2B marketplace has seen by the 20 % increase in registration of meat exporters. Indian meat is gaining preference in global markets as it is 20% cheaper than Brazilian meat. The cost of rearing of animals in Brazil is higher as they are meant for slaughtering alone. In India, the water buffaloes are reared and used as milch animals and sent for slaughtering once they are considered unproductive. The popularity of Indian beef among Middle East and other Muslim countries is on a higher side as the importers are assured of *Halal* slaughter. Beef exports from India more than trebled from around 0.6 million tonnes to over 2 million tonnes between 2009 and 2014. The export value more than quadrupled from $ 1,163.54 in 2009-10 (April-March) to $ 4,781.18 million in 2014-

[7] http://vetconcerns.org/2015/10/16/export-of-livestock-products-india-on-a-winning-streak/

15. India's buffalo meat exports have been growing at an average of nearly 14 per cent each year since 2011. According to Department of Animal husbandry, Dairying and Fisheries, India produced 14.3 lakh tons of beef of which 11 lakh tons are from buffalo-meat and 3.3 lakh tons are from cattle.

All exported meat products must be sourced from abattoirs and meat processing plants registered with APEDA. Export shipments are subject to compulsory microbiological and other testing for the issuance of animal health certificates by the certified GOI agency. Since most Indian states restrict or prohibit cow slaughter due to religious sensitivities, India's carabeef[8] sector mainly depends on unproductive water buffalo and water buffalo bulls from the dairy sector. In 2015, several India states, including Maharashtra and Haryana, enacted stringent cattle slaughter legislation to completely prohibit the cattle slaughter. However, industry sources indicate that these legislations have not had a major impact on the carabeef trade and supply chain. All Indian states except Kerala, West Bengal, and north-eastern states prohibit the slaughter of cattle of any age, including for both female and male calves.

Once a net importer, India has now turned a net exporter of dairy products. The value of dairy exports in 2013-14 is USD 546.1 million. Saudi Arabia, Bangladesh, UAE, Egypt, Nepal, Singapore and Pakistan are among the top export destinations for dairy products from India. India's import of dairy products during 2012-13 and 2013-14 accounts for US $ 30.65 and 35 million. Milk and cream concentrates, whey powders, and cheese are major products imported among dairy products. New Zealand, France and Australia are the major suppliers of dairy products to India. GCMMF is also India's largest exporter of Dairy Products. It has been accorded a "Trading House" status. Many of our

[8] https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Livestock%20and%20Products%20Annual_New%20Delhi_India_8-31-2016.pdf

products are available in USA, Gulf Countries, Singapore, The Philippines, Japan, China and Australia. GCMMF has received the APEDA Award from Government of India for Excellence in Dairy Product Exports for the last 16 years.

4.5 Maintenance of Progeny History of Dairy Animal

Given the fact that stress due to climate variability and availability of feed will be increasing constraints, more emphasis is required in promoting indigenous breed. Besides, as the milk productivity of our animals is low and high variability in the economic traits of cows, there is a vast scope for improvement of the milk production and consequently marketable surplus of milk for processing by systematic implementation of genetic improvement of cattle and buffaloes through progeny testing and building the capacity of different states, union territories, government institutes, dairy development agencies and public-private partnership for overall improvement of dairy animals in the country.

Genetic improvement of dairy animals depends on the type of genetic resources available in the country[9]. The types of bovine genetic resources varies in different agro-climatic regions and even within the particular region of the country. The global cattle and buffalo population indicate that there are 861 and 74 recognized cattle and buffalo breeds in the world and out of that India has 30 recognized cattle breeds and 15 breeds of Indian buffaloes. Among fifteen breeds of buffalo, eight breeds have a sizeable breedable population and are recognized. In India most of the indigenous cattle breeds have been developed from *Bos indicus* origin. The cattle breeds are different morphologically with different types of horns, long drooping ears, prominent dewlaps and hump over the withers but the animals are suitable to variable climatic conditions because of

[9] http://www.dairyfarmguide.com/types-of-genetic-resources-0126.html

different sweat glands and are more tolerant to enzootic diseases. Like cattle, the buffalo breeds are also different morphologically though the average productivity of different breeds is low. In spite of that the country possesses some best breeds of cattle and buffaloes in the world. The rural household have different types of genetic resources such as indigenous pure breed of cattle, pure breed of buffalo, non-descript cattle, graded buffaloes, different types of crossbred animals and various combinations of the above types of animal. The herd size in India is predominantly very small whether in organized or rural areas. Therefore, it is important to maintain the progeny history of all dairy animals.

Besides, recording of breeding information such as herd status, growth, reproduction, production Performance of male and females, age at first service and age at first training and production of semen doses, age group wise mortality of male and female animals, bull wise semen production and utilization, test and elite daughters and males born shall be maintained in the herd. Under rural condition beside pedigree the peak yield and monthly milk yield of each dairy animal should be maintained. The NDRI has initiated the performance recording of daughters of various crossbred and Murrah test bulls in 15 villages on test day milk yield at monthly interval for evaluation of high pedigree bulls.

4.6 Policies & Schemes for Dairy Development (Central, State & Union)

As a part of agriculture, the dairy sector in India comes under the State subject to policy concerns. The central government, however, has taken a lead in formulating policies in this sector at the national level while implementation of these policies has been largely left to the State Governments (Sharma and Singh, 2007). Despite the importance of dairying in the Indian economy, especially for livelihoods of resource poor farmers and landless labourers, government policy for the sector

has suffered from the lack of a clear, strong thrust and focus. One of the priority indicators to a sector could be judged from budget allocation under plan periods to the sector. The allocation of animal husbandry and dairying as total percentage plan outlay varied from 0.98 per cent during the Fourth Plan to about 0.18 per cent during Ninth Plan compared to the sector's contribution to the national GDP over five per cent. Although the dairy sector occupies a pivotal position and its contribution to the agricultural sector is the highest, the plan investment made so far does not appear commensurate with its contribution and future potential for growth and development. We can divide dairy sector policies in the country in the post independence period into distinct phases: Pre-operation Flood (1950s & 1960s; Operation Flood to the Pre-reforms Period, (1970s & 1980s); Post-reform Period (Post 1991); and Post MMPO period 2002 (see, Box 4.3).

Box 4.3: Summary of Indian dairy sector policy changes: 1950s to 2000s	
Pre-Operation Flood Period 1950s and 1960	> Focus on urban consumers > Promotion of govt. owned dairy plants and periurban dairying > Limited practice of crossbreeding introduced in 1960s > Failure of urban milk schemes recognized > Stagnant Production; > Decline in per capita milk availability
Operation Flood Period 1970s and 1980s	> Missing Link between rural producer and urban consumer > Launch of Operation Flood Programme in 1970 > White Revolution: Institutional innovation, linked rural producers with urban consumers; reduced transactions costs through coops > Import substitution strategy through tariffs and Non-tariff barriers > Restricted competition within organised sector through licensing and preference for cooperatives > Large public investment (Coops) in processing infrastructure > Significant increase in milk production and per capita availability
Post Macro-Reforms Period1990s	> Industrial licensing for setting up milk processing facilities abolished > 1992 - Reintroduced of licensing through Milk and Milk Products Order (MMMPO) > Milkshed area concept introduced for procurement of raw milk > Signed the URAA in 1994 and became member of the WTO in 1995 > Non-tariff barriers (NTBs) such as quantitative restrictions (QRs), canali2ation, etc. removed > Amendments in the MMPO
Post- MMPO Period 2002 -	> 2002 - MMPO amended >. > Licensing requirements abolished > No milkshed area requirement for setting up milk but food safety and hygiene requirements

Source: Sharma and Singh, 2007.

Government of India is making efforts for strengthening the dairy sector through various Central sector Schemes like "National Programme for Bovine Breeding and Dairy Development", National Dairy Plan (Phase-I) and "Dairy Entrepreneurship Development Scheme". The restructured Scheme National Programme for Bovine Breeding and Dairy Development (NPBBDD) was launched by merging four existing schemes i.e. Intensive Dairy Development Programme (IDDP), Strengthening Infrastructure for Quality & Clean Milk Production (SIQ&CMP), Assistant to Cooperatives and National Project for Cattle & Buffalo Breeding. In order to meet the growing demand for milk with a focus to improve milch animal productivity and increase milk production, the Government has approved National Dairy Plan Phase-I (NDP-I) in February, 2012 with a total investment of about Rs.2242 crore to be implemented from 2011-12 to 2018-19 with an aim to . increase domestic production through productivity enhancement, strengthening and expanding village level infrastructure for milk procurement and provide producers with greater access to markets. The strategy involves improving genetic potential of bovines, producing required number of quality bulls, and superior quality frozen semen and adopting adequate bio-security measures etc. The scheme is implemented by NDDB through end implementing agencies like state Dairy Cooperative Federations/Unions/Milk Producers Companies.

The overall performance of most of the schemes has not been to the desired levels (GOI, 2012). Problems lied with funding pattern, poor flexibility, etc. Most of the schemes were stand alone with meagre financial outlay. Their implementation across all the state resulted in dilution of the focus. As states have their own specific needs and problems but are not able to address them comprehensively due to inadequate financial resources of their own and therefore they have to essentially look forward to the Central assistance. In fact it would be beneficial to harness the regional strengths using a regionally

differentiated approach for exploiting the potential. The programmes /schemes are being implemented in Gujarat are presented in Table 4.2.

Table 4.2: Policies/Schemes implemented in Gujarat

No	Activity	Scheme/ Institutions	Central/ State	Nodal Dept.	Relative Components/ Description
1	Establishment of Milch Animal Farm	Scheme for Subsidy on Interest for establishment of Milch Animal Farm of 1 to 4 milk cattle unit	State	Deputy Director Animal Husbandry	On the basis of the cost of the cattle unit determined by **NABARD** or the amount of loan per unit of the bank for purchase of cattle, the bank will be actually paid up to 12% interest subsidy or up to 12% interest subsidy.
2	Establishment of Milch Animal Farm	12% interest subsidy to **SC/ST/General** Subsidiaries for establishment of 1 to 20 milk cattle unit	State	Deputy Director Animal Husbandry	For the cost of cattle unit or bank animal purchase, which is less than the lending of the unit, the bank will actually be eligible for a cylindrical interest or up to 12% interest subsidy under the main scheme for a period of five years. For the purpose of setting up a unit through the Nationalized Bank or the Reserve Bank of India through the Reserve Bank of India. 12% interest subsidy to SC/ST/General Subsidiaries for establishment of 1 to 20 milk cattle unit
3	Support for cattle shed, water tank, store room and steel bucket (ICDP)	Support for construction of cattle shed, water tank, store room and steel bucket for cattle	State	Deputy Director Animal Husbandry (ICDP)	Only **for Scheduled Caste** farmers are eligible for construction of Cattle shed, water tank and aid for water bucket (ICDP) to apply for help on iKhedut portal. To take advantage of this scheme, the farmers should have at least two animals (cows / buffaloes). The cattle keeper should have his own land to cattle shed construction. Cattle-shed will be set up in the 90-day time limit of the beneficiary's approval order. If the beneficiary fails to establish cattle shed in the prescribed time limit as per this, or canceling the approval order given to the beneficiary, it will be given an approval order to the other beneficiary in the waiting list. 50% of the total approved cost or maximum Rs. 18,000 / - whichever is lower
4	Support for cattle shed, water tank, store room and steel bucket	Support for construction of cattle shed, water tank, store room and 7 (seven) liter steel bucket for 10 cattle	State	Deputy Director Animal Husbandry (ICDP)	Generally, genuine cattle breeders seeking help for Cattle shed, water tank, store room and 7 (seven) liter steel bucket will have to apply on iKhedut portal. Print out of application will be submitted to the intensive cattle rehabilitation scheme office. To take advantage of these schemes, the farmer should have at least ten (10) animals (cows / buffaloes). The farmer should have his own land according to cattle construction. Cattle Shed will be established in the 120-day time limit for the beneficiary's

					approval order. If the beneficiary fails to establish Cattle Shed in the prescribed time limit as per this, or canceling the approval order given to the beneficiary, it will be given an approval order to the other beneficiary in the waiting list. For cattle breeders seeking assistance for cattle shed, water tank, store room and 7 (seven) liter steel buckets for cattle - 50% of the original cost or maximum Rs. 1, 25,000 / -.
5	Support for cattle shed, water tank, store room and steel bucket	Support for construction of cattle shed, water tank, store room and 7 (seven) liter steel bucket for 5 cattle	State	Deputy Director Animal Husbandry	In order to get help for Cattle shed, water tank, manger, store room and steel for 7 (seven) liter bucket, the general cattle breeders will have to apply on iKhedut portal and the application will be printed out and submitted to the intensive cattle rehabilitation scheme office. For cattle breeders seeking the help to construct cattle shed, water tank, manger, store room and 7 (seven) liter steel buckets for cattle - 50% of the original cost or maximum Rs. 63,000 / -. To take advantage of these schemes, a cattle keeper must have at least five animals (cows / buffaloes).The cattle keeper should have his own land according to Cattle shed construction. Cattle Shed will be established in the 120-day time limit for the beneficiary's approval order. If the beneficiary fails to establish Cattle Shed in the prescribed time limit as per this, or canceling the approval order given to the beneficiary, it will be given an approval order to the other beneficiary in the waiting list.
6	Artificial Insemination services	Assistance for Promotion scheme for Calves born through artificial insemination	State	Deputy Director Animal Husbandry	Main objective of this scheme is to protect and increase native breed of cattle. After the birth of a pure native breed with artificial insemination, the beneficiary will have to apply on the iKhedut portal. The benefits of this scheme are to be met once per year for maximum five calves per livestock. In the form of cash assistance of Rs.3000 / - for the birth of a pure native breed, by artificial insemination in the state of his native cow (cow).Assistance for maximum five shepherds per cattle keeper will be available.
7	Animal Insurance	Assistance for Animal Insurance Assistance for all female DCS members of SC/ST/General category of farmers	State	Deputy Director Animal Husbandry	After taking insurance for the scheme, the beneficiaries will be required to apply on the iKhedut portal or nearest veterinary hospital, after receiving the policy. Assistance provided for women member of **SC/ST/General** in the state, 75% of the sum assured per animal or Rs. 1125 / - for those who are

					less than two and maximum five (5) animals per cattle
8	Aid for Concentrate, Feed to Pregnant Animals	Scheme for provide assistance on Concentrate, Feed Aid to Pregnant Animals	State	Deputy Director Animal Husbandry	This scheme is only for **women beneficiaries.** The female beneficiary has to apply on the iKhedut portal and the application will be printed out and submitted to the intensive cattle rehabilitation scheme office. This assistance is Rs. In the limit of Rs.3000 / - (as per 75% of total purchase cost), a maximum of one pregnant cows per animal will be given as cattle feed. The woman member, who buys the bill by purchasing himself, will be receivable only after scrutinizing the purchase amount.
9	Concentrate, Feed Aid to Pregnant Animals	Scheme for provide assistance on Concentrate, Feed Aid to Pregnant Animals	State	Deputy Director Animal Husbandry	This scheme is only for women beneficiaries. The female beneficiary has to apply on the iKhedut portal and the application will be printed out and submitted to the intensive cattle rehabilitation scheme office. This assistance is being provided to **Scheduled Caste** woman beneficiaries. In the limit of Rs.300 / - (as per 75% of total purchase), a maximum of one cows per animal will be given as cattle feed. The woman member, who buys the bill by purchasing himself, will be receivable only after scrutinizing the purchase amount.
10	Concentrate, Feed Aid to Pregnant Animals	Scheme for provide assistance on Concentrate, Feed Aid to Pregnant Animals	State	Deputy Director Animal Husbandry	This scheme is only for women beneficiaries. The female beneficiary has to apply on the iKhedut portal and the application will be printed out and submitted to the intensive cattle rehabilitation scheme office. This assistance is being provided to **Scheduled Tribe** beneficiaries. In the limit of Rs.300 / - (as per 75% of total purchase), a maximum of one cows per animal will be given as cattle feed. The woman member, who buys the bill by purchasing himself, will be receivable only after scrutinizing the purchase amount.
11	Establishment milch cattle farm/unit	Scheme for subsidy on interest for woman farmer for establishment of 1 to 10 milch animal farm	State	Deputy Director Animal Husbandry	Women beneficiaries will be eligible only if they are given loans to establish a unit through the Nationalized Bank or the Reserve Bank of India through a recognized financial institution. The beneficiary will have to apply on iKhedut portal. Dairy farming is an important source of constant subsidiary income. The small woman farmers can purchase 1 to 10 animals as per their need and capacity to maintain. If any bank recognized by Reserve bank of India, sanction loan for any dairy animal cow & buffalo, the beneficiary can gets 7% interest Out of which 5 %

					would be assisted by Govt. of Gujarat and remaining 2% would be borne by Gujarat Co-operative Milk Marketing Federation ltd. and District co-operative milk unions equally for five years on bank loan amount (as per unit cost of NABARD guide line).
12	Financial Assistance for Automatic Milk collection system	AMCS Assistance for Women/General PDCS	State	Deputy Director Animal Husbandry	To be purchased from a valid seller / dealer Empanelment by Animal Husbandry Director /GCMMF. This scheme is for **women / general** milk producer co-operatives, in whom the maximum amount of money on automatic milk collection system (machine) (AMCS) 80,000 / - per unit or 80% of the cost, whichever is less, are eligible to be assisted.
13	Financial Assistance for Automatic Milk collection system	AMCS Assistance for Women/General PDCS	State	Deputy Director Animal Husbandry	To be purchased from a valid seller / dealer Empanelment by Animal Husbandry Director /GCMMF. This scheme is for the milk producer co-operative societies of the **Scheduled Caste** area Women, In which the maximum amount of money on automatic milk collection system (machine) (AMCS) 80,000 / - per unit or 80% of the cost, whichever is less, are eligible to be assisted.
14	Financial Assistance for Automatic Milk collection system	AMCS Assistance for Women/General PDCS	State	Deputy Director Animal Husbandry	To be purchased from a valid seller / dealer Empanelment by Animal Husbandry Director /GCMMF. This scheme is for women milk producer co-operative societies belonging to **Scheduled Tribes area** In which the maximum amount of money on automatic milk collection system (machine) (AMCS) 80,000 / - per unit or 80% of the cost, whichever is less, are eligible to be assisted.
15	BMC assistance for Women operated DCS	BMC assistance for Women operated/General PDCS	State	Deputy Director Animal Husbandry	To be purchased from a valid seller / dealer Empanelment by Animal Husbandry Director /GCMMF. This scheme is for **women / general** milk producer co-operatives in which the unit price fixed on the bulk milk cooler (BMC). Financial assistance will be given to (1000 lt-7.75 lakh, 2000 lt-9.25 lakhs, 3000 lt. 11.00 lakhs, 4000 lt. 12.50 lakhs, 5000 lt-14.00 lakh, 10000 lt-23 00 lakhs). Assistance in the limit of 80% of the unit price or purchase price, whichever is less
16	BMC assistance for Women operated DCS	BMC assistance for Women operated PDCS in **Scheduled Castes area**	State	Deputy Director Animal Husbandry	To be purchased from a valid seller / dealer Empanelment by Animal Husbandry Director /GCMMF. This scheme is for women milk producers' co-operative societies in **Scheduled Castes**, in which the unit price fixed on Bulk milk Cooler (BMC). Financial assistance will be given to (1000 lt-7.75 lakh, 2000 lt-9.25 lakh, 3000 lt. 11 lakh lakhs, 4000 lakh 12.50 lakh, 5000 lt-

					14.00 lakh) Assistance in the limit of 80% of the unit price or purchase price, whichever is less.
17	BMC assistance for Women operated DCS	BMC assistance for Women operated PDCS in **Scheduled Tribes area**	State	Deputy Director Animal Husbandry	To be purchased from a valid seller / dealer Empanelment by Animal Husbandry Director /GCMMF. This scheme is for the milk producer co-operative women in the **Scheduled Tribes,** with the unit price fixed on the bulk milk cooler (BMC). financial assistance will be given to (1000 lt-7.75 lakh, 2000 lt-9.25 lakh, 3000 lt. 11 lakh lakhs, 4000 lakh 12.50 lakh, 5000 lt-14.00 lakh) Assistance in the limit of 80% of the unit price or purchase price, whichever is less.
18	Establishment of milk adulteration testing machine (MADM) for women operated DCS	Assistance for the establishment of milk adulteration testing machine (MADM) for women operated /General DCS of SC/ST/General area	State	Deputy Director Animal Husbandry	To be purchased from a valid seller / dealer Empanelment by Animal Husbandry Director /GCMMF. The standard of assistance for scheduled Women/General co-operative milk producers' associations of **SC/ST** area will be 75% of the unit cost and for **General/Women DCS** area will be 50% of the unit cost.
19	Establishment of milk house/Godown for women operated DCS	Scheme for Assistance for the establishment of house/Godown for DCS (women/general) for **SC/ST/General** population area	State	Deputy Director Animal Husbandry	Women / General Beneficiary Society shall have to undergo the supervision of the Civil Engineer of the respective dairy union as per the layout and standards laid down by the GCMMF, Anand. This scheme is for all milk producer co-operative societies. Under this scheme financial assistance is given Up to Rs. 10,00,000 / - per unit cost of establishment of milk house/godown or actual cost of establishment which is less than 50% of the cost, not more than Rs. 5,00,000 / -
20	Milking machine	Scheme for Assistance for the on buying the milking machine For the female member of PDCS for all category of farmers	State	Deputy Director Animal Husbandry	The purchasing of a milking machine from an authorized dealer of the manufacturer, authorized by the Animal Husbandry Director / GCMMF. The applicant has to have five (5) or more milch animals belonging to the concerned Rural Milk Producers' Co-operative Societies, as well as the certified certificate as per the requirement of regular milk. Assistance will be given For the female member of DCS in the state, for purchase of a matching machine 75% of the purchase price or Rs. 33,750 / - whichever is lower
21	Award distribution	Scheme for planning the state's best Animal rears award distribution ceremony	State	Deputy Director, Deputy Director (ICDP) Animal Husbandry	(1). Taluka level award will be given in District Animal Husbandry Camp (2). State level awards and district level awards will be awarded at any one departmental level. (3). Best Animal Achievement Scheme will have to apply on iKhedut portal and the application

					will be printed out and submitted to the intensive Animal Recovery scheme office. financial assistance for (1). Taluka Level Award - (Total Taluka 248 x Taluka 2 prize = Number of total prize 496) - First prize - Rs. 5000, second prize - Rs. 3000 (2). District Level Award - (Total District 33x 2 prize = District of total prize - 66) - First prize - Rs. 7000, second prize - Rs. 5000 (3). State level award - first prize - Rs. 25000, second prize - Rs. 15000, Third Prize - Rs. 10000 Total Award = 565 (Total prize of taluka = 496 + Total prize of district = 66 + Total prize of state = 3)
22	Chaff Cutter	Scheme for Assistance to Power Operated Chaff Cutter for all common Beneficiary	State	Deputy Director Animal Husbandry	The benefit of this scheme will be available to the cattle of five (5) or more cattle. An authorized manufacturer / authorized dealer approved by the Animal Husbandry Director / Agriculture Director will have to purchase an electric powered chaffer. financial assistance at the rate 75% of the purchase price or Rs. 15,000 / -, whichever is lower
23	Assistance for Poly Propylene Silage Bag	Assistance for Poly Propylene Silage Bag for all Common Beneficiary	State	Deputy Director, Deputy Director (ICDP) Animal Husbandry	Animal care taker, who wants to take advantage, will have to apply on iKhedut portal or near veterinary hospital and the application should be taken print out and submit to the intensive ICDP office. for SC/ST farmers financial assistance is 75% of the purchase price or maximum Rs.750 for General farmer it is 50% of the purchase price or maximum Rs. Help up to Rs.500 / -
24	Fodder Development	Minikits for fodder seed for All farmers	State	Deputy Director, Deputy Director (ICDP) Animal Husbandry	To acquaint farmers with improved fodders and help them to routinely use these, Fodder Minikits and necessary information related to fodder are provided by Seed Development Centers. Free of cost Fodder Minikits for all farmers
25	Compensation for Accidental Animal Death Scheme	Scheme for Compensation for Accidental Animal Death Scheme for All farmers	State	Assistant/ Deputy Director, Deputy Director (ICDP) Animal Husbandry	Animal Husbandry is a Subsidiary to Agriculture for helping poor farmers. There are Certain conditions like Anthrax, Bird flu, Rabies, Food poisoning, chemical poisoning, snake bite cases. There is no provision to give any assistance to the animal owner for death of their livestock due to aforesaid reasons. In such conditions animal owners lose their animals and livelihood also. So that in these conditions the animal owner can purchase the replacement of his lost animal and continue his income generation. So the relief assistance per animal for Cow: 16,400/- (maximum 2 animals/Family.), Buffalo :

					16,400/-(maximum 2 animals/Family), Bullock : 15,000/-(maximum 2 animals/Family), Calves/Heifers (Above six months), Donkey, Pony, Khachchar : 10,000/- (maximum 2 animals/Family), Sheep/Goat (Adults) : 1650/- (maximum 100 animals/Family), Camel & Horse (Adults): 15,000/- (maximum 2 animals/Family).
26	Milk Competition	Scheme for Milk Production competition for All farmers	State	Assistant/ Deputy Director, Deputy Director (ICDP) Animal Husbandry	This scheme is meant for giving prizes to encourage the owners of high milk producing animals in the state by arranging state level milk yield competition. Under this competition in each breed of Cattle and Buffalos. Only for Gir and Kankrej Cattle 1st Prize of Rs.51,000/- and for remaining breeds 1st Prize of Rs.25,000/- 2nd Prize of Rs.20,000/- 3rd Prize of Rs.15,000/- and runner up Would be distributed to the tune of Rs.5000/-in each case by the state Government. Consolation prizes of Rs.1000/- are also distributed to the each entry of competition.
27	Integrated Gaushala Development Scheme	Scheme for Integrated Gaushala Development Scheme	State	Gauseva and Gauchar Vikas Board, Gujarat state	The Gaushalas registered under Public Registration Act and rearing pure breed Gir and Kankrej cattle are eligible for subsidy against different development works like Construction of Cattle Shed, Construction of grass godown, Bore well/ Compound wall at 75 % of the total expenditure incurred for the respective work in the limit of the amounts. On basis of cows reared (10,20,30,40,50) For one development work in a year. Maximum for 5 (Five) years. 75% of the total expenditure.
28	Establishment of elite herd of high pedigreed Male/Female calves of Gir and Kankrej breed	Scheme for establishment of elite herd of high pedigreed Male/Female calves of Gir and Kankrej breed	State	Gauseva and Gauchar Vikas Board, Gujarat state	The Gaushala has scientifically rear breed male/female calves of the pure breed Gir/Kankrej cows, producing more than 1500 liters and 1800 litres milk respectively in a lactation period. Gaushalas adhering to these conditional numbers are eligible to get subsidy for maintenance of male/female calves at the rate of 50% of the expenditure incurred in the limit of Rs.10000 per male/female calf for maximum three years.
29	Seminar/Conference for representative of Gaushalas/Panjarapoles	Scheme for conducting district level seminar/conference for representative of Gaushalas/Panjarapoles	State	Gauseva and Gauchar Vikas Board, Gujarat state	The organizers of such seminar have to prior approvals of place, date and time of the seminar/conference. To compensate different expenditure to organize seminar like rent of hall or mandap, lunch with tea and breakfast, there is provisions to give financial assistance. Post production of vouchers of actual expenditure in conducting the seminar with the optimum limit of Rs.50000 only.

30	Pure breeding and supply of bull	Scheme for pure breeding and supply of bull	State	Gauseva and Gauchar Vikas Board, Gujarat state	The main objective of the scheme is to provide good genetically potential breeding bulls to the institute involved in pure breeding activities. The institute registered under public charity act, gram panchayat and village milk producer cooperative societies are eligible to get the benefits the scheme. The provision for financial assistance for Purchase of Pure Gir/Kankrej Bull (actual purchase price or Rs.30000/ whoever is less, construction of bull shed (actual cost of construction work or Rs.50000 whichever is less, maintenance charges(Maximum up to Rs.20000
31	Castration of scrub bulls	Scheme for Castration of scrub bulls	State	Gauseva and Gauchar Vikas Board, Gujarat state	The voluntary organizations like lions clubs, Rotary clubs etc. which may organize camps for castration of scrub bulls in collaboration with NGO need prior permission from the board. Such organizations will be entitled to get financial assistance at the rate of Rs. 100/- per Castration.
32	Production of organic bio fertilizer from cow dung	Scheme for production of organic bio fertilizer from cow dung	State	Gauseva and Gauchar Vikas Board, Gujarat state	Under this scheme, financial assistance limited to Rs.50000 at the rate of 50% of the estimated one time expenditure of Rs.1 lakh towards the cost of bio starter, enrich media, bags to pack manure, labour charges and other ancillary expenditures, shall be given to the SakhiMandal and gram Panchayats having animal hostel on first come first basis. Organizations possessing Gobar gas plant and producing green fodder will be given priority. Those organizations who have more than 100 animals or who collect the dung in sufficient quantity, shall be eligible for this scheme.
33	Financial assistance to create infrastructural facilities	Scheme for financial assistance to infrastructural facilities	State	Gauseva and Gauchar Vikas Board, Gujarat state	The Gaushalas and Panjrapoles, registered under Public Charity Act having their own lad are eligible to get benefits of this scheme at the rate of 75% of total expenditure for above each item or Rs. 4.00 lacs whichever is less for additional development works like construction of additional cattle shed, compound wall, water troughs, new tube wells, deepening of existing wells, diesel engine or submersible pumps, procurement of pipeline, purchase of new chaff cutter, construction of grass godown etc. rs.
34	Financial assistance to create infrastructural facilities	New Panjrapoles	State	Gauseva and Gauchar Vikas Board, Gujarat state	The trust registered under public charity trust act, which desires to establish a new Panjrapoles within the radius of 15 km of the urban area, will be eligible to get benefits of financial assistance for development works for five years to maximum up to Rs.2 lakh at a

					stretch (single installment). The institution, which desires to get benefit of this scheme, must have at least 100 breedable cows.
35	Financial assistance to create infrastructural facilities	JivDaya Helpline	State	Gauseva and Gauchar Vikas Board, Gujarat state	The organisation, desiring to start JivDaya helpline for treatment of cattle, must have at least 500 animals in the institute /organisation. Under this scheme, organisation shall have to purchase a mobile van, medicines and equipments etc. they also have to appoint a veterinary officer. The organisation will be eligible for financial assistance in the limit of Rs.3.0 lakh in first year, rs.2.00 lakh in second year and Rs.1.00 lakh in third year or 50% of the total expenditure incurred, whichever is less in the respective year.
36	Financial assistance to create infrastructural facilities	Managerial Assistance	State	Gauseva and Gauchar Vikas Board, Gujarat state	Under this scheme, an organisation rearing more than 500 animals, if appoints a veterinary officer as technical officer, will get financial assistance at the rate of Rs.15000 per month for three years, and if appoint a livestock inspector as technical employee, will get financial assistance of Rs.7000 per month for three years as remuneration charges of the employee.
37	Supply of bull for pure breeding	Scheme for supply of bull for pure breeding to Gram Panchayats, Gaushalas, Panjarapoles and Gauseva Committee of the State	State	Gauseva and Gauchar Vikas Board, Gujarat state	A bull of pure Gir or Kankrej breed is provided to Gram (Panchayats, Gaushalas, Panjarapoles and Gauseva Committee of the State) for breeding their own cows as well as cows in neighboring villages Total financial assistance in First Year: Purchase of bull, Rs. 1.00 lacs Insurance Premium, Maintenance of bull: Construction of bull shed Rs. 0.42 lacs, Total Rs. 1.42 lacs Second year: Maintenance of bull Rs. 62,000 Third Year: Maintenance of bull Rs. 62,000
38	Research, publicity and dissemination of information to improve usage of cow products	Scheme for Training	State	Gauseva and Gauchar Vikas Board, Gujarat state	For economically sustainable cow husbandry, it is necessary to get benefits in the field of health and environment through usage of cow urine and dung along with cow milk products. Under this scheme, organisation involved in cow rearing will have to organize training programs, with prior permission of the board. Financial Assistance of maximum Rs.6000/- for a training class towards payment of Rs. 200 per day per trainee will be provided to the training organisation to meet the training expenses.
39	Research, publicity and dissemination of information to improve usage of cow products	Scheme for Financial Assistance for purchase of equipments	State	Gauseva and Gauchar Vikas Board, Gujarat	Financial assistance of 50% out of total expenses, limited to Rs. 1.5 lakhs will be provided for procurement of equipments used for manufacture of medicines in form of extract, tablets, capsules,

				state	powder etc. and pesticides from cow urine along with procurement of packing machine.
40	Research, publicity and dissemination of information to improve usage of cow products	Fellowship scheme for Research Work	State	Gauseva and Gauchar Vikas Board, Gujarat state	This is a scheme to provide fellowship to each Post-Graduate student of any recognized University of Gujarat State must be engaged in Cow based research work. Maximum Rs. 2.00 lacs
41	Incentive for Gaushalas/ Panjarapoles and Gau-Rakshaks (cow protectors)	Scheme to Provide Incentive Prize for Gaushalas/ Panjarapoles	State	Gauseva and Gauchar Vikas Board, Gujarat state	Scheme of providing incentive has been sanctioned with a view to encourage healthy competition among cattle rearing organizations to strengthen arrangement for cattle and rearing them in a better way. The organization has to apply in a prescribed form. The board will decide the order of first three winner organization accordingly to recommendations of the Selection Committee. The best organization honored by cash award and certificates. Implementation – Every three years. Financial Assistance For first winner of Gaushala, Panjarapole get Cash Price (Rs.) 150000, 150000 respectively. For second winner of Gaushala, Panjarapole get Cash Price (Rs.) 100000, 100000 respectively. For third winner of Gaushala, Panjarapole get Cash Price (Rs.) 50000, 50000 respectively
42	Incentive for Gaushalas/ Panjarapoles and Gau-Rakshaks (cow protectors)	Scheme for incentive prize to cow protectors (Gau-Rakshaks)	State	Gauseva and Gauchar Vikas Board, Gujarat state	A scheme is implemented by the board, with a view to encourage the person who rescues the cows and cows progeny from being taken to slaughter houses and to take legal actions against the persons involved in such illegal activities. Gau-Rakshaks has to apply in a prescribed form. To lodge police complaint. To inform police. Three persons will be awarded with cash prize and certificate. Post humus award will be also taken in to consideration on basis of biodata of the Gau-Rakshaks. Financial Assistance: Three persons – every three year to be awarded. Cash prize. Rs. 50,000/- to each person.
43	Maintenance of the rescued Cattle being to slaughter house and assistance to the Cow Protectors	Scheme for financial assistance for maintenance of the rescued Cattle being to slaughter house and assistance to the reporting person (Cow Protectors)	State	Gauseva and Gauchar Vikas Board, Gujarat state	Encouragement scheme has been implemented for maintenance of the resettled cattle being taken to slaughter house as well as for the cow protectors, involved in rescue operation of such cattle with the help of police. The Financial Assistance for Panjarapole -Rs. 2500/- per accepted cow progeny. Cow Protector – Rs.500/-per informed cow progeny.
44	Maintenance of stray cattle	Scheme of financial assistance for maintenance of	State	Gauseva and Gauchar Vikas	The objective of the scheme is to be helpful in taking away stray cattle for public roads and resident areas by LSG bodies.

		stray cattle		Board, Gujarat state	Under this scheme. One time financial assistance of Rs.1000 per cattle will be given to the Panjarapoles.
45	Rearing of elite pure breed Gir/Kankrej Male Calves of best genetic potential				
46	Modernize / upgrade Gaushalas	Scheme of financial assistance to Gaushalas/ Panjarapoles, Govt./ Semi .Govt. Organizations, Other Agencies, Progressive cow breeders /Farmers to modernize/upgrade their Gaushala	State	Gauseva and Gauchar Vikas Board, Gujarat state	Gaushalas/ Panjarapoles, Govt./ Semi .Govt. Organizations, Other Agencies, Progressive cow breeders /Farmers in the state who own must have 3 to 5 acres land and Beneficiary must rear at least 50 breed able cows are eligible for financial assistance of Rs. 4 lakh or 75 % of the total expenses, whichever is less for each development work/item. List of Infrastructure facilities: Milk pouch packing machine 200 liter capacity bulk milk coolers (with/without generator) Panchgavya based machine production equipments. Ripper machine Mini/ Large tractor. Hydraulic trolley. Solar water pump. Solar Unit. Water fogger, Gobar Gas plant (compulsory) Drip irrigation facility (3-5 acre land) (compulsory) Wormy Compost shed (compulsory) etc.
47	Gauchar/fodder Development	Gauchar Development scheme for improvement of fodder/pasture production in the gauchar owned by gram panchayat, gaushalas and Panjarapoles	State	Gauseva and Gauchar Vikas Board, Gujarat state	Gram Panchayat, Gaushala, Panjarapole are eligible to get benefits of this scheme. The organization has to apply in a prescribed form. The organization has to carry out work like, Removal of babuls, scrubs from Gauchar land, Leveling of the land. Plaguing, Cultivation by sowing fodder seeds, Wire fencing the land etc. under this scheme Financial Assistance : Rate of subsidy :- (75% subsidy of total expenditure incurred) Rs. 0.75 lacs for 1 hector of land, Maximum: Rs. 15.00 lacs for 20 hector of land (75% of the total expenditure incurred)
48	Fodder Development	Scheme to provide improved verities of fodder seeds to the Organizations/ individual desired for Gauchar Development	State	Gauseva and Gauchar Vikas Board, Gujarat state	Gaushalas/Panjarapoles, Gram Panchayats, Older organization, Progressive cow breeders can avail benefit of the scheme. Purchase of Labeled improved verity seeds of fodder crops through Gujarat State Seed Corporation Ltd and providing Free supply of fodder crop seeds to Gaushalas/ Panjarapoles, Grampanchayats and land holder organizations and progressive, cow breeders.
49	Organize visit to village	Scheme to organize visit to village – Dharmaj, Dist. Anand for demonstration	State	Gauseva and Gauchar Vikas Board, Gujarat	Under this scheme Gram Panchayat, Village service Co-operative society, Village milk producer Co-operative society, Sakhi Mandal (Female Self Help Groups) Organizations engaged

		of ideal /model Grass land (Gauchar).		state	in animal husbandry activities will visit the Model grass land in groups. One batch of maximum 50 visitors. The managing organization has to make necessary arrangements of to and through travelling journey. The tour programme shall be planned only after pre sanction of the board for visit of grass land. Rs.1000/- per person (visitor) towards travelling fare, refreshment and meal expense to visitors. The travelling expanse will be encashed by Gram Panchayat, Dharmaj, on submission of vouchers of travelling area by managing organization.
50	Transportation cost of calves/bullocks	Scheme for financial assistance for transportation of cow male calves/bullocks	State	Gauseva and Gauchar Vikas Board, Gujarat state	Under this scheme healthy bullocks area selected from Gaushala /Panjarapoles and supplied to the needy farmers free of cost. The use of bullocks for agriculture purpose will be increased and saved from slaughtering. The bullocks supplied to farmers will be selected from Gaushala /Panjarapoles free of cost and Transportation charges, at the rate of 2 Rs per km (Minimum 500 and maximum 2000/) will be paid to the beneficiary farmers
51	Organisation of Training Programme	organisation of training programme of Animal breeders and farmers for cow husbandry, cow breeding, Panchgavya therapy and gauchar development	State	Gauseva and Gauchar Vikas Board, Gujarat state	It is planned to organize training programme of three day period, at least 6 batches in the year, at each selected ideal 10 Gaushalas and Panjarapoles with strength of 50 trainees in each batch.
52	Castration of scrub bulls	Scheme for Castration of scrub bulls	State	Gauseva and Gauchar Vikas Board, Gujarat state	The state government has sanctioned Scheme for Castration of scrub bulls for genetic improvement of indigenous breed of cattle with the budget provision of Rs.350 lakhs for the year 2016-17 and the scheme is continued with budget provision of Rs.200 lakh for the year 2017-18. it is planned to castrate 110000 scrub cow bulls during the year 2016-17 & 2017-18 in the state.
53	Establishment of Nandi-Ghar	Scheme for establishment of Nandi-Ghar under Hon. chief minister sponsored cattle development programme	State	Gauseva and Gauchar Vikas Board, Gujarat state	Under this scheme, the cows of breeders of surrounding areas of the Gaushala will be bred with the bull, will be with high milk production efficiency. so the breeders will obviously get or earn more income from sale of milk. Their economic & social status. The financial assistance of Rs. 2.50 lakh is to be provided to each Gaushala for purchase and maintenance of bull and construction of Nandi Ghar .

Milk Union sponsored					
1	Calf rearing activity	Shwet Sarita calf rearing project for tribal area development	State	District Planning office-	Under the developing taluka scheme, Dairy cooperative societies will be formed in 20 villages will be selected from Dediyapada taluka of Narmada district under the developing taluka scheme. In this selected DCS, 10 cattle calves will be given to 200 tribal HHs and training is also given for scientific calf rearing.
2	Animal Health	Fertility improvement project	GCMMF, Anand	Milk Union, Bharuch	Financial assistance will be given from GCMMF under the fertility improvement project. 50% percent financial assistance will be provided by federation and remaining 50% will be provided by milk union
3	Cattle loan	Bankable cattle loan scheme	Milk Union, Bharuch	DCS	Milk union is signed MOU with BOB, IDBI, ICICI Bank for Financial assistance for cattle purchase will be given to members. Member should have two acre land.
4	Infrastructure creation	Electronic Milko Tester Machine	Milk Union, Bharuch	DCS	Under this scheme financial assistance will be given up to Rs.10000. New registered DCS and repeated after seven years of completion
5	Infrastructure creation	Milko screen machine	Milk Union, Bharuch	DCS	Financial assistance of Rs. 50000 will be given, Unit cost is Rs.275000, remaining amount of Rs.225000, after subtraction of financial assistance will be given by cooperative society
6	Infrastructure creation	Automated Milk collection system	Milk Union, Bharuch	DCS	Financial assistance of Rs. 25000 will be given under newly purchased system, only for new unit purchasing
7	Infrastructure creation	Construction of Milk House (Dudh Ghar sahay)	Milk Union, Bharuch	DCS	Under this scheme financial assistance will be given up to Rs.50000 after completion of New Milk House. Under the government financial assistance scheme Rs.3 lakh loan will be given at 12 % interest to dairy cooperative society.
8	Infrastructure creation	To provide of AI crate	Milk Union, Bharuch	DCS	Under this scheme financial assistance will be given up to Rs.2000 for provider of AI crate facilities to DCS.
9	Cattle Feed & Animal nutrition	Assistance for Mineral Mixture	Milk Union, Bharuch	DCS	Under this scheme financial assistance of Rs.25 per kg will be given for purchasing of mineral mixture to DCS
10	Infrastructure creation	working BMCU will transfer to name of village milk producer societies	Milk Union, **Bharuch**	DCS	Charges of token of amount will be taken from dairy cooperative societies, maintenance of unit will be responsibility of respective village dairy cooperative society. under this scheme financial assistance of Rs.50,000 for 1000 litre, Rs.75,000 for 2000 litre, Rs.1,00,000 for 3000 litre, Rs.1,25,000 for 4000/5000 litre capacity, 1 Rs. token amount charged for 100% assisted unit, for new unit union will be given 15% assistance and 12% (@12% interest) loan will be given by union and 3% cost will be barred

					by respective cooperative societies.
11	*Infrastructure facility*	*49 developing taluka scheme*	*State*	District planning office-Milk union, Panchmahals	*Under the 49 Developing taluka scheme financial assistance will be given for construction of milk house, infrastructure development/creation, for animal purchasing, cattle farm*
12	Infrastructure facility	Integrated dairy development project (IDDP)	State	Tribal Development Department Gujarat	Financial assistance will be given for purchasing of milch cattle, animal insurance, transportation cost, cattle feed, training, animal treatment, purchasing of instruments.
13	Calf rearing	Calf rearing project	State	Tribal Development Department Gujarat	Under this project 100% assistance will be given by government for calves development
14	Infrastructure facility	New Gujarat pattern scheme for tribal development department	State	Tribal Development Department Gujarat	under this scheme financial assistance will be given to milk union for creating infrastructure and development of dairy activity
15	Establishment of Milch Animal Farm	Mini Dairy Farm scheme	Milk Union, Panchmahals	DCS	Financial assistance 7% interest subsidy will be given for establishment of 5 to 10 milch animal farm, for women member 5% interest subsidy will be given by government, 1% interest subsidy will be given by federation, 1% interest subsidy will be given by milk union
16	Insurance	Animal insurance scheme	Milk Union, Panchmahals	DCS	Group insurance scheme will be implemented
17	Infrastructure Development etc.	Establishment of BMCU	Milk Union, Panchmahals	DCS	To procured good quality milk
18	Infrastructure facility	Establishment of AMCS	Milk Union, Panchmahals	DCS	To procured good quality milk
19	Infrastructure facility	Establishment of AMCS	Milk Union, Panchmahals	DCS	Accurate measurement of fat, quantity & transparency in accounting
20	Infrastructure facility	Construction of Dudhghar	Milk Union, Panchmahals	DCS	To provide infrastructure facility to DCS
21	Infrastructure facility	Construction of Biomass silo	Milk Union, Panchmahals	DCS	Preservation of feed & fodder
22	Infrastructure facility	Establishment of Milko tester machine	Milk Union, Panchmahals	DCS	Accurate measurement of milk quality
23	Infrastructure facility	Supply of milk collection accessories	Milk Union, Panchmahals	DCS	Accurate milk procurement
24	Infrastructure facility	Silage making unit	Milk Union, Panchmahals	DCS	To make availability of green fodder throughout the year
25	Infrastructure facility	VMS programme (vision mission strategy	Milk Union, Panchma	DCS	To aware the milk producers to adopt the scientific practices in animal husbandry & maximize the

		workshop- 3 days village level programme)	hals		profit by implementing the scientific practices
26	Infrastructure facility	VMS annual review (1 days village level programme)	Milk Union, Panchma hals	DCS	To aware the milk producers to adopt the scientific practices in animal husbandry & maximize the profit by implementing the scientific practices
27	Infrastructure facility	DIVA programme (DCS member integrated Vikas Aayojan- 3 days village level programme)	Milk Union, Panchma hals	DCS	To aware the milk producers to adopt the scientific practices in animal husbandry & maximize the profit by implementing the scientific practices
28.	Infrastructure facility	PMP Programme (Progressive milk producers programme-2 days village level programme)	Milk Union, Panchma hals	DCS	To aware the milk producers to adopt the scientific practices in animal husbandry & maximize the profit by implementing the scientific practices
29	Infrastructure facility	EDP Programme (Entrepreneurship Development Programme-8 Days programme)	Milk Union, Panchma hals	DCS	To aware the milk producers to adopt the scientific practices in animal husbandry & maximize the profit by implementing the scientific practices
30	Social responsibility	Tree Plantation	Milk Union, Panchma hals	DCS	Social responsibility
31	Infrastructure facility	Milking Machine (only one time through subsidy, than after original price)	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 30% on purchase value for speedy, clean milk facility
32	Infrastructure facility	Hand operated chaff cutter	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy on purchase of hand operated chaff cutter , 25 % to 30% saving of fodder
33	Infrastructure facility	Animal cooling system (Sprinkler system)	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy for 10 milk cattle (only one time benefit, then after original price)
33	Infrastructure facility	Animal cooling system (Sprinkler system)	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy for 20 milk cattle (only one time benefit, then after original price)
34	Infrastructure facility	Electric chaff cutter	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 30% subsidy (only one time benefit, then after original price)
35	Infrastructure facility	Electric chaff cutter	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 30% subsidy (only one time benefit, then after original price)
36	Infrastructure facility	Providing of Travis For AI facility	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 30% subsidy (only one time benefit, then after original price)
37	Animal Health	PIPERAZINE (Deworming)	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy for effective Deworming in calves
38	Animal Health	Botox medicine	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy

39	Animal Health	Tick kill power medicine	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy
40	Animal Health	Beticoal medicine	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy
41	Animal Health	Clean kit for FMD	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy
42	Education	Scholarship for study in dairy technology	Milk Union, Mehsana	DCS	Under this scheme financial assistance will be given 50% subsidy
C	**Central Govt.**				
1	Dairy Development and infrastructure	Dairy Entrepreneurship Development Scheme (DEDS)	NABARD	CBs,RRBS,UBs, SCBs,SCARDB, institutions, which are eligible for refinance from NABARD	Farmers, Individual Entrepreneurs and Groups of unorganized and organised sector. Groups of unorganized sector, includes SHGs on behalf of their members, Dairy Cooperative societies, Milk Unions on behalf of their members, Milk federations, Panchayati Raj Institution (PRIs) etc. are eligible under the scheme. Back ended capital subsidy @25% of the project cost for general category and 33% for SC/ST farmers. The component-wise subsidy ceiling will be subject to indicative cost arrived by NABARD from time to time. entrepreneur contribution for loans beyond Rs.1 lakh *-10% of project cost (minimum), Bank loan-Balance option.
2	Animal Husbandry & Dairy Development	Rashtriya Krishi Vikas Yojana	Central	Ministry of Agriculture and Farmers welfare	100% Grants would be provided to the states by central government
3	Livestock Health	Livestock Health and Disease Control	Centrally Sponsored	Department of Animal Husbandry	Livestock Health & Disease Control (LH & DC) during 10th plan, a centrally sponsored macro-management scheme called "Livestock Health and Disease Control" is being implemented with an outlay of Rs 525.00 crores.
4	Cattle and Buffalo Breeding	National Project for Cattle and Buffalo Breeding	Central	Department of Animal Husbandry	At present 28 States and one UT are participating under the project. The project envisages 100% grant-in-aid to Implementing Agencies.
5	Infrastructure Development	Assistance for Modernization of Slaughter Houses and Carcass Utilization Plants	Central	State Governments/ Directorates of Animal Husbandry/ Municipal Corporations/ Local Bodies /Livestock Corporations.	Modernization of Slaughter houses 50% of the project cost from GOI and 50% from the State. Establishment of Carcass Utilization Centers 100% grants-in-aid to meet capital expenditure for building, plant & machinery and effluent treatment plant. Only 50% grant is provided for electricity, water fencing boundary, essential housing, etc. by the GOI and remaining from State Govt.
6	Feed and Fodder Development	Assistance to States for Feed and Fodder Development	Central	Directors, Animal Husbandry of the State Governments.	
7	Livestock	Livestock	Central	Government of	The Livestock Insurance Scheme,

	Insurance	Insurance		India Ministry of Agriculture Department of Animal Husbandry, Dairying & Fisheries	a centrally sponsored scheme, which was implemented on a pilot basis. he premium of the insurance is subsidized to the tune of 50%. The entire cost of the subsidy is being borne by the Central Government. The benefit of subsidy is being provided to a maximum of 2 animals per beneficiary for a policy of maximum of three years. The scheme is being implemented in all states except Goa through the State Livestock Development Boards of respective states.
8	Livestock Census	Livestock Census	Central	State government	It is a Central Sector Scheme with 100% central assistance. The ultimate responsibility for conducting the Livestock Census rests with the Animal Husbandry Departments of the States/UTs. The Central Government coordinates the work of the States and gives necessary guidance to ensure uniformity in collection of census data.
9	Livestock Statistics	Integrated Sample Survey Scheme for Estimation of Major Livestock Products	Central	All State Governments/UT Administrations.	The Central Government provides grant-in-aid to the States on 50:50 basis For ONER States, 90:10 for NER and 100% basis to the UTs for the implementation of the scheme. The major part of the funds is utilized on the salaries and allowances of the staff employed under the scheme.
10	Animal Health	National Programme for Prevention of Animal Diseases	Central	Government of India	100% Centrally assisted To prevent ingress of livestock diseases, to provide export certificate for livestock and livestock products. Monitoring the quality of vaccines and biological. Strengthening Central/Regional Disease Diagnostic Laboratories. Implementing Agencies: Government of India
11.	Cattle Breeding	Central Cattle Breeding Farms	Central	subordinate offices of the Department	Various cattle and buffalo development agencies are benefited from the scheme by way of using high quality bulls produced at the farms. These bulls are used for semen production and natural breeding to help upgrade the animals in the country.
12	Fodder Development	Central Minikit Testing Programme on Fodder Crops	Central	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India implements the Scheme directly.	The scheme is for the benefit of Dairy farmers for improvement of fodder and fodder seed production to meet the requirement of these farmers of nutritive fodder for their animals. Fodder seed Minikits of different fodder varieties are supplied to the State Departments of Animal Husbandry for onward distribution to the farmers free of cost.
13	Fodder Development	Regional Stations For Forage Production & Demonstration	Central	These are subordinate offices under the Department of Animal	100% Central funding. Dairy farmers and the State Governments of the respective station's jurisdiction.

				Husbandry, Dairying & Fisheries, Ministry of Agriculture.	
14	cattle and buffalo development	Central Herd Registration Scheme	Central	CHRS Unit	The primary aim is to identify elite germ plasm for further improvement in milk production. Indigenous breeds covered at present are Gir, Kankrej, Hariana, Ongole of cattle and Murrah, Jaffrabadi, Surti and Mehsani of buffaloes. Under the scheme incentives for rearing of elite cows, buffaloes and their male calves is given to the owners of the elite animals. 100% Central Grant.
15	Intensive Dairy Development	Centrally Sponsored Scheme 'Intensive Dairy Development Programme (IDDP)	Central	State Dairy Federations / District Milk Union	The modified scheme has been named as 'Intensive Dairy Development Programme' (IDDP) and is being implemented in hilly and backward areas and also in the districts, which received less than Rs.50.00 lakh for dairy development activities during Operation Flood, programme. The funds are now released directly to the implementing agency i.e. State Dairy Federation / District Milk Union. The Scheme is being continued during the 11th plan with a total plan outlay of Rs.275.00 Crore as merged scheme together with 'CMP'. The pattern of funding is 100% grant-in-aid from Central Government for the districts where investment (central grant) under Operation Flood (OF) programme was less than Rs.50.00 lakh. There is a maximum allocation of Rs.300.00 lakh per district under the programme. For establishment of dairy processing capacity up to 20,000 litres/day will be 100% grant-in-aid basis. Above this cap, OF pattern will be followed, namely, 70% loan and 30% grant.
16	Strengthening Infrastructure & Clean Milk Production	Strengthening Infrastructure for Quality & Clean Milk Production (CMP)	Central	State Government by District Cooperative Milk Union/ State Level Milk Federation.	75% grant-in-aid for all components by Government of India to profit making unions (accumulated project above one crore as on 31st March of previous year). 100% grant-in-aid for all milk unions.
17	To revitalize the sick dairy cooperative unions at the district level and cooperative federations at the State level.	Assistance to Co-operatives	Central	District Cooperative Milk Unions/State Dairy Federation.	The funds are released on 50:50 sharing basis between Union of India and the concerned State Government. The maximum assistance of grant is limited to the minimum amount required so that the net flow becomes positive within seven years. In any case, the total grant does not exceed the accumulated cash losses.

4.7 Convergence of Schemes suggested

As suggested by Working Group for 12th five year plan (GOI, 2012), all the ongoing schemes should be classified under three mega schemes; a) Animal Production, b) Livestock Health and c) Dairy Development, as under.

Table 4.3: Convergence of Schemes suggested

No.	ACTIVITY	SCHEME/ INSTITUTIONS	CENTRAL/ STATE
A	**Animal Production**		
6	Artificial Insemination services	Assistance for Promotion scheme for Calves born through artificial insemination	State
52	Castration of scrub bulls	Scheme for Castration of scrub bulls	State
8.	Infrastructure creation	To provide of AI crate	Milk Union, Bharuch
36.	Infrastructure facility	Providing of Travis For AI facility	Milk Union, **Mehsana**
11.	Cattle Breeding	Central Cattle Breeding Farms	Central
14.	cattle and buffalo development	Central Herd Registration Scheme	Central
28	Establishment of elite herd of high pedigreed Male/Female calves of Gir and Kankrej breed	Scheme for establishment of elite herd of high pedigreed Male/Female calves of Gir and Kankrej breed	State
30	Pure breeding and supply of bull	Scheme for pure breeding and supply of bull	State
37	Supply of bull for pure breeding	Scheme for supply of bull for pure breeding to Gram Panchayats, Gaushalas, Panjarapoles and Gauseva Committee of the State	State
45	Rearing of elite pure breed Gir/Kankrej Male Calves of best genetic potential		
1.	Calf rearing activity	Shwet Sarita calf rearing project for tribal area development	State
13.	Calf rearing	Calf rearing project	State
4.	Cattle and Buffalo Breeding	National Project for Cattle and Buffalo Breeding	Central
B	**Livestock Health**		
3.	Livestock Health	Livestock Health and Disease Control	Centrally Sponsored
2.	Animal Health	Fertility improvement project	GCMMF, Anand
37.	Animal Health	PIPERAZINE (Deworming)	Milk Union, **Mehsana**
38.	Animal Health	Botox medicine	Milk Union, **Mehsana**
39.	Animal Health	Tick kill power medicine	Milk Union, **Mehsana**
40.	Animal Health	Beticoal medicine	Milk Union, **Mehsana**
41.	Animal Health	Clean kit for FMD	Milk Union, **Mehsana**
10.	Animal Health	National Programme for Prevention of Animal Diseases	Central
C	**DAIRY DEVELOPMENT**		
2.	Animal Husbandry & Dairy Development	Rashtriya Krishi Vikas Yojana	Central
21.	Infrastructure facility	Construction of Biomass silo	Milk Union, **Panchmahals**
22	Chaff Cutter	Scheme for Assistance to Power Operated Chaff Cutter for all common Beneficiary	State

53	Establishment of Nandi-Ghar	Scheme for establishment of Nandi-Ghar under Hon. chief minister sponsored cattle development programme	State
32.	Infrastructure facility	Hand operated chaff cutter	Milk Union, **Mehsana**
34.	Infrastructure facility	Electric chaff cutter	Milk Union, **Mehsana**
35.	Infrastructure facility	Electric chaff cutter	Milk Union, **Mehsana**
8	Aid for Concentrate, Feed to Pregnant Animals	Scheme for provide assistance on Concentrate, Feed Aid to Pregnant Animals	State
9	Concentrate, Feed Aid to Pregnant Animals	Scheme for provide assistance on Concentrate, Feed Aid to Pregnant Animals	State
10	Concentrate, Feed Aid to Pregnant Animals	Scheme for provide assistance on Concentrate, Feed Aid to Pregnant Animals	State
23	Assistance for Poly Propylene Silage Bag	Assistance for Poly Propylene Silage Bag for all Common Beneficiary	State
24	Fodder Development	Minikits for fodder seed for All farmers	State
47	Gauchar/fodder Development	Gauchar Development scheme for improvement of fodder/pasture production in the gauchar owned by gram panchayat, gaushalas and Panjarapoles	State
48	Fodder Development	Scheme to provide improved verities of fodder seeds to the Organizations/ individual desired for Gauchar Development	State
9.	Cattle Feed & Animal nutrition	Assistance for Mineral Mixture	Milk Union, Bharuch
24.	Infrastructure facility	Silage making unit	Milk Union, **Panchmahals**
6.	Feed and Fodder Development	Assistance to States for Feed and Fodder Development	Central
12.	Fodder Development	Central Minikit Testing Programme on Fodder Crops	Central
13.	Fodder Development	Regional Stations For Forage Production & Demonstration	Central
15.	Intensive Dairy Development	Centrally Sponsored Scheme 'Intensive Dairy Development Programme (IDDP)	Central
16.	Strengthening Infrastructure & Clean Milk Production	Strengthening Infrastructure for Quality & Clean Milk Production (CMP)	Central
17.	To revitalize the sick dairy cooperative unions at the district level and cooperative federations at the State level.	Assistance to Co-operatives	Central
1	Establishment of Milch Animal Farm	Scheme for Subsidy on Interest for establishment of Milch Animal Farm of 1 to 4 milk cattle unit	State
2	Establishment of Milch Animal Farm	12% interest subsidy to **SC/ST/General** Subsidiaries for establishment of 1 to 20 milk cattle unit	State
11	Establishment milch cattle farm/unit	Scheme for subsidy on interest for woman farmer for establishment of 1 to 10 milch animal farm	State
1	Dairy Development and infrastructure	Dairy Entrepreneurship Development Scheme (DEDS)	NABARD

3	Support for cattle shed, water tank, store room and steel bucket (ICDP)	Support for construction of cattle shed, water tank, store room and steel bucket for cattle	State
4	Support for cattle shed, water tank, store room and steel bucket	Support for construction of cattle shed, water tank, store room and 7 (seven) liter steel bucket for 10 cattle	State
5	Support for cattle shed, water tank, store room and steel bucket	Support for construction of cattle shed, water tank, store room and 7 (seven) liter steel bucket for 5 cattle	State
12	Financial Assistance for Automatic Milk collection system	AMCS Assistance for Women/General PDCS	State
13	Financial Assistance for Automatic Milk collection system	AMCS Assistance for Women/General PDCS	State
14	Financial Assistance for Automatic Milk collection system	AMCS Assistance for Women/General PDCS	State
15	BMC assistance for Women operated DCS	BMC assistance for Women operated/General PDCS	State
16	BMC assistance for Women operated DCS	BMC assistance for Women operated PDCS in **Scheduled Castes area**	State
17	BMC assistance for Women operated DCS	BMC assistance for Women operated PDCS in **Scheduled Tribes area**	State
18	Establishment of milk adulteration testing machine (MADM) for women operated DCS	Assistance for the establishment of milk adulteration testing machine (MADM) for women operated /General DCS of SC/ST/General area	State
20	Milking machine	Scheme for Assistance for the on buying the milking machine For the female member of PDCS for all category of farmers	State
46	Modernize / upgrade Gaushalas	Scheme of financial assistance to Gaushalas/ Panjarapoles, Govt./ Semi .Govt. Organizations, Other Agencies, Progressive cow breeders /Farmers to modernize/upgrade their Gaushala	State
4.	Infrastructure creation	Electronic Milko Tester Machine	Milk Union, Bharuch
5.	Infrastructure creation	Milko screen machine	Milk Union, Bharuch
6.	Infrastructure creation	Automated Milk collection system	Milk Union, Bharuch
10.	Infrastructure creation	working BMCU will transfer to name of village milk producer societies	Milk Union, **Bharuch**
11.	*Infrastructure facility*	*49 developing taluka scheme*	*State*
12.	Infrastructure facility	Integrated dairy development project (IDDP)	State
14.	Infrastructure facility	New Gujarat pattern scheme for tribal development department	State
17.	Infrastructure Development etc.	Establishment of BMCU	Milk Union, **Panchmahals**
18.	Infrastructure facility	Establishment of AMCS	Milk Union, **Panchmahals**
19.	Infrastructure facility	Establishment of AMCS	Milk Union, **Panchmahals**
22.	Infrastructure facility	Establishment of Milko tester	Milk Union,

		machine	**Panchmahals**
23.	Infrastructure facility	Supply of milk collection accessories	Milk Union, **Panchmahals**
31.	Infrastructure facility	Milking Machine (only one time through subsidy, than after original price)	Milk Union, **Mehsana**
5.	Infrastructure Development	Assistance for Modernization of Slaughter Houses and Carcass Utilization Plants	Central
19	Establishment of milk house/Godown for women operated DCS	Scheme for Assistance for the establishment of house/Godown for DCS (women/general) for **SC/ST/General** population area	State
27	Integrated Gaushala Development Scheme	Scheme for Integrated Gaushala Development Scheme	State
33	Financial assistance to create infrastructural facilities	Scheme for financial assistance to infrastructural facilities	State
7.	Infrastructure creation	Construction of Milk House (Dudh Ghar sahay)	Milk Union, Bharuch
15.	Establishment of Milch Animal Farm	Mini Dairy Farm scheme	Milk Union, **Panchmahals**
20.	Infrastructure facility	Construction of Dudhghar	Milk Union, **Panchmahals**
33.	Infrastructure facility	Animal cooling system (Sprinkler system)	Milk Union, **Mehsana**
33.	Infrastructure facility	Animal cooling system (Sprinkler system)	Milk Union, **Mehsana**
D	**Other**		
8.	Livestock Census	Livestock Census	Central
9.	Livestock Statistics	Integrated Sample Survey Scheme for Estimation of Major Livestock Products	Central
34	Financial assistance to create infrastructural facilities	New Panjrapoles	State
35	Financial assistance to create infrastructural facilities	JivDaya Helpline	State
36	Financial assistance to create infrastructural facilities	Managerial Assistance	State
7	Animal Insurance	Assistance for Animal Insurance Assistance for all female DCS members of SC/ST/General category of farmers	State
25	Compensation for Accidental Animal Death Scheme	Scheme for Compensation for Accidental Animal Death Scheme for All farmers	State
3.	Cattle loan	Bankable cattle loan scheme	Milk Union, Bharuch
16.	Insurance	Animal insurance scheme	Milk Union, **Panchmahals**
7.	Livestock Insurance	Livestock Insurance	Central
21	Award distribution	Scheme for planning the state's best Animal rears award distribution ceremony	State
26	Milk Competition	Scheme for Milk Production competition for All farmers	State
41	Incentive for Gaushalas/ Panjarapoles and Gau-Rakshaks (cow protectors)	Scheme to Provide Incentive Prize for Gaushalas/ Panjarapoles	State

42	Incentive for Gaushalas/ Panjarapoles and Gau-Rakshaks (cow protectors)	Scheme for incentive prize to cow protectors (Gau-Rakshaks)	State
29	Seminar/Conference for representative of Gaushalas/Panjarapoles	Scheme for conducting district level seminar/conference for representative of Gaushalas/Panjarapoles	State
38	Research, publicity and dissemination of information to improve usage of cow products	Scheme for Training	State
39	Research, publicity and dissemination of information to improve usage of cow products	Scheme for Financial Assistance for purchase of equipments	State
40	Research, publicity and dissemination of information to improve usage of cow products	Fellowship scheme for Research Work	State
49	Organize visit to village	Scheme to organize visit to village – Dharmaj, Dist. Anand for demonstration of ideal /model Grass land (Gauchar).	State
51	Organisation of Training Programme	organisation of training programme of Animal breeders and farmers for cow husbandry, cow breeding, Panchgavya therapy and gauchar development	State
25.	Infrastructure facility	VMS programme (vision mission strategy workshop- 3 days village level programme)	Milk Union, **Panchmahals**
26.	Infrastructure facility	VMS annual review (1 days village level programme)	Milk Union, **Panchmahals**
27.	Infrastructure facility	DIVA programme (DCS member integrated Vikas Aayojan- 3 days village level programme)	Milk Union, **Panchmahals**
28.	Infrastructure facility	PMP Programme (Progressive milk producers programme-2 days village level programme)	Milk Union, **Panchmahals**
29.	Infrastructure facility	EDP Programme (Entrepreneurship Development Programme-8 Days programme)	Milk Union, **Panchmahals**
42.	Education	Scholarship for study in dairy technology	Milk Union, **Mehsana**
31	Castration of scrub bulls	Scheme for Castration of scrub bulls	State
32	Production of organic bio fertilizer from cow dung	Scheme for production of organic bio fertilizer from cow dung	State
43	Maintenance of the rescued Cattle being to slaughter house and assistance to the Cow Protectors	Scheme for financial assistance for maintenance of the rescued Cattle being to slaughter house and assistance to the reporting person (Cow Protectors)	State
44	Maintenance of stray cattle	Scheme of financial assistance for maintenance of stray cattle	State
50	Transportation cost of calves/bullocks	Scheme for financial assistance for transportation of cow male calves/bullocks	State
30.	Social responsibility	Tree Plantation	Milk Union, **Panchmahals**

4.8 NDDB-Satellite Mapping to boost Dairy Farming[10]

Dairy farming is the latest addition to the list of traditional businesses that are achieving higher efficiency and productivity through technology. Big cooperatives are taking the help of Indian Space Research Organisation (ISRO) to track the milk system at village-level more efficiently. The National Dairy Development Board (NDDB) has taken the help of satellite imaging to track the animal population, fodder status, and land use patterns. Recently, an NDDB project won an award at the Geosmart India 2016 for developing an 'internet-based dairy geographical information system' or IDGIS. IDGIS is a visualisation tool which enables identification of villages and integrates human census, livestock census, land-use and land-cover of villages in all the major milk producing states.

4.9 Chapter Summary

The chapter presented the government policies that have been implemented in India over the period. Apart from the Central and State government programs, the state milk federations and the milk unions have evolved a variety of schemes that provide incentives to the milk producers. National Livestock Policy 2013 formulated by Central Government aim at increasing livestock productivity and production in a sustainable manner, while protecting the environment, preserving animal bio-diversity, ensuring bio-security and farmers' livelihood. Gujarat has witnessed the impressive growth in milk production during the operation flood programmes (OF). All the ongoing schemes should be converged and put under three mega schemes; a) Animal Production, b) Livestock Health and c) Dairy Development.

The next chapter presents the socio-economic profile of selected Milk Unions, PDCS/Private Units and Milk Producers.

[10] http://www.business-standard.com/article/current-affairs/satellite-mapping-to-boost-dairy-farming-116033000465_1.html

Chapter V

Socio-Economic Profile of Selected Milk Unions, PDCS/Private Units and Milk Producers

5.1 About Selected Study Area and Milk Unions:

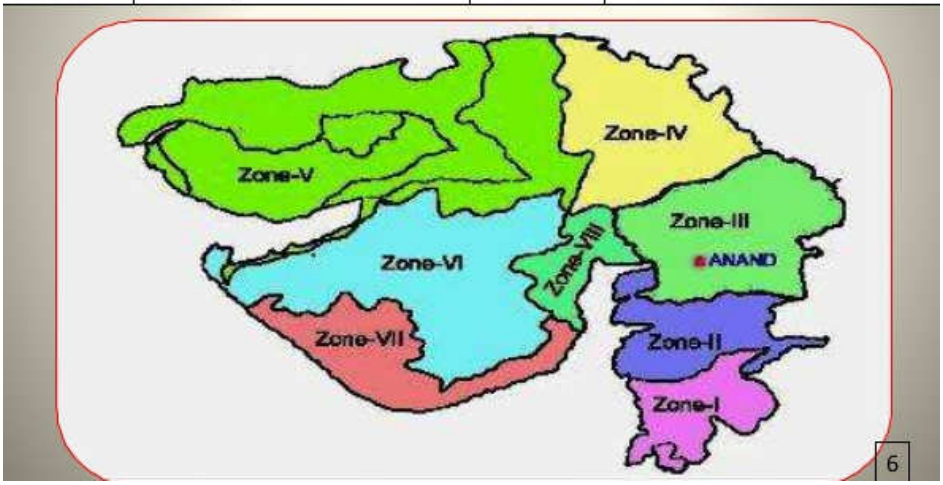
Gujarat state has made rapid strides in its agriculture sector including the agribusiness sub sector during recent past. The spectacular agricultural growth in Gujarat in recent times has been a result of a well thought out strategy, meticulously planned and coordinated scheme of action, sheer hard-work and sincerer implementation of programme, political will to take bold decisions and commitments to economic policy reforms by the state government. Agriculture in Gujarat has been transforming over time from traditional to high value added commercial crops which can be seen from a shift in its cropping pattern from food grains crops to high value cash crops. The trend in shifting of cropping pattern paved ways for many ancillary industries in the areas of processing, packing, storage, transformation, etc. Agricultural growth in the state is favoured by the prevailing eight agro-climatic zones, enterprenuring farming community, policy support from the government, wealth of livestock population, extended coast line and contribution by the agricultural scientist and dedicated NGOs. The Gujarat government has aggressively pursued an innovative agriculture development programme by liberalizing markets, inviting private capital, reinventing agricultural extension (Krishi Motsav, ikisan portal), improving roads and other infrastructure (Jyotigram Scheme). The mass-based water harvesting and farm power reforms in dry Saurashtra and Kachchh, and North Gujarat have helped energise Gujarat's agriculture. These semi-arid regions have outperformed the canal irrigated South and Central Gujarat. For ensuring systematic and coordinated approach to all around development of its agriculture sector, the Government of Gujarat had prepared in the year 2000 a ten

year plan called 'Gujarat Agro-vision 2010'. A comprehensive New Agro-industrial Policy was also announced in 2000. In the new industrial policy, the state has indentifies agro-industries as the major thrust area. The policy aims to spur investment in agro-processing, agro-infrastructure and hi-tech agriculture by monetary incentives. The growth in dairy sector in the state has been revolutionary. This sector plays a vital role in the rural economy of the state and has significant impact on employment generation for marginal, sub-marginal and landless farmers.

Gujarat has varying topographic features though a major part of the state was dominated by parched and dry region. The average rainfall in the state varies widely from 250 mm to 1500 mm across various zones. Out of 8 agro-climatic zones (see, Annexure A1), five are arid to semi-arid in nature, while remaining three are dry sub-humid in nature. As per the sampling framework, four milk unions were selected from four regions of the state (see, Map 5.1), i.e. Mehsana (North Gujarat), Bharuch (South Gujarat), Junagadh (West Gujarat) and Panchmahal (East Gujarat).

Map 5.1: Agro-Climatic Zones of Gujarat

Zone -I	South Gujarat Heavy Rainfall Zone	**Zone -V**	North-west Zone
Zone -II	South Gujarat Zone	**Zone -VI**	North Saurashtra Zone
Zone -III	Middle Gujarat Zone	**Zone -VII**	South Saurashtra Zone
Zone -IV	North Gujarat Zone	**Zone -VIII**	Bhal and Coastal Zone



The details about the selected milk producers' cooperative unions in Gujarat are presented in Tables 5.1 and 5.2 and Map 5.2.

Table 5.1: Selected Milk Producers' Cooperative Unions in Gujarat

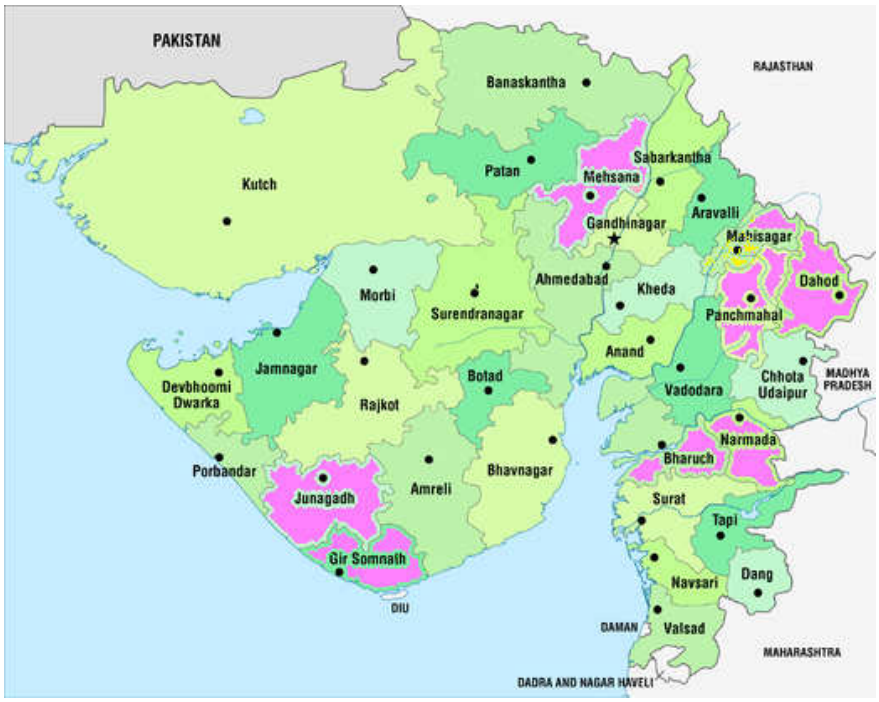
Sr. No.	*Name of Milk Producers' Cooperative Union*	*District*	Agro-Climatic Zone	Region
1	Bharuch Dist. Co-op. Milk Producers' Union Ltd	Bharuch	II	South Gujarat
2	Mehsana Dist. Co-op. Milk Producers' Union Ltd	Mehsana	IV	North Gujarat
3	Panchmahal Dist. Co-op. Milk Producers' Union Ltd.	Panchmahal	III	East Gujarat
4	Sorath Dairy	Junagadh	VII	West Gujarat

Table 5.2: Details of Selected Milk Producers' Cooperative Unions in Gujarat

Sr. No	Item No	Selected Co-operative Milk Producers' Union			
		Bharuch	Mehsana	Panchmahals	Junagadh
1	No. of Districts covered	2	1	3	3
2	Name of Districts Covered	Bharuch and Narmada	Mehsana	Panchmahal, Dahod and Mahisagar	Junagadh, Gir, Somnath
3	Villages Covered	700	1240	2133	414
4	Milk Co-op.Soc.				
5	(i) Registered	463	1219	1708	252
6	(ii)Proposed	217	122	425	161
7	(iii)Total	680	1341	2133	413
8	(iv) Functioning	661	1302	1688	1061
9	Members of Milk Co-op. Soc. (000)	65	612	277	43
10	(i) Milk collected from Soc. (lakh Kg.)	592	6207	3478	534
	(ii) Milk collected from Other. (lakh Kg.)	0	0	84	0
	Total Milk collected (lakh Kg.)	592	6207	3562	534
11	Sale of Rajka Seed (kgs)	0	103500	13988	0
12	Sale of other Seeds (kgs)	0	815710	198880	0
13	Roots/ Slips distributed(Nos)	15000	0	200000	0
14	Production of Cattle feed(M.T.)	0	283581	64175	0
15	Sale of Balance Feed(M.T.)	1252	270317	64485	0
16	No of Female Co- Society	155	170	429	218
17	No of Members of Female Co Soc	25000	330257	55458	14190
18	Installed Capacity (LLPD)	4	25	12	1
19	Milk Procure (LKPD)	1.62	17.01	9.76	1
	(i) Collected from Soc.	1.62	17.01	9.53	1
	(ii) Collected from Others	0	0	0.23	0
20	Milk Processing Cap.(LLPD)	2	25	11	0
21	Procurement price Rs/lit Fat	577	776	795	610
22	Supply of Chalff Cutter	53	36	3366	0
23	Av. Veterinary visits	617.83	30602	19341	21.3

Source: GOG (2016).

Map 5.2: Coverage of Selected Milk Unions



5.1.1 Bharuch District Co-Operative Milk Producers' Union Ltd:

The Bharuch District Co-Operative Milk Producers' Union Ltd. was established on 19/12/1959. The union is operating in the Bharuch and Narmada district covering 661 villages (Table 5.3). The Bharuch District Co-Operative Milk Producers' Union Ltd. is popularly known as "DUDHDHARA DAIRY" The dairy has engaged in animal husbandry and organizing the village level farmers dairy co-operative society (DCS) and farmers' community development since 1959. The union "DUDHDHARA DAIRY" has an average milk procurement of 125000 kilogram/day as on day, with a peak procurement of 242000 in a day, during the year 2015-16. During the year, Bharuch milk union has established new modern dairy plant having milk processing capacity of 200000 litre per day with expandable facility of 4,00,000 litre per day. Union has established following infrastructure facilities (Table 5.4).

Table 5.3: Details about the Dudhadhara Dairy

Particulars	Dudhadhara Dairy				
	2011-12	2012-13	2013-14	2014-15	2015-16
No. of dairy cooperative societies	616	659	647	632	661
No. of Registered cooperative societies	420	426	437	434	463
Average daily Milk collection (In Kilo)	96983	110165	115438	123509	161739
No. of Members	51000	56000	56500	59200	64726
Milk Procurement (Lakh Kilo)	355	402	421	451	592
Daily Milk sale -local(Litres)	49660	53889	54724	56226	54065
Daily Milk sale to GCMMF (litres)	43646	46090	11816	17996	36234
Turnover (Rs.)	119.05	143.75	167.16	205.37	237.38
Profit (Rs. Lakh)	25.72	28.42	36.21	37.06	46.62
Balanced Cattle feed selling	5042	4556	4139	3653	3043.41
No. of AI centres	35	44	63	77	152
No. of AI activity done	22452	28976	34501	42242	48390
sale of Mineral Mixture powder/ other feed supplement (kilo)	7269	3056	7843	9409	30034

Dudhdhara Dairy is a member union of Gujarat Co-operative Milk Marketing Federation Limited, marketing Milk with Amul Brand. Average marketing of milk is 60,000 LPD within the milk shed areas and 50,000 litre milk in Mumbai market with the help of GCMMF Anand. Besides, it is also marketing the milk products such as Dudhdhara Ghee, Khoa, Panner, F1.Milk, Butter Milk Marketing with "Dudhdhara" Brand. Bharuch District has a predominantly tribal Population and capacity for high milk Production. In tribal area, *Pashupalan* and dairy is main source of income to improve living conditions.

Table 5.4: Infrastructure Facilities established at Dudhadhara Dairy

Sr. No.	Particulars	Details
1	Milk processing Plant	200 TLPD capacity
2	Milk chilling Plant	35 TLPD capacity at Rajpipla,
3	Milk chilling Plant	30 TLPD capacity at Dediapada
4	Bulk Milk Cooling Unit	35 TLPD capacity at lambusar
5	BMCU at society level	130
6	AMCS at society level	408
7	Milko testers	650 societies
8	Milko Scan Machine	125 societies

5.1.2 Mehsana District Co-operative Milk Producers' Union Ltd.[1]:

The seeds of Mehsana District Co-operative Milk Producers' Union Ltd. popularly known as **Dudhsagar** dairy, located at Mehsana in Gujarat, were sown in the year 1960 with the noble intention of ensuring a fair return to the milk producers. In the fifties, the private middle men and distributors of milk, made all the profit while the farmers were left with almost nothing. The Cooperatives began as a response to this exploitation and put an end to it. Today the experiment has been replicated in different parts of the country and the results are astounding. Survey by UNICEF in year 1958 suggested the strong probability for large volume of milk production and collection in this area. Dedicated efforts of Founder Chairman Mr. Mansinhbhai Pruthviraj Patel have registered Dudhsagar Dairy as Mehsana District Co-operative Milk Producers Union Ltd on 8th November 1960 under Mumbai Co-operative Societies Act, 1925. On April 2, 1964, the foundation stone was laid down by former Finance Minister Morajibhai Desai. The management of Dudhsagar Dairy was served by second Chairman Late Mr. Motibhai Chaudhary (from 1970 to 2005). The Present chairman of Dudhsagar dairy is Mr. Vipul M Chaudhary, also chairman of GCMMF. Dudhamansagar Dairy, Manesar become the first FSCC-22000 certified Dairy in India

The entire value chain from procurement [to processing] to marketing is the sole and exclusive domain of the farmer. It regular assured income led to better life standards as against agriculture to farmer, overall development in Infrastructure of village, Increase awareness for democracy. Slowly but surely, like a sapling, the dairy grew in the rich soil of cooperation to about 1341 milk cooperative societies involving over 6.11 lakh milk producer members, having turn over 4186 crores (2015-16) and price of per kg fat given to farmer is Rs. 610. Dudhsagar dairy (capacity 25 LLPD) is having:

[1] http://www.dudhsagardairy.coop/about-us/overview/

- Five milk chilling centers (Kheralu, Kadi, Hansapur, Vihar, Harij).
- DURDA (Dudhsagar research and development association).
- One semen collection center at Jagudan (Rank 3rd in India).
- Two newly establish milk processing plant at Kadi and Hansapur.
- Three cattle feed plants at Jagudan, Ubkal, Boraiavi. Jagudan having capacity of 1000 MT/day, it is biggest cattle feed plant in India.
- Two sub units, one at Manesar having capacity of 12.5 LLPD (Expandable to 20LLPD) and another newly established plant at Dharuheda having capacity of 30 LLPD.
- 1240 milk cooperative societies (63 Women milk cooperative societies for women empowerment).
- Mansinhbhai institute of dairy and food science technology (under DURDA).
- Sahyog (Dudhsagar dairy employees' cooperative union).

5.1.3 Panchmahal Dist. Co-op. Milk Producers' Union Ltd[2]

Panchmahal District Cooperative Milk Producers Union Ltd., Godhra was established in May 1973. The milk shed has a total human population of 36.61 lakh (as per Census of India, 2001) of which 26.43 lakh comprises rural population and 3.25 lakh has been classified as urban population. The milk shed has 1908 inhabited villages distributed across 18 talukas of two districts of Panchmahal and Dahod Districts. Initially the milk unions of neighboring districts like Kaira, Sabar and Baroda helped organize the dairy cooperatives in Godhra. The entire operations for milk procurement were handled by these unions. In 1979, The Panchmahal Milk Union started its activities independently at Godhra with the help of Gujarat Dairy Development Corporation (GDDC). The union was included under Operation Flood-2,

[2] http://panchamrutdairy.org/pms/about_areamap.html

1982 and GDDC handed over the operations to the union in 1983. Panchmahal Union got affiliated to the Gujarat Cooperative Milk Marketing Federation (GCMMF) Ltd. Anand on 1st April 1984.

Table 5.5: Details about the Panchmahal Dairy

Particulars	Panchmahals Union		
	2005-06	2010-11	2015-16
Milk cooperative Societies Organised	1656	1915	2133
No. of Regd. Milk Societies	1413	1482	1708
No. of Member Milk Societies	1095	1176	1209
No. of farmer Member (in '000)	215	249	277
Paid up share capital (lakh Rs.)	389	479	548
Avg. Milk Procurement (LLPD)	2.75	4.49	9.5
Total Milk Purchase(lakh Rs.)	12328	37397	114380
Daily Avg milk sale (in '000 ltrs)			
Local sale	70	115	130
sale through GCMMF	37	132	601
Total production of Ghee(MT)	3283	3912	3842
Total sale of Ghee(MT)	3147	3990	4408
Total production of milk powder(MT)	2221	2131	4110
Total sale of milk powder(MT)	2502	2734	1377
Total production of table butter (MT)	501	1120	2074
Total sale of table butter (MT)	493	1125	1900
Total sale (lakh Rs.)	17782	52261	152208
Profit (lakh Rs.)	63.18	308.9	642.79
No. of societies covered under AI	905	1333	1816
No. of AI Performed(in '000)	151	310	433
Animals vaccinationated against FMD(In lakh)	0.8	2.87	6.24
No. of animals covered under insurance	13968	11898	35174
Qty cattle feed sold(MT)	20190	40703	64485
Qty fodder sold(MT)	203	178	213

As per statistics of 2009, total 1990 dairy cooperatives societies (DCS) were organized by the union, 1380 DCS contributed on an average around 2.58 TLPD of milk every day (Table 5.5). The union has milk drying capacity of 18 MTD and ghee manufacturing capacity of 10 MTD. The union has two chilling centers, one at Chopda and other at Limdi with the capacity to handled 2.0 LLPD and .3 LLPD respectively. The annual sale of Panchmahal Milk Union was Rs.157 crores at the end

of 31st March 2005. Union has established following infrastructure facilities (Table 5.6)

Table 5.6: Infrastructure Facilities established at Panchmahal Dairy

Sr. No.	Plant	Event	Year	Capacity
1	Chopda Chilling Centre (Ta. Lunawada)	Established	1993-94	50,000 kg
		First Expansion	2003	From 50,000 kg per day to 1 lakh kg per day
		Second Expansion	2005	From 1 lakh kg per day to 2 lakh kg per day
2	Limdi Milk Chilling Centre (Ta. zalod)	Established	February 2001	30000 LPD
3	Shivrajpur Bulk Milk Chilling Unit (Ta. Halol)	Established	February 2002	5000 LPD
		First Expansion	2005	20,000 LPD
4	Pipero Bulk Milk Cooling Unit (Ta. Dhanpur, Di. Dahod)	Established	2008	10,000 LPD
5	Kharedi Bulk Milk Cooling Unit (Ta. Dahod, Di. Dahod)	Established	2012-2013	10,000 LPD
6	Moti Sarsan Chilling Center Unit (Ta. Santrampur, Di. Panchmahal)	Established	2012-2013	10,000 LPD
7	Cattle Feed Manufacturing Plant (Khandia, Ta. Shahera)	Established	December 2004	100 MTD
8	Milk Packing Unit (Ujjain, Madhya Pradesh)	Established	2012-2013	1.00 LLPD

5.1.4 Sorath Dairy, Junagadh

The details about the Shree Sorath Junagadh District Cooperative Milk Union limited Junagadh is presented in Table 57. It can be seen from the table that the number of dairy cooperatives associated with the union has increased from 339 in 2013-14 to 427 in 2015-16. Also same trend was observed in case of number of dairy societies having AMCS. The Union have registered the considerable profit.

Table 5.7: Details about the Shree Sorath Dairy, Junagadh

Particulars	Shree Sorath Junagadh District Cooperative Society		
	2013-14	2014-15	2015-16
Average Milk Procurement(In Kg.)	55133903	57001178	53446185
Total Milk Procurement(In Kg.)	151051	156167	146428
Highest Milk Procurement(In Kg.)	203749	211678	226736
No. of Dairy cooperative	339	397	427
No. of Dairy cooperative societies having AMCS	123	123	312
Average Milk Price (Rs. Per Kilo fat)	497	544.39	556.93
Turnover (Rs.)	2091067876	2423574338	2080500426
Cost of Production (Per Kilo of Milk) in Rs.	0.87	1.05	1.15
Profit/Loss (Rs.)	101233938	91625989	52924847

5.2 About Selected Study Villages

The information on selected villages such as basic details, workers population and selected amenities available are presented in Tables 5.8 and 5.9. It can be seen from these tables that selected villages in Dahod and Bharuch districts are with significant population of tribal, while Junagadh and Mehsana has no tribal population. The highest area under irrigation was observed in the villages selected in Mehsana district, while the lowest was in Junagadh district. Despite of tribal nature of Dahod district, relatively better irrigation than Junagadh was observed. While as compared to state figures, the ratio of irrigated area to total area is very lower in three districts, i.e. Bharuch, Junagadh and Dahod. The drinking water facility was available in all villages except on DCS village each in Dahod and Junagadh and one NDCS village in Bharuch.

Table 5.8: Basic details of Selected DCS Villages (2011 Census)

Details	Basic details of Selected DCS Villages							
	Dahod		Bharuch		Junagadh		Mehsana	
	Raniyar Inami	Ranakpur khurd	Tavara	Ora	Koylana	Manekwada	Unava	Dholasan
Area of village (in hectares)	451.22	502.73	1,850.02	900.34	1,323.82	1,103.65	2,263.27	657.68
No. of households	211	426	1,180	235	661	600	2,404	591
Population	1,237	2,705	5,913	1,123	3,764	3,418	12,316	3,267
SC population	4	27	175	89	603	382	496	106
ST population	933	2,140	2,019	229	0	0	0	10
Drinking water facilities	0	Yes	Yes	Yes	0	Yes	Yes	Yes
Approach paved roads	0	Yes	BHARUCH (INA)	No	Yes	No	UNJHA	Available
Approach mud roads	> 10 Kms	No	10	BHARUCH	No	No	5	No
Distance (kms)-nearest town	No	10	Yes	Yes	12	Yes	Yes	6
Electricity for domestic use	14	Yes	No	Yes	Yes	Yes	Yes	Yes
Electricity of agricultural use		Yes	No	Yes	Yes		Available	Available
Irrigated area	90	126	101.15	0	361.2	84.62	1532	500
Un-irrigated area	274	304.16	1369.33	820.3	724.26	892.14	230.05	56
% Irrigated Area	24.73	29.29	6.88	0.00	33.28	8.66	86.94	89.93
Culturable waste	47.8	37.2	65.7	19.49	132.54	74.1	91.63	64.68
Area not available for cultivation	39.42	35.37	313.84	60.55	105.82	52.79	409.59	37

Table 5.9: Basic details of Selected NDCS Villages (2011 Census)

Area details	Basic details of Selected NDCS Villages								
	Dahod		Bharuch		Junagadh		Mehsana		
	Varod	Kharedi	Dabhali	Tham	Nanadiya	Sarod	Heduva Hanumat	Ijpura Barot	Kanpura
Area of village (in hectares)	766.9	1,150.31	349.54	803.11	1,668.99	615.78	438.22	183.59	281.19
No. of households	603	736	218	304	596	221	316	151	116
Population	3,854	5,215	1,130	2,221	2,674	1,105	1,480	709	464
SC population	72	232	19	103	520	159	215	26	55
ST population	3,494	4,704	649	470	0	0	14	0	0
Drinking water facilities	Yes	Yes	0	Yes	Yes	Yes	Yes	Yes	Yes
Approach paved roads	Yes	Yes	More than 10 Kms	Yes	Yes	Yes	Yes	>10 Kms	Yes
Approach mud roads	No	Yes	0	No	No	No	No	0	No
Distance (kms)-nearest town	8	7	Not available	8	6	12	2	Not available	35
Electricity for domestic use	Yes	Yes	MAKTAMPUR	Yes	Yes	Yes	Yes	MAHESANA	Yes
Electricity of agricultural use	Yes	Yes	22	yes	Yes	Yes	Yes	16	Yes
Irrigated area	47	188	141.57	265.4	14.41	44.2	252.5	125.31	68
Un-irrigated area	419	655.2	158.73	493.72	1413.43	489.13	85.4	26.43	177.58
% Irrigated Area	10.09	22.30	47.14	34.96	1.01	8.29	74.73	82.58	27.69
Culturable waste	86	296.81	8.35	0	129.8	70.42	35.21	28.84	13.93
Area not available for cultivation	214.9	10.3	40.89	43.99	111.35	12.03	65.11	3.01	21.68

5.3 About Sample PDCS & Private Dairy Units:

The details about the selected Primary Dairy Cooperative Society and Private Dairy Units located in selected villages are presented in Table 5.10. The total milk collection at PDCS was much higher than private dairy units, while milk rate was relatively lower in PDCS.

Table 5.10: Profile of Selected PDCS & Private Dairy Units in Gujarat

District	Profile of Selected PDCS & Private Dairy Units in Gujarat							
	Junagadh		Bharuch		Dahod		Mehsana	
Selected PDCS								
Tehsil/Taluka	Karod	Manavadar	Bharuch	Bharuch	Dahod	Zalod	Unjha	Mehsana
Village	Manakvada	Koyalana	Junatavra	Ora	Ranapur(B)	Savan Inami	Unava	Dholasan
Total No. of HHs in Village	800	250	600	700	300	300	2500	700
Total No. of Dairy Farmers hh (approx.)	200	150	216	110	200	280	1750	400
Total milk collection (liters)	13500	7050	60995	19728	26863	10390.67	28952.92	67857.46
Av. Fat (%)	5	5.5	5	4.8	6.5	5.1	6.2	5.5
Total No. of milk producers	110	80	216	105	165	43	140	351
Milk sent to Milk Union (liters)	13500	7050	46595	19168	26863	10390.6	28952.9	63797.7
Milk sold @ dairy- Quantity (lit)	0	0	14400	560	0	0	0	4059.7
Milk sold @ dairy- Rate/lit (Rs.)			42	40				55
Selected Private Dairy Units-PDU								
Tehsil/ Taluka	Keshod	Manavadar	Bharuch	Waghra	Dahod	Zalod	Jotana	Mehsana
Village	Sarod	Nandiya	Dabhali	Tham	Dahod	Jay Ambe	Kanpura	Deduaa, Hanumanth
Agent	PRID	Agent	Agent	Agent	PRID	PRID	Agent	PRID
Total No. of HHs in Village	180	250	150	350	800	1200	100	150
Total No. of Dairy Farmers hh (approx.)	80	150	50	120	120	600	80	140
Total milk collection (liters)	10500	2400	4500	5400	9642	8676	5758	3075
Av. Fat (%)	5.1	4.8	6	5	6.4	6.01	7.075	6.05
Total No. of milk producers	80	30	30	40	45	148	28	36
Milk sent to Milk Union (liters)	10500	0	0	0	9642	8676	5758	3075
Milk sold @ dairy- Quantity (lit)	0	2400	4500	5400	0	0	0	0
Milk sold @ dairy- Rate/lit (Rs.)		40	42	45				
Any Other		Milk Sold after Cream sepration	Milk Sold after Cream sepration	Milk Sold after Cream sepratio n				

5.4 About Sample Households

5.4.1 Socio-Economic Characteristics

The various socio-economic factors for instance size of family, education and training of dairy producer, availability of land and off farm income, experience in dairy, etc have direct influence on dairy farmers' decision to whether they want to expand and improve their dairy operations. The socio-economic characteristics of selected sample households are presented in Table 5.11. It can be seen from this table that the selected household average size was 5.8 members which was found almost similar in both categories (DCS- member of dairy cooperative society & NDCS- non member of dairy cooperative society). The family composition indicates that around 38 percent were male, followed by 35 percent female and remaining were children. Most of the respondents were male. The average age of respondents of both categories was between 44-46 years, which was marginally higher in DCS than NDCS respondents. Also, in case of average family age, it was around 31 years in DCS members while same was 29 years in NDCS dairy producers. The figures on average level of education of family indicate that on an average respondent were educated up to 7th standard. Around three members from each family engaged in dairy activity.

As dairy business is mostly deal by the females, it was expected that they would the decisions makers. However, field data indicate that about 90 per cent of decisions are taken by the male, while it was mentioned while data collection that female provide the support to the decision taken by the male, as per tradition followed in India everywhere. Out of the selected DCS households, 95 percent were from Hindu religion while about 3 per cent were from Muslim and rest were from Sikh region, while in case of NDCS households, 93 percent were from Hindu religion, 5 per cent were from Muslim and rest were from Christian religion. The distribution of selected DCS households as per

social group indicate the dominance of households belongs to other backward class (48 %), followed by General category (30%), Scheduled Tribe (18%) and remaining were from Scheduled Caste (3%). In case of NDCS households, 46 per cent households belong to other backward classes, 27 per cent were scheduled caste while remaining was scheduled tribe households. The main occupation of the selected households was agriculture comprised of cultivation of land as a farmer along with supportive allied activity of animal husbandry and dairying. It was very surprising to note that very few households were engaged as agriculture labour or as a non farm labour. Thus, a number of dairy producers initially became involved in dairy farming as a secondary and supportive activity.

Table 5.11: Family Profile of Selected Households

Sr. No	Particulars	Gujarat State							
		DCS (n=120)				NDCS (n=120)			
		S	M	L	T	S	M	L	T
1	Av. Household Size (Nos.)								
	Male	2.2	2.3	2.2	2.2	2.5	2.1	2.5	2.3
	Female	2.0	2.0	2.3	2.1	2.3	1.9	2.2	2.1
	Children(Below 15 Year)	1.6	1.5	1.5	1.5	1.3	1.1	1.3	1.2
	Total	5.8	5.8	6.0	5.8	6.0	5.1	6.0	5.7
2	Gender of Respondent/HH (%)								
	Male	90.0	80.0	97.5	89.2	90.0	92.5	75.0	85.8
	Female	10.0	20.0	2.5	10.8	10.0	7.5	25.0	14.2
3	Av. Age of respondent (years)								
	Male	46.6	46.8	44.4	45.9	43.5	45.2	42.7	43.9
	Female	40.3	42.3	55.0	43.6	40.8	47.7	43.8	43.8
	Total	45.5	45.9	45.2	45.5	43.2	45.4	43.0	43.9
4	Av. Age of family (years)	30.8	31.9	30.7	31.1	28.1	29.4	29.5	29.0
5	Av. Education of respondent/HH (years)	7.38	6.65	6.73	6.92	8.40	7.23	6.05	7.23
6	% of Family members works in dairy	52.2	62.6	61.9	58.4	51.5	65.4	53.6	56.3

Notes: S-Small, M-Medium, L-Large, T-Total.
Source: Field survey data.

Table 5.11: Socio-Economic Characteristics of Selected Households

Sr. No.	Particulars	% DCS				% NDCS			
		S	M	L	T	S	M	L	T
1	Gender of Decision Maker (%)								
	Male	90.0	80.0	97.5	89.2	95.0	92.5	87.5	91.7
	Female	10.0	20.0	2.5	10.8	5.0	7.5	12.5	8.3
2	Religion (% to total)								
	Hindu	95.0	100.0	90.0	95.0	92.5	92.5	95.0	93.3
	Muslim	5.0	0.0	2.5	2.5	7.5	5.0	2.5	5.0
	Christian	0.0	0.0	0.0	0.0	0.0	2.5	2.5	1.7
	Sikh	0.0	0.0	7.5	2.5	0.0	0.0	0.0	0.0
3	Social Group (% to total)								
	Scheduled Tribe	22.5	25.0	7.5	18.3	20.0	22.5	37.5	26.7
	Scheduled Caste	10.0	0.0	0.0	3.3	15.0	7.5	2.5	8.3
	Other Backward Class	47.5	47.5	50.0	48.3	35.0	47.5	55.0	45.8
	General/Open	20.0	27.5	42.5	30.0	30.0	22.5	5.0	19.2
4	Occupation (%)								
	Principal								
	Cultivator	87.5	67.5	60.0	71.7	67.5	70.0	60.0	65.8
	AH & Dairying	12.5	32.5	40.0	28.3	12.5	17.5	40.0	23.3
	Agri. Labour	0.0	0.0	0.0	0.0	2.5	7.5	0.0	3.3
	Nonfarm Labour	0.0	0.0	0.0	0.0	5.0	0.0	0.0	1.7
	Own Non-Farm Establishment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Employee in Service	0.0	0.0	0.0	0.0	12.5	5.0	0.0	5.8
	Other (Specify)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subsidiary								
	Cultivator	5.0	17.5	37.5	20.0	12.5	10.0	20.0	14.2
	AH & Dairying	87.5	67.5	60.0	71.7	87.5	82.5	60.0	76.7
	Agri. Labour	5.0	7.5	2.5	5.0	0.0	2.5	2.5	1.7
	Nonfarm Labour	2.5	7.5	0.0	3.3	0.0	2.5	17.5	6.7
	Own Non-Farm Establishment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Employee in Service	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.8
	Other (Specify)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Av. Operational land holding (area in ha)								
	Irrigated	1.3	1.7	1.9	1.6	1.7	1.9	1.2	1.6
	Un irrigated	0.1	0.3	0.1	0.2	0.4	0.3	0.2	0.3
	Total	1.4	2.0	2.0	1.8	2.1	2.2	1.4	1.9
6	Av. Experience in Dairy (years)	22.6	21.6	21.1	21.7	19.7	18.7	20.5	19.6
7	Income Group (%)								
	BPL	37.5	40.0	22.5	33.3	35.0	32.5	45.0	37.5
	APL	62.5	60.0	77.5	66.7	65.0	67.5	55.0	62.5
8	House Structure (%)								
	Pucca	65.0	55.0	72.5	64.2	50.0	52.5	50.0	50.8
	Semi-Pucca	15.0	27.5	20.0	20.8	27.5	17.5	27.5	24.2
	Kuccha	20.0	17.5	7.5	15.0	22.5	30.0	22.5	25.0

Notes: S-Small, M-Medium, L-Large, T-Total.
Source: Field survey data.

The selected DCS households has 1.8 ha operational land holding, of which 88.9 per cent was irrigated, while same was 1.9 ha in NDCS households with 84 per cent land under irrigation. The selected households in both the group has significant land under irrigation and facility of protective irrigation to save crop in case of less rainfall during kharif or grow more crop during rabi and summer seasons. The DCS households were found more experienced (21.7 years) than NDCS household (19.6 years). Around one third of selected households were below poverty line as per income group category indicates relatively better economic condition of two third households in both groups.

5.4.2 Cropping pattern

The details on cropping pattern of selected households during 2015-16 are presented in Table 5.12. It can be seen from the table that out of total gross cropped area, around 53-55 per cent area was in kharif season, around 36 per cent was in rabi season and remaining was in summer season. Groundnut, cotton, soybean, maize, tur and moog were the dominant kharif crops, while wheat and gram were important crops grown in Rabi season while summer bajra and groundnut were grown. Besides, significant area was allotted to fodder crops as well, due to requirement of fodder for dairy animals. The cropping intensity was found higher in case of DCS households than NDCS households.

Table 5.12: Cropping Pattern of Sample Household (2015-16)

(Total Area in ha)

Sr. No	Season /Crops	DCS (n=120)				NDCS (n=120)			
		S	M	L	T	S	M	L	T
A	**Kharif**								
	Bajra	0.86	0.79	0.47	0.69	1.61	1.87	3.02	2.10
	Jowar	0.00	0.16	0.00	0.06	9.70	12.56	8.87	10.56
	Paddy	1.11	2.01	3.31	2.29	1.68	4.33	0.65	2.40
	Maize	7.26	2.30	6.30	5.06	2.21	1.95	3.26	2.41
	Tur	0.62	2.14	0.91	1.29	2.85	2.07	3.12	2.63
	Moong	6.57	5.00	0.79	3.77	1.48	1.84	0.10	1.23
	Moth	0.00	0.00	0.71	0.27	0.80	0.00	0.40	0.38
	Castor seed	3.08	0.99	0.32	1.24	6.14	1.04	0.00	2.47
	Groundnut	8.34	13.08	12.52	11.70	5.49	4.99	5.25	5.23
	Soyabean	7.69	9.29	11.18	9.63	15.54	11.79	12.10	13.14
	Cotton	2.83	0.66	0.47	1.12	6.74	8.32	7.38	7.52
	Sugarcane	3.81	6.25	2.76	4.30	0.00	1.63	0.00	0.62
	Fodder Crops	5.54	2.68	4.99	4.27	3.05	3.85	5.60	4.07
	Others	0.12	0.53	0.39	0.38	0.96	0.80	0.20	0.68
	Total Kharif	47.83	45.89	45.11	46.07	58.26	57.03	49.97	55.46
B	**Rabi**								
	Wheat	20.67	23.60	26.30	23.92	24.57	20.27	23.31	22.57
	Maize	1.85	0.74	1.58	1.33	0.00	0.24	1.37	0.48
	Gram	0.00	0.25	1.42	0.64	4.31	2.97	2.59	3.32
	R&M	0.25	0.00	0.16	0.12	0.60	0.36	0.24	0.41
	Fodder crops	10.27	8.96	8.90	9.26	6.14	4.10	9.56	6.32
	Others	4.80	6.74	4.57	5.43	0.60	2.73	1.45	1.65
	Total Rabi	37.84	40.30	42.92	40.70	36.23	30.66	38.52	34.74
C	**Summer**								
	Maize	0.0	0.0	0.0	0.0	1.28	5.16	0.00	2.40
	Bajra	1.97	0.53	0.63	0.92	0.00	1.60	3.68	1.64
	Jowar	1.23	0.04	0.00	0.32	0.00	0.00	0.00	0.00
	Moong	0.74	2.38	0.63	1.30	0.34	3.56	0.40	1.59
	Groundnut	0.49	0.99	0.79	0.79	0.00	0.47	2.02	0.75
	Guar seed	0.25	0.33	0.00	0.18	0.00	0.00	0.00	0.00
	Fodder crops	9.66	9.54	9.92	9.72	3.89	1.51	5.41	3.41
	Total Summer	14.33	13.82	11.97	13.23	5.51	12.31	11.51	9.79
D	Net Cropped Area	57.94	54.60	53.01	54.81	58.26	57.03	49.97	55.46
E	Cropping Intensity (%)	172.6	183.2	188.7	182.4	171.64	175.33	200.12	180.29

5.5 Chapter Summary

The chapter presented the profile of the selected state and study area as well as about sample households. The varying topographic features of Gujarat justify the selection of four unions from four regions, i.e. Mehsana (North Gujarat), Bharuch (South Gujarat), Junagadh (West Gujarat) and Panchmahal (East Gujarat). The selected villages in Dahod and Bharuch districts area are with significant population of tribal, while Junagadh and Mehsana has no tribal population. The selected household average size was 5.8 members with average age of respondents of between 44-46 years. Around three members from each family engaged in dairy activity. The selected households in both the group has significant land under irrigation and facility of protective irrigation to save crop in case of less rainfall during kharif or grow more crop during rabi and summer seasons. The DCS households were found more experienced than NDCS household. Groundnut, cotton, soybean, maize, tur and moog were the dominant kharif crops, while wheat and gram were important crops grown in Rabi season while summer bajra and groundnut were grown. Besides, significant area was allotted to fodder crops as well, due to requirement of fodder for dairy animals. The cropping intensity was found higher in case of DCS households than NDCS households.

The next chapter presents cost of milk production and awareness about the schemes.

Chapter VI

Cost of Milk Production & Awareness about the Schemes

6.1 Introduction:

After having discussed about the selected study area and characteristics of the sample households, this chapter discusses the data on various parameters collected from the DCS and NDCS households in order to work out the size of the herd, number of animals covered under programme, details on feed and fodder, labour use and expenditure on animal health, and cost of milk production.

6.2 Breedable Animals

As mentioned earlier, Gujarat harbours some of the elite breeds, such as Gir and Kankrej of cows and Mehsani, Surti, Jafarabadi and Banni breeds of buffalos, which are well known for high milk yields. It is important to have information on distribution of local and crossbreed cows and buffaloes with selected households. The details on herd strength and cattle shed are presented in Tables 6.1 and 6.2. As mentioned in sample selection section, the milk producers were categorized as per holding of number of bovine population (cattle and buffalos) as small milk producers (SMP-1-2 milch animal), medium milk producers (MMP-3-5 milch animal) and large milk producers (LMP-above 5 milch animal). It can be seen from the Table 6.1 that all together, every DCS households has the highest share of buffaloes, followed by local cows and then cross bred cows in total heard strength. Out of total heard strength with DCS household, around 55 per cent animals were milch animals, the highest share was of cross breed (78.6%), followed by buffaloes (58.6%) and cows (52.5 %). In case of NDCS households (table 6.2), the dominance of buffaloes can be seen in total heard strength with households, while share of local and cross

crossbreed cows was lower than DCS households. In case of share of milch animals to total animal in each species, it was highest in case of buffaloes (61.7%), followed by cross breed cows (56.8%), and local cows (53.6%). At overall level, both the groups (DCS & NDCS) have almost similar herd strength. All the households has at least one cattle shed in both group and costing of same was found lower (around Rs. 3000/-) in case of NDCS households than DCS households (around Rs. 4300).

Table 6.1: Details on Herd Strength & Cattle Shed – DCS Households

Particulars	Details on Herd Strength & Cattle Shed- Gujarat -DCS (n=120)							
	Total Animal (No.)				Milch Animal (No)			
	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
Local Cattle	0.15	1.45	3.83	1.81	0.08	0.83	1.95	0.95
Cross Bread	0.80	1.48	2.63	1.63	0.50	1.20	2.15	1.28
Buffalo	1.80	2.28	4.80	2.96	0.95	1.48	2.78	1.73
Other	0.63	0.68	1.13	0.81	0.00	0.08	0.03	0.03
Total	3.38	5.88	12.38	7.21	1.53	3.58	6.90	4.00
	Av. No. of Cattle Shed				Present Average value in Rs./shed			
Pucca	0.3	0.3	0.5	0.4	4236	9215	8628	7655
Semi-Pucca	0.4	0.2	0.2	0.3	3867	4815	5494	4591
Kuccha	0.4	0.5	0.3	0.4	1324	614	1235	989
Total	1.0	1.0	1.0	1.0	3015	3924	6075	4338

Source: Field Survey Data.

Table 6.2: Details on Herd Strength & Cattle Shed – NDCS Households

Particulars	Details on Herd Strength & Cattle Shed- Gujarat -NDCS (n=120)							
	Total Animal (No)				Milch Animal (No)			
	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
Local Cattle	0.35	0.53	2.95	1.28	0.20	0.35	1.50	0.68
Cross Bread	0.20	0.25	0.48	0.31	0.10	0.15	0.28	0.18
Buffalo	2.00	4.45	7.78	4.74	1.08	2.80	4.90	2.93
Other	0.93	0.50	1.50	0.98	0.13	0.08	0.05	0.08
Total	3.48	5.73	12.70	7.30	1.50	3.38	6.73	3.87
	Cattle Shed				Present Average value in Rs./shed			
Pucca	0.18	0.28	0.23	0.68	8061	4364	9861	7155
Semi-Pucca	0.20	0.38	0.40	0.98	5179	2053	3398	3246
Kuccha	0.65	0.40	0.40	1.45	912	910	1213	994
Total	1.0	1.1	1.0	3.10	2965	2223	3964	3044

Source: Field Survey Data.

The details of species wise average milk yield recorded at the DCS and NDCS household level are depicted in Table 6.3. It can be seen from the table that the highest milk yield/day was recorded in case of crossbred cows, followed by buffaloes and then local cows.

Table 6.3: Details of Animals Breeds for DCS & NDCS

No.	Particulars	Name of breeds
1	Local Cow	Gir, Kankrej, Dangi
2	Crossbred Cow	Jersey Crossbred, Holstein Crossbred , Other Crossbreds
3	Buffalo	Jaffarabadi, Mehsana, Surti, Banni, Non-descript
4	Others	Goats

Source: Field Survey Data.

On the date of survey, the information was collected on numbers of breedable animals with the selected households and presented in Tables 6.4 and 6.5. It can be seen from these tables that on an average, in both DCS and NDCS group, the age of local and cross bred cows was around 5-6 years and for buffaloes, it was around 7 years. The age at first calving of local cattle (40-41 months) was found higher than crossbred cows (31-34 days). The average age of first calving ranges from 31-41months in case of cows and 42-44 months in case of buffalos. The lactation order of the milch animal was found to be either 2 or 3. The average level of peak yield recorded during the present lactation was marginally lower than earlier lactation in case of cross breed cows of both groups, and buffalos of DCS households, while same was found marginally higher in local cows of both groups. It was very strange to note that almost in all the species, milk yield during presented and earlier lactation period was found highest in case of LMP followed by MMP and SMP, except few exceptions. Across the group and species, the milk yield of local cows and buffaloes during present lactation was found higher in DCS households, while milk yield of cross

breed cows was found higher in NDCS households. However, in both cases, as mentioned earlier, the milk yield of cross breed cows was the highest followed by buffaloes and local cows. The information was also collected on animals covered under insurance scheme and it was observed that some of the DCS households has covered under their few animals under animal insurance program of the Government, wherein the government has paid some amount and dairy producer has deposited his share. The coverage of animals under insurance was relatively better in case of cross bred cows followed by meagre number of buffaloes and almost nil in case of local cows. In fact in case of NDCS households, it was very strange to note that no animal was covered under insurance. It indicates that government should make necessary policy and arrange extension activities to increase the awareness among the dairy producers to cover their animals under insurance scheme. On an average the premium paid per animal ranges between Rs. 1500-2500/-.

Table 6.4: Details of Breedable Animals with DCS Households on Survey Date

No	Particulars	Animal (DCS)											
		Local Cow				Crossbred Cow				Buffalo			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Av. Age (year)	5	6	6	6	5	6	5	6	7	7	7	7
2	Av. Age at I st Calving Month)	38	42	40	41	32	32	31	31	44	44	44	44
3	Lactation Order@	3	2	2	2	2	3	3	3	3	3	3	3
4	Lactation Period (Days)	275	245	228	235	243	246	249	248	243	236	249	244
5	Peak Yield-												
	Last Lactation	6.8	6.4	8.4	7.7	10.8	9.2	11.7	10.8	9.6	9.3	11.4	10.5
	Present Lactation	6.3	7.2	8.4	7.9	10.3	10.3	11.1	10.7	9.5	9.5	10.9	10.2
6	Total Animals Covered under Insurance (n=120)	1	0	0	1	5	10	25	40	5	3	3	11
	Premium paid (Rs./animal)												
	Government	1125	0	0	1125	1065	1075	1046	1056	1110	1075	1100	1098
	Self	500	0	0	500	823	593	1548	1218	880	725	3150	1457

Source: Field survey data.

Table 6.5: Details of Breedable Animals with NDCS Households on Survey Date

No	Particulars	Animal (NDCS)											
		Local Cow				Crossbred Cow				Buffalo			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Av. Age (year)	7	5	6	6	6	6	4	5	7	7	7	7
2	Av. Age at I st Calving Month)	46	37	40	40	41	36	32	34	42	43	44	43
3	Lactation Order@	3	2	3	3	2	2	2	2	3	3	3	3
4	Lactation Period (Days)	235	237	217	222	280	272	260	266	242	231	238	236
5	Peak Yield-												
	Last Lactation	7.0	6.5	7.0	6.9	10.0	10.7	12.2	11.6	7.7	9.3	9.3	9.1
	Present Lactation	8.4	6.3	7.8	7.6	8.3	9.4	13.3	11.5	7.6	9.2	10.0	9.4
6	Covered under Insurance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Premium paid (Rs./animal)												
	Government	-	-	-	-	-	-	-	-	-	-	-	-
	Self	-	-	-	-	-	-	-	-	-	-	-	-

Source: Field survey data.

The details on season-wise milk production are presented in table 6.6. It can be seen from the table that except local cow milk which was higher in case of NDCS households, the milk yield of cross bred cows and buffaloes was found higher in case of DCS households. Across the seasons, the milk yield was higher during winter season followed by rainy season and the lowest was in summer season. Overall the large milk producer group dominates the milk yield in all species irrespective of members of DCS or not.

Table 6.6: Season wise Milk Yield (Per day) of Selected HH 2015-16.

No	Season	Season wise Milk Yield (Per day) of Selected HH 2015-16 (Av. Yield (Lit/animal)											
		Local Cow				Crossbred Cow				Buffalo			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	**DCS HH n=120**												
1	Rainy	5.8	9.1	7.9	8.2	11.5	12.7	12.8	12.3	10.0	11.9	14.7	12.0
2	Winter	7.0	9.7	9.2	9.2	12.6	13.4	14.6	13.6	11.9	14.0	16.6	14.0
3	Summer	4.4	7.7	6.9	7.0	9.9	11.1	11.7	10.9	9.4	10.4	13.6	10.9
B	**NDCS HH n=120**												
1	Rainy	7.3	8.5	11.2	9.8	8.0	9.8	11.9	10.4	8.8	9.2	9.4	9.2
2	Winter	8.0	9.6	12.2	10.8	8.0	10.2	14.6	12.4	9.6	10.5	10.8	10.3
3	Summer	7.1	6.5	9.9	8.5	6.0	7.8	9.6	8.7	7.7	8.0	9.3	8.4

Source: Field survey data.

6.3 Labour Use Pattern

As dairy activities are carried out as complimentary activity to agriculture activities, the labour use pattern by the selected sample households indicate the complete dominance of use family labour who were engaged in both the activities and out of total time worked in a day, about half of the time was spent on dairy and household activities while remaining time was spent on field. Though some of the household had hired casual labour, which were mainly used for agriculture activities, while tendency of having permanent labour was very rare and found with few households only. Thus, activities of dairy were carried out mostly by the household members. The significant involvement of female in dairy activity can be seen from the data which indicate that in all the operations, female are part of that. The same trend has been recorded in case of NDCS.

Table 6.7: Labour Use Pattern -DCS hh

Sr. No.	DCS	Involvement of Rural Men and Women in Dairy activities															
		No. of Workers / Day								Total Minutes Worked / Person / Day							
		Male				Female				Male				Female			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	**Family Labours**																
1	Fodder Management	1.0	1.0	1.1	1.0	0.9	1.1	1.0	1.0	1.4	1.5	2.2	1.7	0.9	0.8	0.9	0.8
2	Shed Management	0.6	0.6	0.8	0.6	1.1	1.3	1.2	1.2	0.4	0.4	0.9	0.6	0.9	1.2	1.1	1.1
3	Milking	0.7	0.8	0.8	0.7	0.9	1.0	1.1	1.0	0.3	0.4	0.6	0.5	0.5	0.5	0.7	0.6
4	Animal Health	0.9	1.0	0.9	0.9	0.4	0.4	0.5	0.4	0.6	0.6	0.9	0.7	0.2	0.1	0.2	0.2
B	**Hired Labours**																
1	Fodder Management	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0
2	Shed Management	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0
3	Milking	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Animal Health	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	**Labour Rate (Rs./Day) Male/Female**	250	245	246	247	218	216	215	216	--	- -	- -	- -	- -	- --	- -	- -

Source: Field Survey Data.

Table 6.8: Labour Use Pattern -NDCS hh

Sr. No.	NDCS	Involvement of Rural Men and Women in Dairy activities-NDCS															
		No. of Workers / Day								Total Minutes Worked / Person / Day							
		Male				Female				Male				Female			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	**Family Labours**																
1	Fodder Management	0.8	1.0	1.3	1.1	1.0	0.9	1.3	1.1	1.3	1.5	2.0	1.6	1.3	1.0	1.4	1.2
2	Shed Management	0.6	0.7	1.1	0.8	1.1	1.1	1.2	1.1	0.6	0.5	1.2	0.8	1.1	1.1	1.2	1.1
3	Milking	0.6	0.7	1.1	0.8	0.9	1.0	1.0	1.0	0.5	0.5	0.9	0.6	0.5	0.8	0.7	0.7
4	Animal Health	0.6	0.8	0.9	0.8	0.3	0.4	0.5	0.4	0.8	0.8	1.0	0.9	0.4	0.3	0.3	0.3
B	**Hired Labours**																
1	Fodder Management	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0
2	Shed Management	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0
3	Milking	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0
4	Animal Health	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
C	**Labour Rate (Rs./Day) Male/Female**	241	238	235	238	208	205	206	206	--	- -	- -	- -	- -	- --	- -	- -

Source: Field Survey Data.

6.4 Details on Feed/Fodder and Water

There is a direct relation between the nutritional status of the animals and the type of feed feeded. For getting the best results, feeding of animal need planned scientific, practical as well as economical approach. Livestock feeds are generally classified as roughages and concentrates. Roughages are further classified into green fodder and dry fodder. Green fodder are cultivated and harvested for feeding the animals in the form of forage (cut green and fed fresh), silage (preserved under anaerobic condition) and hay (dehydrated green fodder). Fodder production and its utilization depend on various factors like cropping pattern followed, climatic condition of the area as well as the socio-economic conditions of the household and type of livestock reared. The cattle and buffaloes are normally feeded on the fodder available from cultivated areas, supplemented to a small extent

by harvested grasses. The major sources of fodder supply are crop residues, cultivated fodder and fodder from common property resources like forests, permanent pastures and grazing lands.

Table 6.9: Details of Feed and Fodder (at the Time of Survey)

No	Stall-Feeding	Details of Feed and Fodder (at the Time of Survey) (Kg. /day /Animal)											
		Animal type (Quantity Feeded (Kg))											
		Local Cows				Cross Breed				Buffalo			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	**DCS**												
1	Dry Fodder	8.2	12.9	12.3	12.3	15.8	13.2	15.7	15.0	17.0	13.8	12.0	13.5
2	Green Fodder	9.8	12.7	10.4	11.2	12.4	12.6	13.6	13.1	13.5	11.9	11.0	11.7
3	Concentrates	2.6	3.5	3.3	3.3	3.0	2.7	3.3	3.1	3.4	3.1	3.1	3.2
4	Supplements (Gram)	0.0	100.0	104.5	103.8	140.0	130.4	151.6	145.2	138.3	121.0	152.7	139.5
5	Out feeding Grazing (No of Hrs./day)	5.0	7.7	7.7	7.6	6.3	6.0	6.0	6.1	4.0	5.0	5.4	5.0
B	**NDCS**												
1	Dry Fodder	19.1	16.4	15.3	15.9	11.7	13.8	17.8	15.8	16.2	15.4	14.4	15.0
2	Green Fodder	15.6	16.8	12.6	13.8	10.3	9.3	15.9	13.6	17.3	12.8	12.6	13.2
3	Concentrates	5.2	6.1	5.0	5.2	6.7	6.3	5.4	5.8	6.4	5.7	6.8	6.4
4	Supplements (Gram)	50.0	50.0	73.1	65.8	50.0	50.0	53.3	51.8	57.1	31.5	75.0	43.6
5	Out feeding Grazing (No of hrs./day)	0.0	8.0	8.0	8.0	0.0	0.0	8.0	8.0	6.0	7.3	4.8	5.9

Source: Field Survey Data.

At present, there is huge gap between demand and supply of animal feed and fodder. The increased growth of livestock particularly that of genetically upgraded animals, has further aggravated the situation. Additionally, the quality of the available fodder is also poor, being deficient in energy, protein and minerals. Therefore, it is important to have information on feed and fodder feeded to animals. The details on feed and fodder feeded by the selected households at the time of survey are presented in Table 6.9. It can be seen from the tables that except few exceptions, in all the species and across the size groups, the quantity of feed (dry and green fodder) and concentrates

was found higher in case of NDCS households, while in case of supplements, except one case, DCS households have feeded more quantity than NDCS households. The selected households used fodder from both sources (self cultivated & purchased fodder). The animals were also feeded with concentrates which were mostly purchased from the market. Besides feeding the animals at stall in shed, the selected households could graze their animals every day for about 6-8 hours on their own agriculture land or common grazing land of the village.

Table 6.10: Availability of Water for Dairy activities- DCS households

No.	Particulars	Availability of Water for Dairy -DCS											
		Rainy				Winter				Summer			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	Sources of Water Available for Dairy Purpose (multiple)												
1	Open Well	15.0	17.5	2.5	11.7	15.0	17.5	2.5	11.7	15.0	17.5	2.5	11.7
2	Tubewell	55.0	40.0	42.5	45.8	55.0	40.0	42.5	45.8	52.5	40.0	42.5	45.0
3	River	7.5	5.0	0.0	4.2	2.5	0.0	0.0	0.8	2.5	0.0	0.0	0.8
4	Canal	2.5	5.0	0.0	2.5	0.0	5.0	0.0	1.7	0.0	5.0	0.0	1.7
5	Village Talawadi	12.5	42.5	55.0	36.7	7.5	42.5	55.0	35.0	7.5	40.0	55.0	34.2
6	Farm Pond	17.5	2.5	0.0	6.7	20.0	2.5	0.0	7.5	5.0	2.5	0.0	2.5
7	Tanker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	6.7
	Av. Distance (Meters)	141	815	447	468	560	687	447	565	560	687	447	565
B	**Supply of Water is adequate**												
1	Yes	100	95.0	92.5	95.8	97.5	95.0	92.5	95.0	97.5	92.5	85.0	91.7
2	No	0.0	5.0	7.5	4.2	2.5	5.0	7.5	5.0	2.5	7.5	15.0	8.3
C	**Water Quality (Village talawadi/Tanker)**												
1	Normal	100	100	100	100	100	100	100	100	100	100	100.0	100.0
2	Poor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Very Poor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	**Alternative source of Water supply in shortage**												
1	Open Well	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.8	0.0	0.0	10.0	3.3
2	TubeWell	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Canal	2.5	0.0	2.5	1.7	2.5	0.0	2.5	1.7	2.5	0.0	5.0	2.5
5	Village Talawadi	12.5	7.5	7.5	9.2	12.5	7.5	7.5	9.2	12.5	10.0	7.5	10.0
6	Farm Pond	0.0	2.5	5.0	2.5	0.0	2.5	5.0	2.5	0.0	2.5	5.0	2.5
7	Tanker	12.5	2.5	7.5	7.5	22.5	2.5	7.5	10.8	5.0	2.5	7.5	5.0
	Av. Distance (Meters)	300	3800	2000	2033	750	3800	2000	2183	750	3333	941	1675
E	**Payment Made for Water, If any (Rs)**	221	333	250	268	221	333	250	268	150	453	363	322

Source: Field Survey Data.

Table 6.11: Availability of Water for Dairy activities- NDCS households

No.	Particulars	Availability of Water for Dairy -NDCS											
		Rainy				Winter				Summer			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	Source of Water Available for Dairy Purpose												
1	Open Well	15.0	15.0	12.5	14.2	10.0	12.5	12.5	11.7	15.0	12.5	10.0	12.5
2	Tubewell	40.0	32.5	40.0	37.5	42.5	32.5	37.5	37.5	40.0	40.0	37.5	39.2
3	River	2.5	0.0	0.0	0.8	2.5	0.0	0.0	0.8	2.5	0.0	0.0	0.8
4	Canal	5.0	7.5	5.0	5.8	5.0	7.5	5.0	5.8	5.0	7.5	5.0	5.8
5	Village Talawadi	20.0	20.0	22.5	20.8	20.0	20.0	22.5	20.8	20.0	25.0	22.5	22.5
6	Farm Pond	0.0	2.5	2.5	1.7	0.0	2.5	0.0	0.8	0.0	0.0	2.5	0.8
7	Tanker	22.5	25.0	22.5	23.3	22.5	25.0	25.0	24.2	17.5	22.5	17.5	19.2
	Av. Distance (Meters)	168	144	145	152	168	152	184	168	151	156	115	141
B	Supply of Water is adequate												
1	Yes	57.5	70.0	87.5	71.7	50.0	57.5	52.5	53.3	37.5	22.5	27.5	29.2
2	No	42.5	30.0	12.5	28.3	50.0	42.5	47.5	46.7	62.5	77.5	72.5	70.8
C	Water Quality (Village talawadi/Tanker)												
1	Normal	40.0	37.5	32.5	36.7	60.0	57.5	22.5	46.7	35.0	47.5	40.0	40.8
2	Poor	47.5	42.5	50.0	46.7	25.0	22.5	40.0	29.2	37.5	30.0	27.5	31.7
3	Very Poor	12.5	20.0	17.5	16.7	15.0	20.0	37.5	24.2	27.5	22.5	32.5	27.5
D	Alternative source of Water supply in shortage												
1	Open Well	27.5	5.0	15.0	15.8	5.0	2.5	2.5	3.3	7.5	0.0	0.0	2.5
2	TubeWell	10.0	7.5	5.0	7.5	0.0	0.0	2.5	0.8	2.5	0.0	2.5	1.7
3	River	10.0	12.5	7.5	10.0	25.0	22.5	25.0	24.2	12.5	17.5	15.0	15.0
4	Canal	15.0	20.0	10.0	15.0	25.0	25.0	22.5	24.2	22.5	7.5	7.5	12.5
5	Village Talawadi	22.5	25.0	27.5	25.0	25.0	32.5	30.0	29.2	32.5	37.5	52.5	40.8
6	Farm Pond	5.0	5.0	7.5	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Tanker	17.5	27.5	27.5	24.2	27.5	25.0	25.0	25.8	30.0	35.0	22.5	29.2
	Av. Distance (Meters)	151	156	115	141	182	185	152	173	223	217	213	218
E	Payment Made for Water, If any (Rs)	168	145	201	172	189	208	219	205	232	206	209	168

Source: Field Survey Data.

Beside feed and fodder, availability of quality of water also determines growth of dairy activities. It can be seen from the tables 6.10 and 6.11 that in both the groups (DCS & NDCS) groundwater is the main source of water followed by village talawadi and open well in the village. The water for dairy activities were also fetched from the other minor sources such as river, canal, farm pond and tanker. Though the supply of water is almost adequate, few households suffer with shortage of water and in such case, alternative sources were exploited. Some of the households reported that they had got water

through tanker by making payment for same. The NDCS households faces shortage of water required for dairy activities. Besides, water shortage, water quality of problem for some of NDCS households.

6.5 Details on Veterinary and Breeding Services and Expenditures

The details of veterinary and breeding expenditure incurred during last one year by beneficiary and non-beneficiary households are presented in Tables 6.12 and 6.13. It can be seen from the tables that almost all the animals were given vaccinations (such as FMD, HS, BQ, Deworner, Thailera, Swell in Feet, etc), which was mostly received free of cost. Besides, some of the selected households had incurred expenditure on medicine and doctor as and when some of animals fell sick. On an average DCS household had incurred medicine plus doctor fee cost ranging between Rs. 100-550/- per animal during the year, while corresponding figure for NDCS households was at higher side which ranges between Rs. 280-700/animal. During the visit to the field and discussion with the selected household, it was observed that despite of various efforts made by the government; availability of veterinary doctor is one of the bottlenecks in dairy development. It can be seen from the table that on an average, every year total number of visit of veterinary doctor ranges between 3 to 4 only. Thus, most of the households had either depend on the alternative source of advisory and medical support for their animals.

Though under cooperative dairy sector, member of dairy can register a complaint at diary society and doctor visit the animals, it sometimes takes long time to get doctor visited and thus delayed visit and prescription of doctor sometime result in extra expenditure on medicine and doctor as well as loss in income due to low milk yield (in case of milch animal). Beside natural service, artificial insemination facility was availed by the selected households for their animals and on an average, rate of conception of AI was less than 2.

Table 6.12: Details of Veterinary and Breeding Expenditure during last one year DCS Households

No.	Particulars	DCS - Veterinary and Breeding Expenditure during Last year (2015-16)											
		LC				CB				B			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	Vaccination												
	HS	5	39	76	120	18	31	77	126	36	51	102	189
	BQ	2	30	56	88	12	23	65	100	24	20	78	122
	FMD	6	35	69	110	26	45	88	159	39	53	103	195
B	Medicines + Doctor(Rs)	107	238	414	330	249	274	542.5	368	239	340	423	361
C	Av. No. of Visit By Vet./Year	1.33	2.12	1.76	1.88	1.94	1.59	3.08	2.28	1.96	1.86	1.64	1.77
D	Service												
	Artificial Insemination	5	21	48	74	26	48	92	166	30	32	54	116
	Natural service	2	23	34	59	0	2	8	10	14	27	58	100
	Amount	105	126	137	132	68	70	63.45	66.13	161	219	234	215
E	No. of AI Per conception	1.33	1.59	1.45	1.49	2.03	1.76	2.38	2.15	1.5	1.7	1.36	1.48
F	Per visit rate paid to vet. Doctor (Rs/visit	112.5	140	173	159	92.69	102.6	125.3	114	146	167	224	190

Source: Field Survey Data.

Table 6.13 Details of Veterinary and Breeding Expenditure during last one year NDCS Households

No.	Particulars	NDCS - Veterinary and Breeding Expenditure during Last year (2015-16)											
		LC				CB				B			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	Vaccination												
	HS	3	10	25	38	2	3	3	8	22	71	81	174
	BQ	0	2	21	23	2	2	3	7	7	18	7	32
	FMD	3	10	44	57	2	4	3	9	24	58	93	175
B	Medicines + Doctor(Rs)	342	678	632	601	417	280	461	406	764	604	660	657
C	Av. No. of Visit vet./yr	2.1	1.7	2.1	2.1	1.3	1.4	2.0	1.7	2.0	1.4	1.7	1.6
D	Service												
	Artificial Insemination	7	7	33	47	2	4	9	15	17	55	51	123
	Natural service	3	7	34	44	1	1	2	4	25	53	129	207
	Amount	171.0	246.4	211.3	212.3	266.7	365.0	204.5	256.6	255.0	279.4	292.2	283.3
E	No. of AI Per conception	2.0	2.2	2.0	2.0	2.0	2.6	2.3	2.3	2.0	2.0	2.0	2.0
F	Per visit paid to vet. doctor (Rs/visit)	200	186	307	277	217	220	319	269	297.2	240.1	314.8	282.3

Source: Field Survey Data.

6.6 Awareness about the Schemes:

There are many government schemes that provide forward and backward linkages for promotion of dairying involving milk producers. Besides, the state milk federations and the milk unions have evolved a variety of schemes that provide incentives to the milk producers. However, proper awareness about the benefit of scheme would not only help in success of aim of scheme but also benefit the dairy producer in many ways. Therefore, an attempt was made in this study also to know the status of awareness about various schemes among the selected households. It can be seen from the Table 6.14 that on an average, about three fourth of DCS households were aware about different vaccinations schemes/programmes, while in case of NDCS households, awareness about same was very poor (41.7 %). In case of artificial insemination programmes, about 71 per cent DCS households had information while hardly 42 per cent NDCS households were about same. Around 64 percent DCS households were aware about other dairy development programmes, while NDCS households were almost unawareness about same. The main sources of information of schemes/programmes for DCS households was cooperative society followed by government animal husbandry department, media and fellow farmers. However, very few of them have benefited with scheme. While in case of NDCS households, they were dependent on media and fellow farmers for same. Thus, it is very much clear from the data that DCS households were well aware about the various programmes may be due to information they receive from the dairy cooperative society and government animal husbandry department. The association of dairy producers with cooperative milk society improve the awareness about the various dairy development schemes. Therefore, in order to make inclusive development of dairy, more efforts should be made by the government to disseminate the information about scheme through distributing pamphlets; organising village awareness programme, etc.

Table 6.14: Details on Awareness about various schemes

Sr. No.	Particulars	DCS % of response				NDCS % of response			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Awareness about different Vaccinations schemes/programmes (%) Yes	77.50	70.00	77.50	75.00	35.00	45.00	45.00	41.67
	No	22.50	30.00	22.50	25.00	65.00	55.00	55.00	58.33
2	Awareness about Artificial Insemination (AI) programmes (%)- Yes	65.00	72.50	75.00	70.83	40.00	47.50	37.50	41.67
	No	35.00	27.50	25.00	29.17	60.00	52.50	62.50	58.33
3	Awareness about any dairy development scheme/programmes (%) -Yes	75.00	60.00	57.50	64.17	5.00	0.00	5.00	3.33
	No	25.00	40.00	42.50	35.83	95.00	100.00	95.00	96.67
4	Sources of information about schemes (%)								
	a) Govt. Animal Husbandry Department	16.36	22.92	22.92	21.38	20.00	0.00	0.00	0.00
	b) Dairy Cooperative/ Milk Union	54.55	50.00	47.92	53.10	0.00	0.00	0.00	0.00
	c) Media (Press/TV)	16.36	10.42	6.25	11.72	40.00	0.00	0.00	0.00
	d) Fellow farmer/dairy owner/neighbor	12.73	16.67	10.42	13.79	40.00	0.00	0.00	0.00
	5. Have you benefited with any dairy scheme (%) Yes	22.50	10.00	12.50	15.00	0.0	0.0	0.0	0.0
	No	77.50	90.00	87.50	85.00	100.0	100.0	100.0	100.0
	a) If benefited, please provide following								
	i) Av. No. of visits to concern office	-	-	-	-	-	-	-	-
	ii) Wage days lost, if any (Days)	-	-	-	-	-	-	-	-
	iii) Total Expenditure to avail scheme (doc/travel/etc)	-	-	-	-	-	-	-	-
	iv) Bribe paid to any one	-	-	-	-	-	-	-	-
	v) Quality of material received					-	-	-	-
	Good	92.31	100.0	100.0	100.0	-	-	-	-
	Bad	8.33	0.00	0.00	0.00	-	-	-	-
	vi)Satisfied with benefit received (%) -Yes	92.31	100.0	100.0	100.0	-	-	-	-
	No	8.33	0.00	0.00	0.00	-	-	-	-
	If no, give reason	-	-	-	-	-	-	-	-

Source: Field Survey Data.

6.7 Cost of Milk Production:

The cost of production of milk and net returns realised by the sample households are presented in Tables 6.15 to 6.16. It can be seen from the tables that net returns realised by the DCS households was higher than NDCS households all groups and in all species. On an average, net return of about Rs. 32/- per animal per day was realised by the DCS households as compared to Rs. 14/- per animal per day realised by the NDCS households. The net return realised by the DCS households was higher by 130 per cent at overall level. The highest net return by DCS households was recorded in case of crossbred cows, followed by local cows and lowest was in case of buffaloes. However, in case of NDCS households, the highest net return per animal was recorded in local cows, followed by cross breed cows and lowest was in buffalos. Low margins for NDCS dairy producers may be due to low milk productivity from animals with low genetic potential, poor health, feeding and husbandry practises low price offered by private agent/agency. Therefore, there is a huge scope to enhance producers' income from dairy by enhancing animals productivity, improving management practise, and ensuing remunerative prices.

Low productivity of milk animals is a serious constraint to dairy development. The productivity of dairy animals could be increased by crossbreeding low-yielding nondescript cows with high-yielding selected indigenous purebreds or suitable exotic breeds in a phased manner. The cattle-breeding policy should not only focus on milk yield but should also provide for the production of good-quality bullocks to meet the draft-power requirements of agriculture. Upgrading nondescript buffalo through selective breeding with high-yielding purebreds such as Murrah, Mehsani or Nili Ravi should be given high priority in all areas where buffalo are well-adapted to the agro-climatic conditions.

Table 6.15: Cost of Cow Milk Production and Net Returns- DCS households

Sr. No.	Particulars	DCS- Cost of Milk Production –Cow							
		LC				CB			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Total Dry Fodder (Rs./Animal/Day)	28.7 (16.9)	33.3 (17.6)	31.9 (15.0)	31.3 (16.4)	29.9 (16.0)	32.3 (17.4)	30.5 (14.1)	30.9 (15.7)
2	Total Green Fodder (Rs./Animal/Day)	28.0 (16.5)	24.2 (12.8)	20.4 (9.6)	24.2 (12.7)	27.1 (14.5)	25.0 (13.5)	22.7 (10.5)	25.0 (12.7)
3	Total Concentrates (Rs./Animal/Day)	45.9 (27.0)	60.8 (32.2)	61.6 (29.0)	55.7 (29.2)	56.5 (30.2)	56.0 (30.2)	62.5 (28.8)	56.1 (28.6)
4	Total Supplements (Rs./Animal/Day)	0.0 (0.0)	4.2 (2.2)	4.7 (2.2)	4.4 (2.3)	5.6 (3.0)	5.5 (3.0)	6.8 (3.1)	6.1 (3.1)
5	Total feed & fodder (Rs./Animal/Day)	102.7 (60.4)	122.5 (64.9)	118.6 (55.8)	115.6 (60.7)	119.1 (63.7)	118.8 (64.1)	122.5 (56.5)	118.1 (60.1)
6	Total Labour (Rs./Day) Male (Rs./Day)	33.3 (19.6)	40.8 (21.6)	64.9 (30.5)	46.3 (24.3)	33.3 (17.8)	40.8 (22.0)	64.9 (29.9)	46.3 (23.6)
	Female (Rs./Day)	33.0 (19.4)	23.7 (12.6)	27.2 (12.8)	28.0 (14.7)	33.0 (17.6)	23.7 (12.8)	27.2 (12.5)	28.0 (14.2)
	Total	66.3 (39.0)	64.6 (34.2)	92.1 (43.3)	74.3 (39.0)	66.3 (35.4)	64.6 (34.9)	92.1 (42.5)	74.3 (37.8)
7	Veterinary Cost (Rs./Animal/Day)	1.0 (0.6)	1.7 (0.9)	1.9 (0.9)	1.5 (0.8)	1.7 (0.9)	1.9 (1.0)	2.3 (1.0)	2.0 (1.0)
8	Total Cost (Rs./Animal/Day)	170.0 (100)	188.8 (100)	212.5 (100)	190.4 (100)	187.1 (100)	185.3 (100)	216.9 (100)	196.4 (100)
9	Milk Production (Litre/Animal)	5.5	6.2	6.5	6.1	6.3	6.4	6.6	6.4
10	Price (Rs. /litre)	33.7	32.8	35.9	34.1	33.7	32.8	35.9	34.1
11	Returns from Milk Production (Production*Avg Price)	185.4	203.3	233.3	207.3	212.1	208.3	236.9	219.1
12	Income from Dung (Rs./Animal/Day)	11.3	10.0	11.0	10.8	11.4	11.5	11.5	11.5
13	Total Income (Rs./Animal/Day)	196.7	213.3	244.3	218.1	223.5	219.8	248.4	230.6
14	Net Return/Profit (RS./Animal/Day)	26.7	24.4	31.8	27.6	36.3	34.6	31.6	34.1

Table 6.16: Cost of Buffalo Milk Production and Net Returns- DCS households

Sr. No.	Particulars	DCS- Cost of Milk Production –Buffalo & All							
		B				ALL			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Total Dry Fodder (Rs./Animal/Day)	31.7 (16.3)	32.3 (16.7)	30.9 (13.7)	31.6 (15.5)	30.1 (15.8)	32.6 (17.1)	31.1 (14.1)	31.3 (15.6)
2	Total Green Fodder (Rs./Animal/Day)	28.5 (14.7)	28.2 (14.6)	28.0 (12.4)	27.4 (13.5)	27.4 (14.4)	24.8 (13.0)	24.2 (10.9)	25.4 (12.7)
3	Total Concentrates (Rs./Animal/Day)	60.9 (31.4)	61.3 (31.8)	65.4 (29.1)	62.9 (30.8)	60.1 (31.5)	61.3 (32.2)	65.4 (29.5)	62.9 (31.3)
4	Total Supplements (Rs./Animal/Day)	5.5 (2.9)	5.1 (2.6)	6.9 (3.1)	5.9 (2.9)	5.6 (2.9)	5.3 (2.8)	6.6 (3.0)	5.9 (3.0)
5	Total feed & fodder (Rs./Animal/Day)	126.6 (65.3)	126.8 (65.8)	131.1 (58.3)	127.9 (62.7)	123.1 (64.6)	124.0 (65.2)	127.2 (57.5)	125.5 (62.5)
6	Total Labour (Rs./Day)								
	Male (Rs./Day)	33.3 (17.2)	40.8 (21.2)	64.9 (28.8)	46.3 (22.7)	33.3 (17.5)	40.8 (21.5)	64.9 (29.3)	46.3 (23.1)
	Female (Rs./Day)	33.0 (17.0)	23.7 (12.3)	27.2 (12.1)	28.0 (13.7)	33.0 (17.3)	23.7 (12.5)	27.2 (12.3)	28.0 (13.9)
	Total	66.3 (34.2)	64.6 (33.5)	92.1 (40.9)	74.3 (36.4)	66.3 (34.8)	64.6 (33.9)	92.1 (41.6)	74.3 (37.0)
7	Veterinary Cost (Rs./Animal/Day)	1.1 (0.6)	1.4 (0.7)	1.8 (0.8)	1.4 (0.7)	1.3 (0.7)	1.7 (0.9)	2.0 (0.9)	1.7 (0.8)
8	Total Cost (Rs./Animal/Day)	194.0 (100)	192.8 (100)	225.0 (100)	203.9 (100)	190.7 (100)	190.2 (100)	221.3 (100)	200.7 (100)
9	Milk Production (Litre/Animal)	6.3	6.4	6.5	6.4	6.3	6.4	6.8	6.5
10	Price (Rs. /litre)	33.7	32.8	35.9	34.1	33.7	32.8	35.9	34.1
11	Returns from Milk Production (Production*Avg Price)	212.1	208.3	233.3	217.9	212.1	208.3	244.1	221.5
12	Income from Dung (Rs./Animal/Day)	11.3	10.5	11.0	10.9	11.3	10.7	11.2	11.0
13	Total Income (Rs./Animal/Day)	223.4	218.8	244.3	228.8	223.4	219.0	255.3	232.5
14	Net Return/Profit (RS./Animal/Day)	29.4	26.0	19.3	24.9	32.7	28.7	34.0	31.8

Table 6.17: Cost of Cow Milk Production and Net Returns- NDCS households

Sr. No.	Particulars	NDCS- Cost of Milk Production -Cow							
		LC				CB			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Total Dry Fodder (Rs./Animal/Day)	30.0	32.0	34.4	32.2	31.2	33.0	30.6	31.6
		(18.6)	19.1	17.2	18.2	18.3	17.6	15.3	17.0
2	Total Green Fodder (Rs./Animal/Day)	24.5	25.0	30.2	26.0	23.8	25.8	29.9	25.9
		(15.2)	14.9	15.1	14.7	13.9	13.7	15.0	13.9
3	Total Concentrates (Rs./Animal/Day)	41.8	40.4	48.8	43.6	47.5	53.9	53.2	51.5
		(25.9)	24.1	24.3	24.7	27.8	28.7	26.6	27.7
4	Total Supplements (Rs./Animal/Day)	2.0	2.1	3.3	2.8	2.0	2.1	2.4	2.2
		1.2	1.3	1.6	1.6	1.2	1.1	1.2	1.2
5	Total feed & fodder (Rs./Animal/Day)	98.3	99.5	116.7	104.6	104.5	114.8	116.2	111.2
		(61.0)	59.4	58.1	59.3	61.1	61.1	58.0	59.7
6	Total Labour (Rs./Day)								
	Male (Rs./Day)	32.8	33.0	45.0	36.9	32.8	33.0	45.0	36.9
		(20.3)	19.7	22.4	20.9	19.2	17.6	22.5	19.8
	Female (Rs./Day)	27.6	31.4	35.0	31.4	27.6	31.4	35.0	31.4
		(17.1)	18.8	17.4	17.8	16.2	16.7	17.5	16.8
	Total	60.4	64.4	80.0	68.3	60.4	64.4	80.0	68.3
		(37.5)	38.5	39.9	38.7	35.3	34.3	40.0	36.6
7	Veterinary Cost (Rs./Animal/Day)	2.5	3.5	4.0	3.3	6.0	8.6	4.0	6.2
		(1.6)	2.1	2.0	1.9	3.5	4.6	2.0	3.3
8	Total Cost (Rs./Animal/Day)	161.2	167.5	200.7	176.4	170.9	187.9	200.1	186.3
		(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
9	Milk Production (Litre/Animal)	5.4	5.5	6.2	5.7	6.0	6.5	6.2	6.2
10	Price (Rs. /litre)	31.0	31.5	33.0	31.8	30.0	30.0	32.0	30.7
11	Returns from Milk Production (Production*Avg Price)	167.4	173.3	204.6	181.8	180.0	195.0	198.4	191.1
12	Income from Dung (Rs./Animal/Day)	10.0	10.5	12.0	10.8	10.0	9.0	12.0	10.3
13	Total Income (Rs./Animal/Day)	177.4	183.8	216.6	192.6	190.0	204.0	210.4	201.5
14	Net Return/Profit(RS./Animal/Day)	16.2	16.3	15.9	16.1	19.1	16.1	10.3	15.2

Table 6.18: Cost of Buffalo Milk Production and Net Returns- NDCS households

Sr. No.	Particulars	NDCS- Cost of Mil Production –Buffalo & All							
		B				ALL			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Total Dry Fodder (Rs./Animal/Day)	28.0	32.0	35.3	31.7	29.3	32.3	34.9	32.2
		16.7	17.4	17.7	17.3	17.5	18.2	16.9	17.5
2	Total Green Fodder (Rs./Animal/Day)	23.8	26.3	30.2	26.2	24.0	25.7	30.1	26.0
		14.2	14.3	15.1	14.2	14.3	14.5	14.6	14.2
3	Total Concentrates (Rs./Animal/Day)	45.6	52.0	54.6	50.7	46.2	45.6	50.1	47.3
		27.1	28.3	27.4	27.6	27.6	25.7	24.3	25.7
4	Total Supplements (Rs./Animal/Day)	2.3	2.3	2.9	2.5	2.2	1.6	3.0	2.3
		1.4	1.3	1.5	1.4	1.3	0.9	1.5	1.2
5	Total feed & fodder (Rs./Animal/Day)	99.7	112.5	123.0	111.1	101.8	105.1	118.1	107.8
		59.3	61.2	61.7	60.4	60.7	59.2	57.3	58.6
6	Total Labour (Rs./Day)								
	Male (Rs./Day)	32.8	33.0	35.0	33.6	32.8	33.0	45.0	36.9
		19.5	17.9	17.5	18.3	19.5	18.6	21.8	20.1
	Female (Rs./Day)	27.6	31.4	35.0	31.4	27.6	31.4	35.0	31.4
		16.4	17.1	17.5	17.1	16.5	17.7	17.0	17.1
	Total	60.4	64.4	70.0	64.9	60.4	64.4	80.0	68.3
		35.9	35.0	35.1	35.3	36.0	36.3	38.8	37.2
7	Veterinary Cost (Rs./Animal/Day)	8.0	7.0	6.5	7.2	5.5	8.0	8.0	7.2
		4.8	3.8	3.3	3.9	3.3	4.5	3.9	3.9
8	Total Cost (Rs./Animal/Day)	168.1	184.0	199.5	183.9	167.7	177.6	206.1	183.8
		(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
9	Milk Production (Litre/Animal)	6.1	6.2	6.0	6.1	6.0	6.1	6.4	6.2
10	Price (Rs. /litre)	29.0	31.0	33.5	31.2	28.5	30.0	33.5	30.7
11	Returns from Milk Production (Production*Avg Price)	177.4	192.2	201.1	190.2	171.0	182.0	214.5	189.2
12	Income from Dung (Rs./Animal/Day)	8.0	8.0	10.0	8.7	9.3	8.0	8.0	8.4
13	Total Income (Rs./Animal/Day)	185.4	200.2	211.1	198.9	180.3	190.0	222.5	197.6
14	Net Return/Profit(RS./Animal/Day)	17.3	16.2	11.5	15.0	12.7	12.4	16.4	13.8

6.8 Chapter Summary

From field data, it was observed that all together, every DCS households has the highest share of buffaloes, followed by local cows

and then cross bred cows in total heard strength. Out of total heard strength with DCS household, around 55 per cent animals were milch animals. In both DCS and NDCS group, the age of local and cross bred cows was around 5-6 years and for buffaloes, it was around 7 years. The milk yield of cross breed cows was the highest followed by buffaloes and local cows. Few DCS households has covered under their few animals under animal insurance program of the Government, wherein the government has paid some amount and dairy producer has deposited his share. The coverage of animals under insurance was relatively better in case of cross bred cows followed by meagre number of buffaloes and almost nil in case of local cows. In fact in case of NDCS households, no animal was covered under insurance. The activities of dairy were carried out mostly by the household members. Except few exceptions, in all the species and across the size groups, the quantity of feed (dry and green fodder) and concentrates was found higher in case of NDCS households, while in case of supplements, except one case, DCS households have feeded more quantity than NDCS households. Groundwater is the main source of water followed by village talawadi and open well in the village. Almost all the animals were given vaccinations, which was mostly received free of cost. Besides, some of the selected households had incurred expenditure on medicine and doctor as and when some of animals fell sick. On an average, about three fourth of DCS households were aware about different vaccinations schemes/programmes, while in case of NDCS households, awareness about same was very poor. The net returns realised by the DCS households was higher than NDCS households all groups and in all species. Low margins for NDCS dairy producers may be due to low milk productivity from animals with low genetic potential, poor health, feeding and husbandry practises low price offered by private agent/agency.

The next chapter presents details on milk marketing.

Chapter VII

Milk Consumption & Marketable Surplus

7.1 Introduction:

After having discussed about the issues related to milk production, it is important to have the discussion of issues related of marketing milk. As mentioned earlier, more than 62 per cent of the milk produced in the country is marketed by the unorganised sector (private organisations) and less than 38 per cent is marketed by the organised sector (government or cooperative societies). Even though co-operatives provide a remunerative price to the producer, the unorganized sector plays a major role in milk marketing because of three factors. The first factor is the pricing policy of the co-operatives: their purchase price is based on the fat content of the milk, whereas the private sector pays a flat rate per liter of milk. The second factor, which motivates the milk producers to sell milk to private vendors, involves the type of milk reared by the producer. Crossbred cows yield more milk with a lower fat than do buffalo. The crossbred cow population has increased over years because animals of artificial insemination and improvements in management practices. The third factor is payment policy. The private sector can pay their producers every day, whereas the co-operatives pay weekly or fortnightly. Producers sometimes have to fight with the co-operatives to get their payments. Within the organized sector, the co-operative sector is by far the largest in terms of volumes of milk handled, installed processing capacities, and marketing infrastructure. Cooperatives pay back the highest share of consumer rupee to the milk producer. Besides, input services are also provided to member milk producer. This chapter discuses details on milk production and its use and marketing, cost of milk marketing, constraints faced in milk marketing.

7.2 Use of Milk at Home and Processing

The data collected on production and use of milk on the earlier day of visit is presented in Tables 7.1 and 7.2. It can be seen from the tables that the small milk producers generally consume larger proportion of milk produced followed by medium milk producer and the lowest was in case of large milk producers. In fact, across the species, households preferred to consume and process the milk of local cows (20.1%), followed by buffaloes (13.1%) and cross bread cows (7.3 %). While the highest preference was given to milk produced by local cows and about 71.4 per cent of total milk produced was consumed or used for processing by small milk producers, followed by 26.0 per cent by medium and 15.5 per cent by large milk producer group. Thus the buffalo and cross bred cow milk was sold outside and local cow milk was mostly consumed at the home. In case of NDCS households, though the use of local cow milk was relatively better but was at par with the cross bread cows and marginally higher than buffalo cows. Thus, it indicates that the NCDS households preferred cross bred cow milk in consumption, while no reason was cited for same.

Table 7.1: Production and Use of Milk by selected DCS Households (day of visit)

Sr. No.	Particulars	Local Cow				Crossbred Cow				Buffalo			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Milk Drawn Lit/animal	2.3	7.9	5.3	6.0	7.9	7.4	9.4	8.6	8.9	6.9	6.6	7.1
2	Use of Milk at Home (lit)	5.0	68.0	63.5	136.5	16.5	24.0	56.0	96.5	68.5	66.5	59.0	194.0
	% Milk used at Home	71.4	26.0	15.5	20.1	10.5	6.8	6.9	7.3	20.1	16.4	8.0	13.1
	For Direct Consumption (%)	90.0	82.4	84.3	83.5	90.9	97.9	96.4	95.9	87.6	79.7	73.7	80.7
	For Processing (%)	10.0	17.6	15.7	16.5	9.1	2.1	3.6	4.1	12.4	20.3	26.3	19.3
3	Raw/Liquid Milk sold (Lit)	2.0	194.0	346.5	542.5	141.0	331.5	752.0	1224.5	271.5	338.0	677.0	1286.5
	% to total production	28.6	74.0	84.5	79.9	89.5	93.2	93.1	92.7	79.9	83.6	92.0	86.9

Source: Field Survey Data.

Table 7.2: Production and Use of Milk by selected NDCS Households (day of visit)

Sr. No.	Particulars	Local Cow				Crossbred Cow				Buffalo			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Milk Drawn Lit/animal	14.9	5.3	7.4	7.8	5.5	7.0	9.2	7.9	6.1	6.4	5.3	5.8
2	Use of Milk at Home (lit)	24.0	19.0	95.5	138.5	6.5	9.0	18.5	34.0	74.0	131.5	88.5	294.0
	% Milk used at Home	20.1	25.7	21.4	21.7	29.5	21.4	18.3	20.6	28.1	18.3	8.5	14.5
	For Direct Consumption (%)	81.3	73.7	76.4	76.9	38.5	100.0	83.8	79.4	84.5	74.9	75.1	77.4
	For Processing (%)	18.8	26.3	23.6	23.1	61.5	0.0	16.2	20.6	15.5	25.1	24.9	22.6
3	Raw/Liquid Milk sold (Lit)	95.5	55.0	350.5	501.0	15.5	33.0	82.5	131.0	189.0	585.5	955.0	1729.5
	% to total production	79.9	74.3	78.6	78.3	70.5	78.6	81.7	79.4	71.9	81.7	91.5	85.5

Source: Field Survey Data.

7.3 Sale of Milk and Cost of Milk Marketing

Tables 7.3 and 7.4 presented the details on disposal of milk by selected households. It was observed that on an average, except in case of local cow milk use by small milk producers, more than 70 percent of milk produced had been disposed by the selected households of both groups. The range of milk sale was found to be 70-93 per cent of total. However, across the milch animal holding group, there are variations. Small milk producers have used more share of milk for the home purpose and used for preparation of further value added products, such as ghee, curd, etc. If we look at the disposal pattern of milk, it can be observed that all the DCS households had sold milk to dairy cooperative societies, where they got weekly payment. Few households from large milk producer group had sold small quantum of milk to consumers on month payment basis. The distance of dairy societies was quite closer and thus very meagre cost was incurred on transportation. The milk rate realised by milk producer was around Rs. 25-27/litre in case of cow milk and around Rs. 39/litre in case of buffalo milk.

The opposite picture can be seen in case of sale of milk by the NDCS households. It can be seen from the table that the NDCS households opted to sale their milk to private milk plant which was maximum 6 kms away from the households for which they incurred around Rs. 6-14 cost as transportation cost. The payment was provided as per requirement and milk rate realised was around same as in case of DCS members. Few of NDCS members have sold the milk to private vendor/shop/middlemen as well as to catering services. Thus, it is clear that unlike of almost 100% sale to dairy cooperative society by DCS households, NDCS households had to sale to variety of customers, where in rates are relatively lower and other facilities may not have available as like in dairy cooperatives.

Table 7.3: Sale of Milk and Cost of Milk Marketing- DCS Households

Sr. No	Particulars	DCS HH- Sale of Milk and Cost of Milk Marketing											
		Local Cow				Crossbred Cow				Buffalo			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Milk Sold (% to total prod	28.6	74.0	84.5	79.9	89.5	93.2	93.1	92.7	79.9	83.6	92.0	86.9
2	Agencies												
A	**DCS**												
a	Milk Sold (% to total sale)	100	100	97.1	98.2	100	100	100	100	100	100	97.0	98.4
b	Price (Rs./Lit	23.3	27.3	27.1	27.0	24.8	24.4	25.8	25.2	39.6	37.6	40.0	39.1
c	Payment (%)												
	Daily	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Weekly	100	100	100	100	100	100	100	100	100	100	100	100
	Monthly	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Half Monthly	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d	Distance (Kms)	0.1	0.2	0.2	0.2	0.1	0.4	0.1	0.2	0.4	0.5	1.1	0.7
e	Transport Cost (Rs.)	0.0	1.4	0.3	0.8	0.0	1.3	0.4	0.6	1.4	3.9	5.5	3.5
B	**Consumer**												
	Milk Sold (% to total sale)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.6
	Price Rs./Lit	-	-	-	-	-	-	-	-	-	-	50.0	50.0
	Payment (%)	-	-	-	-	-	-	-	-	-	-	-	-
	Daily	-	-	-	-	-	-	-	-	-	-	-	-
	Weekly	-	-	-	-	-	-	-	-	-	-	-	-
	Monthly	-	-	-	-	-	-	-	-	-	-	100	100
	Half Monthly	-	-	-	-	-	-	-	-	-	-	-	-
	Distance (Kms)	-	-	-	-	-	-	-	-	-	-	0.2	0.2
	Transport Cost (Rs.)	-	-	-	-	-	-	-	-	-	-	0.0	0.0
C	**Private vendor /Middlemen**			-	-	-	-	-	-	-	-	-	-
	Milk Sold (% to total sale)	0.00	0.00	2.89	1.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Price Rs./Lit	0.0	0.0	26.0	26.0	-	-	-	-	-	-	-	-

	Payment (%)												
	Daily	-	-	0.0	0.0	-	-	-	-	-	-	-	-
	Weekly	-	-	0.0	0.0	-	-	-	-	-	-	-	-
	Monthly	-	-	100	100	-	-	-	-	-	-	-	-
	Half Monthly												
	Distance (Kms)	-	-	0.3	0.0	-	-	-	-	-	-	-	-
	Transport Cost (Rs.)	-	-	0.0	0.0	-	-	-	-	-	-	-	-
D	**Sweet Shop/ Catering Services/etc**												
	Milk Sold (% to total sale)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Price Rs./Lit	-	-	-	-	-	-	-	-	-	-	-	-
	Payment	-	-	-	-	-	-	-	-	-	-	-	-
	Daily	-	-	-	-	-	-	-	-	-	-	-	-
	Weekly	-	-	-	-	-	-	-	-	-	-	-	-
	Monthly	-	-	-	-	-	-	-	-	-	-	-	-
	Half Monthly												
	Distance (Kms)	-	-	-	-	-	-	-	-	-	-	-	-
	Transport Cost (Rs.)	-	-	-	-	-	-	-	-	-	-	-	-
E	**Private Milk Plants**												
	Milk Sold (% to total sale)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Price Rs./Lit	-	-	-	-	-	-	-	-	-	-	-	-
	Payment	-	-	-	-	-	-	-	-	-	-	-	-
	Daily	-	-	-	-	-	-	-	-	-	-	-	-
	Weekly	-	-	-	-	-	-	-	-	-	-	-	-
	Monthly	-	-	-	-	-	-	-	-	-	-	-	-
	Half Monthly												
	Distance (Kms)	-	-	-	-	-	-	-	-	-	-	-	-
	Transport Cost (Rs.)												
F	**Catering Services**												
	Milk Sold (% to total sale)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Price Rs./Lit	-	-	-	-	-	-	-	-	-	-	-	-
	Payment	-	-	-	-	-	-	-	-	-	-	-	-
	Daily	-	-	-	-	-	-	-	-	-	-	-	-
	Weekly	-	-	-	-	-	-	-	-	-	-	-	-
	Monthly	-	-	-	-	-	-	-	-	-	-	-	-
	Half Monthly												
	Distance kms	-	-	-	-	-	-	-	-	-	-	-	-
	Transport Cost (Rs.)	-	-	-	-	-	-	-	-	-	-	-	-
G	members did not sale milk to dairy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	reasons	-	-	-	-	-	-	-	-	-	-	-	-

Source: Field survey data.

Thus, in case of NDCS households, marketing channels remains traditions and more than 89 per cent of marketable surplus in milk is sold through informal channels, especially private traders in unorganised sector and direct sale to consumer. This is in sharp contrast to sale of milk by DCS households to dairy cooperatives.

Table 7.4: Sale of Milk and Cost of Milk Marketing- NDCS Households

Sr. No	Particulars	NDCS HH- Sale of Milk and Cost of Milk Marketing											
		Local Cow				Crossbred Cow				Buffalo			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Milk Sold (% to total prod	79.9	74.3	78.6	78.3	70.5	78.6	81.7	79.4	71.9	81.7	91.5	85.5
2	Agencies												
A	**DCS**												
a	Milk Sold (% to total sale)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
b	Price (Rs./Lit	-	-	-	-	-	-	-	-	-	-	-	-
c	Payment (%)	-	-	-	-	-	-	-	-	-	-	-	-
	Daily	-	-	-	-	-	-	-	-	-	-	-	-
	Weekly	-	-	-	-	-	-	-	-	-	-	-	-
	Monthly	-	-	-	-	-	-	-	-	-	-	-	-
	Half Monthly	-	-	-	-	-	-	-	-	-	-	-	-
d	Distance (Kms)	-	-	-	-	-	-	-	-	-	-	-	-
e	Transport Cost (Rs.)	-	-	-	-	-	-	-	-	-	-	-	-
B	**Consumer**												
	Milk Sold (% to total sale)	12.6	0.0	2.0	3.8	0.0	39.4	12.1	17.6	25.1	8.5	16.5	14.7
	Price Rs./Lit	25.0	0.0	40.0	32.5	0.0	32.0	35.0	33.5	41.0	47.1	41.2	42.3
	Payment (%)	-	-	-	-	-	-	-	-	-	-	-	-
	Daily	0	0	0	0	0	0	0	0	10	0	0	2.7
	Weekly	0	0	0	0	0	0	0	0	10	0	0	2.7
	Monthly	100	0	100	100	0	100	0	50	80	100	100	94.6
	Half Monthly	0	0	0	0	0	0	100	50	0	0	0	0.0
	Distance (Kms)	0.0	0.0	0.0	0.0	0.0	3.0	2.0	2.5	2.2	11.0	1.8	3.6
	Transport Cost (Rs.)	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	8.9	20.7	5.0	11.0
C	**Private Vendor Middlemen**			-	-	-	-	-	-	-	-	-	-
	Milk Sold (% to total sale)	5.24	5.45	0.00	1.60	22.58	0.00	0.00	2.67	11.11	19.98	17.54	17.66
	Price Rs./Lit	31.5	25.0	0.0	29.3	20.0	0.0	0.0	20.0	31.2	39.2	25.8	34.0
	Payment (%)												
	Daily	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Weekly	50.0	100	0.0	66.7	0.0	0.0	0.0	0.0	20.0	50.0	16.7	34.8
	Monthly	50.0	0.0	0.0	33.3	100	0.0	0.0	100	80.0	50.0	83.3	65.2
	Half Monthly	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Distance (Kms)	1.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.80	4.75	0.1	3.11
	Transport Cost (Rs.)	2.5	5.0	0.0	3.3	**0.0**	0.0	0.0	0.0	6.0	10.0	8.0	8.5
D	**Sweet Shop/ Catering Services/etc**												
	Milk Sold (% to total sale)	0.0	0.0	2.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.8
	Price Rs./Lit	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	40.0
	Payment	-	-	-	-	-	-	-	-	-	-	-	-
	Daily	-	-	0.0	0.0	-	-	-	-	-	-	0.0	0.0
	Weekly	-	-	0.0	0.0	-	-	-	-	-	-	0.0	0.0

	Monthly	-	-	100	100	-	-	-	-	-	-	100	100
	Half Monthly	-	-	0.0	0.0	-	-	-	-	-	-	0.0	0.0
	Distance (Kms)	0	0	5	5	0	0	0	0	0	0	5	5
	Transport Cost (Rs.)	0.0	0.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0
E	**Private Milk Plants**												
	Milk Sold (% to total sale)	79.6	90.9	95.4	91.9	77.4	60.6	87.9	79.8	63.8	68.9	64.5	65.9
	Price Rs./Lit	-	-	-	-	-	-	-	-	-	-	-	-
	Payment	-	-	-	-	-	-	-	-	-	-	-	-
	Daily	16.7	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	5.6	2.7
	Weekly	50.0	70.0	73.7	71.2	50.0	33.3	88.9	71.4	88.9	79.5	66.7	74.8
	Monthly	33.3	30.0	26.3	27.4	0.0	66.7	11.1	21.4	5.6	20.5	27.8	21.6
	Half Monthly	0.0	0.0	0.0	0.0	50.0	0.0	0.0	7.1	5.6	0.0	0.0	0.9
	Distance (Kms)	1.4	1.7	1.8	1.7	3.0	6.0	2.1	3.1	1.95	2.45	2.05	2.17
	Transport Cost (Rs.)	**11.7**	7.9	6.4	7.6	10.0	10.0	13.3	12.0	8.2	6.9	13.9	9.9
F	**Catering Services**												
	Milk Sold (% to total sale)	2.6	3.6	0.0	0.9	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.9
	Price Rs./Lit	25.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	33.6	0.0	33.6
	Payment												
	Daily	0.0	0.0	-	0.0	-	-	-	-	-	33.3	-	33.3
	Weekly	100	100	-	100	-	-	-	-	-	33.3	-	33.3
	Monthly	0.0	0.0	-	0.0	-	-	-	-	-	33.3	-	33.3
	Half Monthly	0.0	0.0	-	0.0	-	-	-	-	-	0.0	-	0.0
	Distance (Kms)	2	2	0	2	0.0	0.0	0.0	0.0	0.0	1.14	0.0	1.1
	Transport Cost (Rs.)	0.0	0.0	0.0	0.0	0	0	0	0	0	11.4	0.0	11.4

Source: Field survey data.

Handling of Income from Dairying

As dairy activities are carried out mostly at household level and it has been observed that most of labour engaged in dairy activities were family labour, it is expected the dominance of female member in feeding the animals as well as handling the income of dairy. It can be seen from the Table 7.5 that only in case of sale of dairy products, income was handled by the female members while in case of sale of milk and dung, dominance of male was observed. However, sometime both of them handle it. While spending the income received from the sale of milk, priority is given to animal feed and health and then to meet family expenditure, whereas income which received from sale of

milk products and dung, vice versa, i.e. family priorities taken accounts first and then animal health and feed.

Table 7.5: Details about Income received from Dairying and its use

Sr. No	Particulars	Who receives the income				Income spent on (share in approx.)					
						Family Exp			Animal Feed & Health		
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	SMP	MMP	LMP
I	**DCS**										
A	*Income from dairy (sale of milk)*										
1	Male	35.0	27.5	50.0	37.5	43.6	41.3	40.3	56.5	58.8	60.3
2	Female	35.0	40.0	10.0	28.3						
3	Both	30.0	32.5	40.0	34.2						
B	*Income from sale of products*										
1	Male	27.5	45.0	30.0	34.2	66.8	56.3	40.0	33.3	43.8	60.0
2	Female	50.0	35.0	22.5	35.8						
3	Both	22.5	20.0	47.5	30.0						
C	Income sale of dung /FYM										
1	Male	37.5	40.0	42.5	40.0	64.8	58.3	49.5	35.3	41.7	50.5
2	Female	40.0	35.0	30.0	35.0						
3	Both	20.0	25.0	27.5	24.2						
II	**NDCS**										
A	*Income from dairy (sale of milk)*										
1	Male	50.0	50.0	47.5	49.2	42.5	43.3	43.6	57.5	56.8	56.4
2	Female	17.5	22.5	27.5	22.5						
3	Both	32.5	27.5	25.0	28.3						
B	Income from sale of products										
1	Male	30.0	35.0	32.5	32.5	68.8	68.8	70.8	31.3	31.3	29.3
2	Female	35.0	27.5	40.0	34.2						
3	Both	35.0	37.5	27.5	33.3						
C	Income sale of dung /FYM										
1	Male	50.0	50.0	47.5	49.2	45.8	47.5	50.3	54.3	52.5	49.8
2	Female	17.5	20.0	27.5	21.7						
3	Both	32.5	30.0	25.0	29.2						

Source: Field Survey Data.

7.4 Problems in Milk Marketing:

In spite of various developments in dairy sector over the period of time, milk marketing in India remains grossly primitive compared to its western counterparts. It begins with the largely unregulated sector, which handles the majority of the milk production, providing ample opportunity for malpractice. Some of the common forms of malpractice include false measurements in the selling of milk and adulteration of milk. Another major impediment to an efficient marketing system is the presence of numerous intermediaries, which take advantage of producers' weakness. In many cases, intermediaries dictate the price by

advancing a loan to the milk producers. Producers' bargaining power is also limited because of perishiability and bulkiness of milk. In addition, the lack of proper infrastructure for transportation, distribution, and storage also makes milk procurement difficult.

On the other hand, it will be impossible for most producers to market their milk without the presence of these market intermediaries. The Cooperative Societies Act continues to be restrictive rather than enabling, even though the Anand Pattern milk producers' co-operatives have emerged as the most stunningly effective institutional model for milk marketing. Political and bureaucratic interference, delayed payments to the primary producers, and the decision-making power of the administrators over marketing of milk and milk products by the district-level union and the state-level federation also adversely affect the growth of dairy co-operatives. The cooperative laws in general have inhibited the emergence of true leadership, professional management, and democratic functioning of the co-operatives.

7.5 Chapter Summary:

The chapter presents the details on milk consumption and marketable surplus at sample households. As expected, small milk producers consumed larger proportion of milk produced followed by medium milk producer and the lowest was in case of large milk producers. In fact, across the species, selected households had preferred to consume and process the milk of local cows, followed by buffaloes and cross bread cows. Thus buffalo and cross bred cow milk was sold outside and local cow milk was mostly consumed at the home. While in case of NCDS households, they preferred cross bred cow milk for consumption. On an average, except in case of local cow milk use by small milk producers, more than 70 percent of milk produced had been disposed by the selected households of both groups. The range of milk sale was found to be 70-93 per cent of total. However, across the milch animal holding

group, there are variations. Small milk producers have used more share of milk used for the home purpose and used for preparation of further value added products, such as ghee, curd, etc. The disposal pattern indicates that in case of all the DCS households, they had sold milk to dairy cooperative societies and got weekly payment. The distance of dairy societies was quite closer and thus very meagre cost was incurred on transportation. The milk rate realised by the milk producer was around 25-27 in case of cow milk and around Rs. 39 in case of buffalo milk. The NDCS households opted to sale their milk to private milk plant which was maximum 6 kms away from the households for which they incurred around Rs. 6-14 cost as transportation cost. The payment was provided as per requirement and milk rate realised was around same as in case of DCS members. Few of NDCS members have sold the milk to private vendor/shop/middlemen as well as to catering services. Thus, unlike of almost 100% sale to dairy cooperative society by DCS households, NDCS households had to sale to variety of customers, where in rates are relatively lower and other facilities may not have available as like in dairy cooperatives. Thus, in case of NDCS households, marketing channels remains traditions and more than 89 per cent of marketable surplus in milk is sold through informal channels. This is in sharp contrast to sale of milk by DCS households to dairy cooperatives.

The next chapter presents the constraints faced in production and marketing of milk and Suggestions.

Chapter VIII

Constrains faced in Production and Marketing of Milk and Suggestions

8.1 Introduction:

After having discussed about the issues related to marketing of milk, attempt was made to find out the constraints faced by the milk producer in production and marketing of milk as well as sought the suggestions from the milk producers. This chapter also discusses the details on services delivery systems and constraints faced in milk marketing.

8.2 Service Delivery System

Efficient input supply and service delivery determines the success of the dairy activity in particular region, whether provided by the government through its department, by dairy cooperative societies or by the private dairy plant/agent. The performance of the dairy sector is depends on many factors includes input supply (particularly feed) and service provision (veterinary service and Artificial Insemination (AI) or breed) or output services. There is a whole range of services that are needed to enhance the capacity of poor households to exploit the full potential of livestock production. These include health and production services such as clinical care, preventive health and provision of pharmaceutical supplies, feed and fodder supply, artificial insemination, livestock research and extension, and other market services such as credit, livestock insurance, delivery of market information, output marketing and milk collection. Good support services are critical for enhancing livestock productivity and for enabling the poor to gain access to expanding markets. This section reviews the status of livestock service delivery system existing in study area and raises some issues for efficient delivery of these services to

the dairy producer. The details of input and output service delivery experienced by selected households are presented in Tables 8.1 and 8.2.

Table 8.1: Details of Input and Output Service Delivery experienced by DCS households

No	Particulars	Service Provider (% of response) - DCS											
		PDCS				Agent				Private agent			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	**Input Delivery (%)**												
1	**Supply of Cattle Feed**												
	Adequate	96.9	87.9	100.0	94.7	-	-	-	-	87.5	100.0	100.0	96.0
	Inadequate	3.1	12.1	0.0	5.3	-	-	-	-	12.5	0.0	0.0	4.0
	Not Available	0.0	0.0	0.0	0.0	-	-	-	-	0.0	0.0	0.0	0.0
2	**Cattle feed & fodder seed on Credit**												
	Available	87.5	78.1	90.0	85.1	-	-	-	-	100.0	87.5	90.0	92.3
	Not Available	12.5	21.9	10.0	14.9	-	-	-	-	0.0	12.5	10.0	7.7
3	**Cost of cattle feed & mineral mixture**												
	High	62.5	50.0	41.4	51.6	-	-	-	-	100.0	75.0	81.8	85.2
	ok	31.3	34.4	44.8	36.6	-	-	-	-	0.0	25.0	9.1	11.1
	Not Available	6.3	15.6	13.8	11.8	-	-	-	-	0.0	0.0	9.1	3.7
4	**Emergency Veterinary Services (EVS)**												
	Available	96.8	91.4	93.9	93.9	-	-	-	-	100.0	100.0	100.0	100.0
	Not Available	3.2	8.6	6.1	6.1	-	-	-	-	0.0	0.0	0.0	0.0
	Charges for EVS												
	High	31.3	33.3	38.7	34.4	-	-	0.0	0.0	87.5	85.7	57.1	77.3
	Medium	56.3	51.5	48.4	52.1	-	-	100.0	100.0	0.0	14.3	28.6	13.6
	Low	12.5	15.2	12.9	13.5	-	-	0.0	0.0	12.5	0.0	14.3	9.1
	Rs/Visit												
5	**Vaccines**												
	Adequate	95.0	100.0	92.5	95.8	-	-	-	-	-	-	-	-
	Inadequate	2.5	0.0	2.5	1.7	-	-	-	-	-	-	-	-
	Not Available	2.5	0.0	5.0	2.5	-	-	-	-	-	-	-	-
6	**Delivery & applications of quality & requisite quantity of vaccines**												
	Yes	90.0	92.5	85.0	89.2	-	-	-	-	-	-	-	-
	No	10.0	7.5	15.0	10.8	-	-	-	-	-	-	-	-
7	**Semen at the AI centre**												
	Adequate	95.0	97.5	90.0	94.2	-	-	-	-	-	-	-	-
	Inadequate	2.5	2.5	5.0	3.3	-	-	-	-	-	-	-	-
	Not Available	2.5	0.0	5.0	2.5	-	-	-	-	-	-	-	-
8	**Provision of loan in society or govt. for Purchasing cattle**												
	Adequate	33.3	30.0	15.0	26.1	-	-	-	-	100.0	-	-	100.0
	Inadequate	5.1	10.0	17.5	10.9	-	-	-	-	0.0	-	-	0.0
	Not Available	61.5	60.0	67.5	63.0	-	-	-	-	0.0	-	-	0.0

9	**Charges for insurance**												
	Very high	15.0	10.0	10.0	11.7	-	-	-	-	-	-	-	-
	High	20.0	25.0	30.0	25.0	-	-	-	-	-	-	-	-
	Medium	65.0	65.0	60.0	63.3	-	-	-	-	-	-	-	-
10	**Technical Guidance**												
	Available	47.5	37.5	42.5	42.5	-	-	-	-	-	-	-	-
	Not available	52.5	62.5	57.5	57.5	-	-	-	-	-	-	-	-
B	**OUTPUT DELIVERY**												
1	Milk Price(Rs./lit)												
	Adequate	52.5	25.0	37.5	38.3	-	-	-	-	-	-	-	-
	Low	47.5	75.0	62.5	61.7	-	-	-	-	-	-	-	-
2	**Payment of Milk**												
	Immediate	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
	Within 2 days	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
	Within 15 days	100.0	100.0	100.0	100.0	-	-	-	-	-	-	-	-
	More than 15 days	0.0	0.0	0.0	0.0								
3	**incentives or bonus for supplying milk**												
	Adequate	75.0	62.5	57.5	65.0	-	-	-	-	-	-	-	-
	Low	25.0	37.5	42.5	35.0	-	-	-	-	-	-	-	-
	Not Available	0.0	0.0	0.0	0.0								
4	**Acceptability cross-bred cow milk in family**												
	Poor	12.5	0.0	5.0	5.8	-	-	-	-	-	-	-	-
	Acceptable	72.5	67.5	67.5	69.2	-	-	-	-	-	-	-	-
	Not acceptable	15.0	32.5	27.5	25.0	-	-	-	-	-	-	-	-
5	**Advance payment for milk by society/ vendors**												
	Available	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Not available	100.0	100.0	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Field Survey Data.

It can be seen from the Table 8.1 that DCS households recorded the adequate supply of cattle feed which was also made available on credit by cooperative society, however most of households mentioned that cost of cattle feed and miner mixtures was high. Though the emergency veterinary services were available, the EVS charges of dairy cooperative were medium as compared to high charges by private agents. Not only the availability of vaccines and semen at the AI centre at dairy cooperatives as well as at private dairy agents was inadequate but also the delivery & applications of quality & requisite quantity of vaccines was very poor. It was observed that there was no provision of loan in society or government for the purchase of cattle and no technical guidance was available to them. Most of the households mentioned that premium for insurance was medium, however, very few dairy producer had taken animal insurance.

In case of output delivery, DCS households mentioned that the milk price received by them was adequate and they get fortnightly payment. Two third of households mentioned that incentives or bonus for supplying milk were adequate, while one fourth of selected households mentioned that cross bred cow milk is not acceptable in family. Dairy cooperatives do not have system of advance payment for milk while agent or private agency has provided this facility in selected area.

In case of NDCS households, these households did not have facility to get any support from the dairy cooperatives existing in their area, they are fully depend on the agent or private agency to get support for input and output service systems. It can be seen from the Table 8.2 that though the supply of cattle feed and fodder was adequate with agents and private agency, which was available on credit for half of the households. Almost three fourth of households mentioned about non availability of emergency veterinary services and whatever is available was availed at very high charges. The poor availability of vaccines and semen was also noted by NDCS households. More than 90 per cent of households mentioned that charges for premium are very high and no technical support is available to them. As expected, three fourth of selected NDCS households mentioned that milk price received by them are low. The two third of households received payment after 15 days while one third received within 15 days time after sale of milk. Almost all the selected households mentioned about no incentives or bonus for supplying milk and no advance payment was provided by vendors/private agency. Three fourth of selected households mentioned about non acceptability of cross bred cow's milk for home consumption.

Table 8.2: Details of Input and Output Service Delivery experienced by NDCS households

No	Particulars	Service Provider (% of response) - NDCS											
		PDCS				Agent				Private agent			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
A	**Input Delivery (%)**												
1	**Supply of Cattle Feed**												
	Adequate	-	-	-	-	-	-	-	-	72.5	77.5	57.5	69.2
	Inadequate	-	-	-	-	-	-	-	-	17.5	15.0	15.0	15.8
	Not Available	-	-	-	-	-	-	-	-	10.0	7.5	27.5	15.0
2	**Cattle feed & fodder seed on Credit**	-	-	-	-								
	Available	-	-	-	-	0.0	-	100.0	100.0	53.8	50.0	56.4	53.4
	Not Available	-	-	-	-	100.0	-	0.0	100.0	46.2	50.0	43.6	46.6
3	**Cost of cattle feed & mineral mixture**	-	-	-	-								
	High	-	-	-	-	-	-	-	-	40.0	55.0	52.5	49.2
	ok	-	-	-	-	-	-	-	-	7.5	10.0	2.5	6.7
	Not Available	-	-	-	-	-	-	-	-	52.5	35.0	45.0	44.2
4	**Emergency Veterinary Services (EVS)**	-	-	-	-								
	Available	-	-	-	-	-	-	-	-	27.5	30.0	20.0	25.8
	Not Available	-	-	-	-	-	-	-	-	72.5	70.0	80.0	74.2
	Charges for EVS	-	-	-	-								
	High	-	-	-	-	-	50.0	100.0	80.0	72.5	76.3	81.1	76.5
	Medium	-	-	-	-	-	0.0	0.0	0.0	25.0	23.7	16.2	21.7
	Low	-	-	-	-	-	50.0	0.0	20.0	2.5	0.0	2.7	1.7
	Rs/Visit	-	-	-	-								
5	**Vaccines**	-	-	-	-								
	Adequate	-	-	-	-	0.0	12.5	22.2	14.3	16.7	21.9	16.1	18.2
	Inadequate	-	-	-	-	75.0	62.5	33.3	52.4	44.4	31.3	22.6	33.3
	Not Available	-	-	-	-	25.0	25.0	44.4	33.3	38.9	46.9	61.3	48.5
6	**Delivery & applications of quality & requisite quantity of vaccines**	-	-	-	-								
	Yes	-	-	-	-	0.0	0.0	20.0	6.3	34.3	26.5	14.3	25.0
	No	-	-	-	-	100.0	100.0	80.0	93.8	65.7	73.5	85.7	75.0
7	**Semen at the AI centre**	-	-	-	-								
	Adequate	-	-	-	-	0.0	12.5	10.0	8.3	20.6	12.5	13.3	15.6
	Inadequate	-	-	-	-	100.0	87.5	90.0	91.7	26.5	9.4	10.0	15.6
	Not Available	-	-	-	-	0.0	0.0	0.0	0.0	52.9	78.1	76.7	68.8
8	**Provision of loan in society or govt. for Purchasing cattle**	-	-	-	-								
	Adequate	-	-	-	-	0.0	0.0	0.0	0.0	3.4	8.3	0.0	3.8
	Inadequate	-	-	-	-	0.0	0.0	0.0	0.0	6.9	16.7	3.8	8.9
	Not Available	-	-	-	-	100.0	100.0	100.0	100.0	89.7	75.0	96.2	87.3
9	**Charges for insurance**	-	-	-	-								
	Very high	-	-	-	-	88.9	91.7	66.7	81.8	32.3	32.1	39.3	34.5
	High	-	-	-	-	11.1	8.3	33.3	18.2	58.1	64.3	46.4	56.3
	Medium	-	-	-	-	0.0	0.0	0.0	0.0	9.7	3.6	14.3	9.2
10	**Technical Guidance**	-	-	-	-								
	Available	-	-	-	-	-	-	-	-	7.5	12.5	17.5	12.5
	Not available	-	-	-	-	-	-	-	-	92.5	87.5	82.5	87.5

B	OUTPUT DELIVERY	-	-	-	-								
1	Milk Price(Rs./lit)	-	-	-	-								
	Adequate	-	-	-	-	0.0	0.0	0.0	0.0	18.4	28.9	23.7	23.7
	Low	-	-	-	-	100.0	100.0	100.0	100.0	81.6	71.1	76.3	76.3
2	**Payment of Milk**	-	-	-	-								
	Immediate	-	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
	Within 2 days	-	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
	Within 15 days	-	-	-	-	33.3	33.3	-	33.3	39.5	32.4	28.2	33.3
	More than 15 days					66.7	66.7	-	66.7	60.5	67.6	71.8	66.7
3	**incentives or bonus for supplying milk**	-	-	-	-								
	Adequate	-	-	-	-	0.0	0.0	20.0	6.3	0.0	0.0	0.0	0.0
	Low	-	-	-	-	0.0	0.0	20.0	6.3	5.7	5.9	0.0	3.8
	Not Available					100.0	100.0	60.0	87.5	94.3	94.1	100.0	96.2
4	**Acceptability cross-bred cow milk in family**	-	-	-	-								
	Poor	-	-	-	-	-	-	-	-	15.0	10.0	2.5	9.2
	Acceptable	-	-	-	-	-	-	-	-	17.5	20.0	15.0	17.5
	Not acceptable	-	-	-	-	-	-	-	-	67.5	70.0	82.5	73.3
5	**Advance payment for milk by society/ vendors**	-	-	-	-								
	Available	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0
	Not available	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0

Source: Field Survey Data.

8.3 Infrastructural Constraints:

The details on infrastructural constraints faced by the selected household are presented in Table 8.3. It can be seen from the table that in case of DCS households, the four major infrastructural constraints were unavailability of emergency veterinary services, infrequent visit of veterinary staff, unavailability of cattle feed and fodder seed on credit, and low average milk yield of the milk animals. The underlying causes behind the major infrastructural constraints faced by NDCS were infrequent visit of veterinary staff, lack of training facilities, unavailability of emergency veterinary services and lack of improved equipments.

Table 8.3: Details on Infrastructural Constraints faced by Selected Households

No.	Particulars	Infrastructural Constraints (IC) (% to total responses)							
		DCS households				NDCS households			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Lack of improved equipments								
	Never	45.0	32.5	47.5	41.7	30.0	27.5	35.0	30.8
	Sometime	22.5	35.0	27.5	28.3	20.0	30.0	15.0	21.7
	Always	32.5	32.5	25.0	30.0	50.0	42.5	50.0	47.5
2	Irregular & inadequate supply of cattle feed								
	Never	52.5	47.5	42.5	47.5	42.5	35.0	40.0	39.2
	Sometime	30.0	32.5	37.5	33.3	27.5	40.0	30.0	32.5
	Always	17.5	20.0	20.0	19.2	30.0	25.0	30.0	28.3
3	Unavailability of emergency veterinary services								
	Never	20.0	40.0	40.0	33.3	20.0	25.0	20.0	21.7
	Sometime	32.5	27.5	32.5	30.8	20.0	27.5	20.0	22.5
	Always	47.5	32.5	27.5	35.8	60.0	47.5	60.0	55.8
4	Infrequent visit of veterinary staff								
	Never	52.5	27.5	35.0	38.3	7.5	15.0	7.5	10.0
	Sometime	37.5	35.0	25.0	32.5	20.0	12.5	10.0	14.2
	Always	10.0	37.5	40.0	29.2	72.5	72.5	82.5	75.8
5	Unavailability of vaccines								
	Never	55.0	55.0	45.0	51.7	37.5	45.0	25.0	35.8
	Sometime	35.0	25.0	37.5	32.5	15.0	20.0	22.5	19.2
	Always	10.0	20.0	17.5	15.8	47.5	35.0	52.5	45.0
6	Occasional Availability of semen at the AI centre								
	Never	15.0	57.5	57.5	43.3	27.5	45.0	32.5	35.0
	Sometime	17.5	27.5	32.5	25.8	40.0	30.0	25.0	31.7
	Always	67.5	15.0	10.0	30.8	32.5	25.0	42.5	33.3
7	Lack of training facilities								
	Never	35.0	20.0	20.0	25.0	12.5	27.5	15.0	18.3
	Sometime	57.5	35.0	22.5	38.3	25.0	10.0	25.0	20.0
	Always	7.5	45.0	57.5	36.7	62.5	62.5	60.0	61.7
8	Unsuitability of the time of delivery of milk during winters due to bitter cold in early hours of the day								
	Never	35.0	35.0	52.5	40.8	45.0	47.5	47.5	46.7
	Sometime	57.5	32.5	37.5	42.5	45.0	37.5	45.0	42.5
	Always	7.5	32.5	10.0	16.7	10.0	15.0	7.5	10.8
9	Unavailability of green/dry fodder throughout the year								
	Never	42.5	40.0	17.5	33.3	32.5	22.5	37.5	30.8
	Sometime	30.0	35.0	47.5	37.5	40.0	52.5	47.5	46.7
	Always	27.5	25.0	35.0	29.2	27.5	25.0	15.0	22.5
10	Unavailability of cattle feed and fodder seed on credit								
	Never	37.5	40.0	35.0	37.5	47.5	30.0	37.5	38.3
	Sometime	47.5	37.5	40.0	41.7	22.5	27.5	40.0	30.0
	Always	15.0	22.5	25.0	20.8	30.0	42.5	22.5	31.7
11	Low average milk yield of the milk animals								
	Never	45.0	32.5	40.0	39.2	30.0	27.5	40.0	32.5
	Sometime	45.0	42.5	32.5	40.0	40.0	45.0	45.0	43.3
	Always	10.0	25.0	27.5	20.8	30.0	27.5	15.0	24.2

Source: Field Survey Data.

8.4 Economic Constraints:

The details on economic constraints faced by the selected household are presented in Table 8.4. It can be seen from the table that in case of DCS households, the four major economic constraints were low price of milk offered, high cost of fodder seed, high cost f cattle feed and miner mixtures and high charges of emergency veterinary services. The underlying causes behind the major economic constraints faced by NDCS were high cost of veterinary services, high charges of emergency veterinary services, high cost of cattle feed and mineral mixtures, low price of milk offered, high cost of fodder seed, low provision of loan in society or government for purchasing of cattle and low incentives or bonus for supplying milk and high charges for insurance.

8.5 Marketing Constraints:

The details on economic constraints faced by the selected household are presented in Table 8.5. It can be seen from the table the two main marketing constraints faced by the DCS households were less knowledge about marketing strategies and low risk taking behaviour. The NDCS households has faced four marketing constraints viz., less knowledge about marketing strategies, no or less advance payment for milk by society/vendors, lack of time for marketing and low risk taking behaviour.

Table 8.4: Details on Economic Constraints faced by Selected Households

No.	Particulars	Economic Constraints (EC) (% to total responses)							
		DCS households				NDCS households			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	High cost of fodder seed								
	Never	15.0	17.5	20.0	17.5	20.0	30.0	32.5	27.5
	Sometime	20.0	25.0	25.0	23.3	15.0	17.5	5.0	12.5
	Always	65.0	57.5	55.0	59.2	65.0	52.5	62.5	60.0
2	Delay in payment of milk								
	Never	45.0	45.0	60.0	50.0	45.0	40.0	37.5	40.8
	Sometime	30.0	27.5	27.5	28.3	17.5	30.0	20.0	22.5
	Always	25.0	27.5	12.5	21.7	37.5	30.0	42.5	36.7
3	Low price of milk offered								
	Never	10.0	12.5	10.0	10.8	10.0	10.0	10.0	10.0
	Sometime	20.0	20.0	25.0	21.7	30.0	20.0	17.5	22.5
	Always	70.0	67.5	65.0	67.5	60.0	70.0	72.5	67.5
4	High cost of cross bred cow								
	Never	40.0	30.0	30.0	33.3	37.5	35.0	32.5	35.0
	Sometime	22.5	30.0	30.0	27.5	25.0	22.5	17.5	21.7
	Always	37.5	40.0	40.0	39.2	37.5	42.5	50.0	43.3
5	High cost of veterinary medicines								
	Never	15.0	22.5	35.0	24.2	0.0	15.0	2.5	5.8
	Sometime	37.5	35.0	32.5	35.0	15.0	20.0	17.5	17.5
	Always	47.5	42.5	32.5	40.8	85.0	65.0	80.0	76.7
6	High cost of cattle feed and mineral mixture								
	Never	12.5	30.0	20.0	20.8	25.0	7.5	20.0	17.5
	Sometime	25.0	22.5	20.0	22.5	17.5	22.5	7.5	15.8
	Always	62.5	47.5	60.0	56.7	57.5	70.0	72.5	66.7
7	Low provision of loan in society or govt. for purchasing cattle								
	Never	30.0	35.0	45.0	36.7	32.5	42.5	32.5	35.8
	Sometime	32.5	30.0	25.0	29.2	12.5	22.5	15.0	16.7
	Always	37.5	35.0	30.0	34.2	55.0	35.0	52.5	47.5
8	Low incentives or bonus for supplying milk								
	Never	32.5	47.5	50.0	43.3	32.5	25.0	42.5	33.3
	Sometime	35.0	27.5	30.0	30.8	25.0	15.0	17.5	19.2
	Always	32.5	25.0	20.0	25.8	42.5	60.0	40.0	47.5
9	High charges of emergency veterinary services								
	Never	22.5	30.0	32.5	28.3	7.5	12.5	17.5	12.5
	Sometime	25.0	35.0	27.5	29.2	22.5	25.0	10.0	19.2
	Always	52.5	35.0	40.0	42.5	70.0	62.5	72.5	68.3
10	High charges for insurance								
	Never	40.0	47.5	50.0	45.8	45.0	45.0	47.5	45.8
	Sometime	27.5	20.0	10.0	19.2	12.5	15.0	10.0	12.5
	Always	32.5	32.5	40.0	35.0	42.5	40.0	42.5	41.7

Source: Field Survey Data.

Table 8.5: Details on Marketing Constraints faced by Selected Households

No.	Constraints	Marketing Constraints (MC) (% to total responses)							
		DCS households				NDCS households			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Irregular sell of milk								
	Never	60.0	65.0	72.5	65.8	57.5	50.0	55.0	54.2
	Sometime	32.5	25.0	17.5	25.0	10.0	22.5	12.5	15.0
	Always	7.5	10.0	10.0	9.2	32.5	27.5	32.5	30.8
2	Lack of time for marketing								
	Never	40.0	47.5	40.0	42.5	32.5	20.0	30.0	27.5
	Sometime	30.0	30.0	30.0	30.0	25.0	30.0	17.5	24.2
	Always	30.0	22.5	30.0	27.5	42.5	50.0	52.5	48.3
3	Less knowledge about marketing strategies								
	Never	10.0	20.0	20.0	16.7	17.5	22.5	12.5	17.5
	Sometime	35.0	35.0	20.0	30.0	12.5	15.0	5.0	10.8
	Always	55.0	45.0	60.0	53.3	70.0	62.5	82.5	71.7
4	Low risk taking behaviour								
	Never	25.0	35.0	45.0	35.0	32.5	32.5	30.0	31.7
	Sometime	32.5	27.5	17.5	25.8	22.5	27.5	17.5	22.5
	Always	42.5	37.5	37.5	39.2	45.0	40.0	52.5	45.8
5	No or less advance payment for milk by society/venders								
	Never	45.0	40.0	42.5	42.5	15.0	32.5	20.0	22.5
	Sometime	22.5	32.5	25.0	26.7	17.5	27.5	10.0	18.3
	Always	32.5	27.5	32.5	30.8	67.5	40.0	70.0	59.2
6	Inability to market for value added products								
	Never	52.5	62.5	47.5	54.2	37.5	42.5	42.5	40.8
	Sometime	27.5	27.5	35.0	30.0	25.0	30.0	15.0	23.3
	Always	20.0	10.0	17.5	15.8	37.5	27.5	42.5	35.8

Source: Field Survey Data.

8.6 Technical Constraints:

The details on technical constraints faced by the selected household are presented in Table 8.6. It can be seen from the table the two main marketing constraints faced by the DCS households were less knowledge about marketing strategies and low risk taking behaviour. The NDCS households has faced four marketing constraints viz., less knowledge about marketing strategies, no or less advance payment for milk by society/vendors, lack of time for marketing and low risk taking behaviour.

Table 8.6: Details on Technical Constraints faced by Selected Households

No.	Constraints	Technical Constraints (TC) (% to total responses)							
		DCS households				NDCS households			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Lack of technical guidance								
	Never	17.5	20.0	17.5	18.3	7.5	15.0	10.0	10.8
	Sometime	20.0	25.0	27.5	24.2	25.0	27.5	10.0	20.8
	Always	62.5	55.0	55.0	57.5	67.5	57.5	80.0	68.3
2	Unavailability of high genetic merit bull								
	Never	32.5	42.5	42.5	39.2	25.0	35.0	37.5	32.5
	Sometime	40.0	35.0	30.0	35.0	37.5	35.0	22.5	31.7
	Always	27.5	22.5	27.5	25.8	37.5	30.0	40.0	35.8
3	Poor conception rate through artificial insemination								
	Never	37.5	27.5	35.0	33.3	17.5	32.5	32.5	27.5
	Sometime	35.0	50.0	37.5	40.8	45.0	27.5	17.5	30.0
	Always	27.5	22.5	27.5	25.8	37.5	40.0	50.0	42.5
4	Poor knowledge about Feeding and health care								
	Never	7.5	17.5	17.5	14.2	17.5	15.0	15.0	15.8
	Sometime	40.0	27.5	35.0	34.2	25.0	35.0	12.5	24.2
	Always	52.5	55.0	47.5	51.7	57.5	50.0	72.5	60.0
5	Lack of knowledge about cheap & scientific housing of animal								
	Never	22.5	22.5	22.5	22.5	27.5	15.0	17.5	20.0
	Sometime	40.0	30.0	42.5	37.5	30.0	42.5	17.5	30.0
	Always	37.5	47.5	35.0	40.0	42.5	42.5	65.0	50.0

Source: Field Survey Data.

8.7 Socio-Psychological Constraints:

The details on socio-psychological constraints faced by the selected household are presented in Table 8.7. It can be seen from the table the two main socio-psychological constraints reported by DCS as well as NDCS households were lack of purchasing power and lower socio-economic conditions. Lack of time due to busy in domestic/agricultural work was another problems faced by them.

Table 8.7: Details on Socio-Psychological Constraints faced by Selected Households

No.	Constraints	Socio-Psychological Constraints (SC) (% to total responses)							
		DCS households				NDCS households			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Lower socio- economic conditions								
	Never	32.5	20.0	47.5	33.3	27.5	27.5	17.5	24.2
	Sometime	27.5	32.5	25.0	28.3	35.0	25.0	22.5	27.5
	Always	40.0	47.5	27.5	38.3	37.5	47.5	60.0	48.3
2	Lack of purchasing power								
	Never	15.0	10.0	20.0	15.0	7.5	10.0	2.5	6.7
	Sometime	30.0	45.0	35.0	36.7	40.0	35.0	25.0	33.3
	Always	55.0	45.0	45.0	48.3	52.5	55.0	72.5	60.0
3	Lack of time due to busy in domestic/ agricultural work								
	Never	15.0	32.5	27.5	25.0	32.5	32.5	25.0	30.0
	Sometime	60.0	47.5	32.5	46.7	40.0	32.5	37.5	36.7
	Always	25.0	20.0	40.0	28.3	27.5	35.0	37.5	33.3
4	Lack of cooperation and coordination among members								
	Never	37.5	42.5	40.0	40.0	55.0	37.5	37.5	43.3
	Sometime	35.0	45.0	42.5	40.8	25.0	32.5	30.0	29.2
	Always	27.5	12.5	17.5	19.2	20.0	30.0	32.5	27.5
5	Milk producers are meant for influential people								
	Never	40.0	50.0	52.5	47.5	37.5	52.5	30.0	40.0
	Sometime	45.0	40.0	40.0	41.7	35.0	27.5	30.0	30.8
	Always	15.0	10.0	7.5	10.8	27.5	20.0	40.0	29.2
6	Milk of cross-bred cow has poor acceptability (family members)								
	Never	45.0	52.5	62.5	53.3	65.0	72.5	52.5	63.3
	Sometime	25.0	40.0	25.0	30.0	17.5	10.0	20.0	15.8
	Always	30.0	7.5	12.5	16.7	17.5	17.5	27.5	20.8

Source: Field Survey Data.

8.8 Other Constraints:

The details on other constraints faced by the selected household are presented in Table 8.8. The common constraints faced by the both DCS and NDCS households were poor knowledge about scientific animal husbandry practises and dairy farming, poor livestock extension services, lack of awareness about quality of milk, lack of veterinary services in village for quality milk production, and poor housing to

milch animals. Besides these constraints, NDCS households faced other constraints such as lack of marketing facility for dairy business, unavailability of chilling facilities at village level for milk preservation, unavailability of medicine and equipments required for quality milk production.

Table 8.8: Details on Other Constraints faced by Selected Households

No.	Constraints	Other Constraints (OC) (% to total responses)							
		DCS households				NDCS households			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Unavailability of chilling facilities at village level for milk preservation	27.5	12.5	25.0	21.7	50.0	45.0	47.5	47.5
2	Diversion of feed and fodder ingredients for industrial use	20.0	7.5	15.0	14.2	12.5	7.5	10.0	10.0
3	Majority of grazing lands are either degraded or encroached	30.0	20.0	32.5	27.5	30.0	27.5	37.5	31.7
4	Poor access to organized markets deprive farmers in getting proper milk price	27.5	22.5	27.5	25.8	25.0	42.5	27.5	31.7
5	Irregular quality electricity supply	15.0	5.0	20.0	13.3	15.0	17.5	10.0	14.2
6	Poor irrigation facility to grow fodder crops	42.5	35.0	37.5	38.3	32.5	45.0	30.0	35.8
7	Non availability of improved fodder seed	40.0	40.0	32.5	37.5	27.5	47.5	17.5	30.8
8	Poor livestock extension services	45.0	42.5	47.5	45.0	50.0	55.0	57.5	54.2
9	Poor knowledge about scientific animal husbandry practices and dairy farming	60.0	50.0	47.5	52.5	55.0	62.5	60.0	59.2
10	Poor knowledge of mastitis (mastitis in dairy animal) in dairy animals	42.5	35.0	32.5	36.7	35.0	17.5	35.0	29.2
11	Lack of awareness about quality milk production	42.5	40.0	60.0	47.5	60.0	70.0	55.0	61.7
12	Poor housing to milch animals	50.0	37.5	32.5	40.0	40.0	37.5	45.0	40.8
13	Unavailability of medicine and equipment required for quality milk production	42.5	35.0	37.5	38.3	42.5	47.5	40.0	43.3
14	Lack of milk testing and animal screening facilities	32.5	17.5	30.0	26.7	32.5	37.5	37.5	35.8
15	Lack of veterinary services in	52.5	40.0	45.0	45.8	42.5	52.5	55.0	50.0

	village for quality milk production								
16	Lack of nutrition's feed for quality milk production	42.5	40.0	40.0	40.8	40.0	57.5	42.5	46.7
17	Lack of ecto parasites control programmes	35.0	27.5	27.5	30.0	27.5	25.0	22.5	25.0
18	Lack of finance to invest in dairy business for quality milk production/ Inadequate finance	40.0	27.5	25.0	30.8	35.0	30.0	35.0	33.3
19	Lack of necessary space required for tying the milking animals	27.5	15.0	20.0	20.8	22.5	22.5	27.5	24.2
20	Lack of marketing facility for dairy business	47.5	27.5	37.5	37.5	42.5	57.5	52.5	50.8
21	Uneconomical capital investment on quality milk production	15.0	25.0	30.0	23.3	20.0	20.0	25.0	21.7
22	Lack of water supply	30.0	27.5	20.0	25.8	22.5	35.0	27.5	28.3
23	Inadequate labour supply	22.5	20.0	25.0	22.5	15.0	32.5	25.0	24.2
24	Ecological factors- High heat/temperature, High cold, etc	35.0	27.5	20.0	27.5	25.0	17.5	30.0	24.2
25	Competition from established and large units	15.0	10.0	15.0	13.3	20.0	20.0	25.0	21.7
26	Difficulty to store milk in summer	22.5	25.0	40.0	29.2	45.0	37.5	35.0	39.2
27	low acceptability of AI in buffalo	12.5	12.5	17.5	14.2	10.0	12.5	20.0	14.2
28	Disease outbreak: mortality and morbidity	17.5	12.5	7.5	12.5	12.5	10.0	5.0	9.2
29	Politics in Cooperative is not good	25.0	20.0	22.5	22.5	15.0	7.5	7.5	10.0

Source: Field Survey Data.

8.9 Suggestions:

In order to have corrective steps in existing scheme, attempt was made to have suggestions on same. The DCS households had offered suggestions than NDCS households (Table 8.9). About 48 per cent of DCS households have suggested that veterinary literature should be provided in village, 46 per cent households mentioned that marketing facilities should be provided at village level for the outlet of milk and milk product, while about 41 per cent households suggested

that loan sanction procedure should be made easy. Besides, other suggestions were loan amount for the purchase of dairy animals need to ne increased; need to improve service deliver, enhance the milk price for producers, and technical knowledge for management of dairy enterprise. In comparison of suggestions provided by DCS households, the main suggestions made by NDCS households were need to marketing facilities at village level for sale of milk and milk products, improvement in service delivery, need of veterinary literature at village level and need to make easy process of loan sanction.

Table 8.9: Suggestions for improvement in adoption of dairy schemes

Sr. No	Suggestions	% of response to DCS				% of response to NDCS			
		SMP	MMP	LMP	TMP	SMP	MMP	LMP	TMP
1	Marketing facilities be provided at village level for the outlet of milk and milk products	40.0	45.0	52.5	45.8	25.0	42.5	50.0	39.2
2	Providing technical knowledge to manage the dairy Enterprise	32.5	42.5	40.0	38.3	27.5	30.0	22.5	26.7
3	There should be regular and planned supply of vaccines (100%)	25.0	17.5	25.0	22.5	10.0	12.5	12.5	11.7
4	Subsidies should be given on certain inputs like veterinary medicines, fodder seeds, etc.	27.5	32.5	22.5	27.5	25.0	30.0	37.5	30.8
5	Enhanced milk price for the producers	35.0	35.0	47.5	39.2	27.5	30.0	25.0	27.5
6	Loan sanction procedure should be made easy	45.0	35.0	42.5	40.8	27.5	30.0	27.5	28.3
7	The loan amount for the purchase dairy animals need to be increased	25.0	30.0	32.5	29.2	10.0	20.0	15.0	15.0
8	Concentrates should be made available at cheaper rate and in time	12.5	10.0	10.0	10.8	12.5	17.5	15.0	15.0
9	Providing proper A.I. facility at village level /door step	12.5	27.5	22.5	20.8	15.0	25.0	35.0	25.0
10	Cost of veterinary services need to be reduced	37.5	25.0	25.0	29.2	27.5	15.0	22.5	21.7
11	Provide veterinary literature in village	40.0	50.0	52.5	47.5	35.0	40.0	37.5	37.5
12	Small scale dairy industries be encouraged at village level	12.5	20.0	10.0	14.2	12.5	20.0	7.5	13.3
13	Need to improve service delivery	30.0	40.0	42.5	37.5	27.5	40.0	45.0	37.5

Future Challenges

"Failure is never final, and success never ending." Former Chairman Kurien bears out this statement perfectly to describe the current status of the dairy industry in India. The Indian dairy industry needs to focus simultaneously on the four-fold challenge of quality, product development, infrastructure-support development, and global marketing. Equally urgent is the need for strategic alliances with some of the leading dairy companies in the world for technical collaboration and marketing tie-ups. Raw-milk handling needs to be upgraded in terms of physico-chemical and microbiological attributes of the milk collected. Better operational efficiencies are needed to improve yield, reduce waste, minimize fat and protein losses during processing, control production costs, save energy, and extend shelf life. The adoption of Good Manufacturing Practices (GMP) would help manufacture milk products that conform to international standards and thus make exports competitive.

8.10 Constraints faced by PDCS /Private Dairy Units

The constraints (such as milk supply related, infrastructure related and marketing related) faced by the selected primary dairy cooperative societies and private dairy units are presented in Tables 8.9 to 8.11. It can be seen from the tables that in case of milk supply related constraints, top three constraints faced by both the groups are high numbers of small producers, irregular and inadequate supply of milk, unavailability of fodder throughout the years and low average milk yield of milk animals in area. Besides, these DPCS faced problems of not having the provision of advance payment for milk to milk producers, which was sometime available with PDUs.

Table 8.10: Milk Supply related Constraints faced by the PDCS & Private Dairy Units

No.	Constraints	Milk Supply related Constraints faced by (% to total responses)							
		PDCS (% to total responses)				PDU (% to total responses)			
		Bharuch	Dahod	Junagadh	Mehsana	Bharuch	Dahod	Junagadh	Mehsana
1	High number of small producers								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	0.0	0.0	0.0	0.0	0	0	0	0
	Always	25.0	25.0	25.0	25.0	100.0	100.0	100.0	100.0
2	No or less provision for advance payment for milk by society or vendors								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0
	Always	25.0	25.0	25.0	25.0	0	0	0	0
3	Unable to provide cattle feed and fodder seed on credit to members								
	Never	0.0	0.0	0.0	12.5	0	0	0	0
	Sometime	25.0	12.5	25.0	12.5	100.0	100.0	100.0	100.0
	Always	0.0	12.5	0.0	0.0	0	0	0	0
4	Poor Quality milk								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	12.5	25.0	25.0	0	0	12.5	12.5
	Always	0.0	12.5	0.0	0.0	25	25	12.5	87.5
5	Irregular & inadequate supply of milk								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	0.0	0.0	0.0	12.5	0	0	25	25
	Always	25.0	25.0	25.0	12.5	25	25	0	75
6	Late delivery								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	25.0	25.0	25.0	0	25	12.5	62.5
	Always	0.0	0.0	0.0	0.0	25	0	12.5	37.5
7	Unavailability of emergency veterinary services								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	25.0	25.0	25.0	0	25	0	50
	Always	0.0	0.0	0.0	0.0	25	0	25	50
8	Infrequent visit of veterinary staff								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	12.5	25.0	25.0	0	25	0	50
	Always	0.0	12.5	0.0	0.0	25	0	25	50
9	Unavailability of vaccines								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	25.0	25.0	25.0	0	25	12.5	62.5
	Always	0.0	0.0	0.0	0.0	25	0	12.5	37.5
10	Occasional availability of semen at the AI centre								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	25.0	25.0	12.5	0	25	12.5	62.5
	Always	0.0	0.0	0.0	12.5	25	12.5	0	37.5
11	Unsuitability of the time of delivery of milk during winters due to bitter cold in early hours of the day								
	Never	25.0	25.0	25.0	25.0	25	25	12.5	87.5
	Sometime	0.0	0.0	0.0	0.0	0	0	0	0
	Always	0.0	0.0	0.0	0.0	0	0	12.5	12.5
12	Unavailability of green/ dry fodder throughout the year								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	0.0	0.0	0.0	12.5	0	0	0	0
	Always	25.0	25.0	25.0	12.5	25	25	25	100
13	Low average milk yield of the milk animals in area								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	0.0	0.0	0.0	12.5	0	0	12.5	12.5
	Always	25.0	25.0	25.0	12.5	25	25	12.5	87.5
14	Lack of cooperation and coordination among members								
	Never	25.0	25.0	25.0	25.0	25	25	12.5	87.5
	Sometime	0.0	0.0	0.0	0.0	0	0	12.5	12.5
	Always	0.0	0.0	0.0	0.0	0	0	0	0

Table 8.11: Infrastructure related Constraints faced by the PDCS & Private Dairy Units

No.	Constraints	Infrastructure related Constraints faced by (% to total responses)							
		PDCS (% to total responses)				PDU (% to total responses)			
		Bharuch	Dahod	Junagadh	Mehsana	Bharuch	Dahod	Junagadh	Mehsana
1	Unavailability of chilling facilities at village level for milk preservation.								
	Never	0.0	0.0	0.0	25.0	0	0	0	0
	Sometime	0.0	0.0	0.0	0.0	0	0	0	0
	Always	25.0	25.0	25.0	0.0	25	25	25	25
2	Lack of improved equipment								
	Never	0.0	0.0	0.0	12.5	0	0	0	0
	Sometime	25.0	0.0	25.0	0.0	25	0	25	0
	Always	0.0	25.0	0.0	12.5	0	25	0	25
3	Lack of necessary space required for dairy operation								
	Never	25.0	0.0	25.0	0.0	25	0	25	0
	Sometime	0.0	0.0	0.0	0.0	0	0	0	0
	Always	0.0	25.0	0.0	25.0	0	25	0	25
4	Lack of training facilities								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	0.0	0.0	0.0	0.0	0	12.5	0	0
	Always	25.0	25.0	25.0	25.0	25	12.5	25	25

Table 8.12: Market related Constraints faced by the PDCS & Private Dairy Units

No.	Constraints	Market related Constraints faced by (% to total responses)							
		PDCS (% to total responses)				PDU (% to total responses)			
		Bharuch	Dahod	Junagadh	Mehsana	Bharuch	Dahod	Junagadh	Mehsana
1	Inability to market for value-added products								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	0.0	25.0	12.5	25	0	25	0
	Always	0.0	25.0	0.0	12.5	0	25	0	25
2	Competition from private dairy								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	0.0	0.0	0.0	0.0	0	0	0	0
	Always	25.0	25.0	25.0	25.0	25	25	25	25
3	Poor Road infrastructure								
	Never	25.0	0.0	12.5	25.0	25	12.5	25	0
	Sometime	0.0	25.0	12.5	0.0	0	0	0	0
	Always	0.0	0.0	0.0	0.0	0	12.5	0	25
4	Unstable prices of milk								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	0.0	25.0	12.5	0	0	0	0
	Always	0.0	25.0	0.0	12.5	25	25	25	25
5	Completion from imported dairy product								
	Never	0.0	0.0	0.0	0.0	0	0	0	0
	Sometime	25.0	12.5	25.0	12.5	0	0	0	0
	Always	0.0	12.5	0.0	12.5	25	25	25	25

The top two infrastructure related constraints were unavailability of chilling facilities at village level for milk preservation and lack of training facilities. Few of them also faced Lack of necessary space required for dairy operation. While competition from private dairy and Inability to market for value-added products were the major marketing related constraints faced by the both groups. Besides, PDU faced the problem of unstable prices of milk.

8.11 Constraints faced by Milk Unions

Besides the milk producers, milk unions have also faced the constraints, which are presented in Table 8.12. It can be seen from the table that out of the four selected dairy milk unions, two are located in developed cities like Mehsana and Bharuch and are located on the main highway of the state. While Panchmahal and Junagadh district milk unions are located in interior regions of the state, that to these areas are not that developed and thus they face some constraints. Panchmahal dairy is located in tribal area thus face the problem of labour and most of the persons do not want to work in interior areas of the district. Besides, during lean season, this dairy faces the problems of working capital. The dairy producers in this area are mostly illiterate and thus do not have much awareness about the schemes. In case of Junagadh dairy, though progress is good but they face the problem of supply of inputs and they are worried about the FTA issue. Overall, all the dairy unions have bright future subject to no political interfere in the working of unions.

Table 8.13: Constraints faced by Milk Unions-Gujarat

Sr. No	Particulars	Constraints faced by Milk Unions-Gujarat			
1	Milk Union (Name)	Mehsana	Panchmahal	Bharuch	Junagadh
2	Constraints faced				
a	Manpower Constraints (eg. Problems In Recruiting Staff, Etc.)	• Normally don't face any constraint with respect to man power. • Managing a dairy technology college and under graduate course in another college	• Due to tribal area, some employees are not willing to work at interior part of the district.	• Bharuch and Ankleshwar is industrial area, there are number of small & large scale industries. Dahej is also developing very fast, having mega industries. Looking to the facts, there is drop out ratio of skill persons. • The recruited people leave organization if he get attractive salary package. • Even the contractual people leave the job if he gets higher salary at another place. • Normally we do not face problem in recruiting the staff, when ever vacancies exists, our management approves	• Campus Development is in progress • Expandable upto 5 Llpd,

				the same to fill.	
b	Technical Constraints	• We are member of GCMMF and therefore always technical guidance is available as and when required. • NDDB is also there to help us out in case required. we also have strong pool of experienced technical man power.	• Technical employees turnover rate is very high (our plant is located 100 km away from big city like Vadodara & Ahmedabad , • Technical personnel are not agree to work in tribal area.)	• usually our dairy plant needs dairy technocrats and mechanical, electrical technical staff. for field input dealing we required veterinaries to handle animal and societies related issues. we have sufficient input to help our technocrats.	• no supply of any input to dairy forever, work as a mediator between Amul distributor and market, no share /cut for same, 03 veterinary doctors
c	Governance Issues	• As per present cooperative act. there is no restriction on deciding producer's price. we also can recruit on our own there is no restriction on our autonomy. so far as sale price to consumer is concerned that is decided by GCMMF being apex marketing body for all district unions.	• We do not have any issues.	• Our organisation is of cooperative types. whole organization is managed by an elected board. milk producer, price is decided by board members and consumer price is decided by state level marketing federation situated at anand. in recruitment and transfer there is no political interference. our cooperative sector is controlled by state level cooperative registrar office, which is having district level offices to monitor milk unions and village level auditing. bharuch milk union is always facilitating the state level policies.	• rate/litre-10 fat of snf, 62/kg fat, store policy in progress
d	Financial Constraints	• We enjoy very strong credit rating i.e. aa+ and therefore we can avail short term and long term finance without any problem at the base rates of the banks. • In any further requirement GCMMF and NDDB is there to help us in this regards.	• Dairy business is a seasonal business, during the lean season dairy industry is having the short fall of working capital & some time banks are not agree to fund co-operatives. • The farmers are not aware of different finance schemes of banks, so co-operative have to work as a mediator for banks to provide the fund to the farmers. • We are unable to	• At present we don't having financial constraints. for major civil and mechanical establishment NDDB is providing term loan at reasonable interest rates. GCMMF is also helping in minor financial issues. today we are not having financial burden with any banks.	• Adequate, RBP not participated

			provide direct payment to the milk producers because of availability of banks in villages.		
3	Any Other suggestion	--	---	--	• FTA-Duty Should Not Be Reduced,
4	Potential For Future	• Demand of milk and milk products is continuously increasing and therefore growth is not a problem constraint will be procurement of quality milk from the available sources. because in our area of operation milk producers are moving towards other earning avenues like: jobs, business, less no. of new people are joining this dairy farming	• Future of dairy co-operative will be very bright, if it is working purely on commercial ground and there should not be any external political influence in dairy sector.	• Bharuch milk union is procuring daily average of 2.0 llpd of milk form rural area, with well established rural cooperative network. our milk shed area is having very good irrigation facilites. there are about 70000 sugar cane growers. they are diverting their soruces of income from agriculture to animal husbandry, through commercial dairy farming approach. this will help us in average milk procurement of 5.00 llpd in coming 2-3 years. at present we are marketing milk, ghee, paneer, khova, butter milk. step by step we may start packaging and marketing of dahi, table butter, ice cream.	• --

8.11 Chapter Summary:

The performance of the dairy sector in depends on many factors includes input supply (particularly feed) and service provision (veterinary service and Artificial Insemination (AI) or breed) or output services. DCS households recorded the adequate supply of cattle feed and emergency veterinary services while NDCS households did not have facility to get any support from the dairy cooperatives existing in their area, they are fully depend on the agent or private agency to get support for input and output service systems. The major constraints faced by the milk producers are highlighted.

The constraints (such as milk supply related, infrastructure related and marketing related) were also faced by the selected primary dairy cooperative societies and private dairy units. In case of milk supply related constraints, top three constraints faced by both the groups are

high numbers of small producers, irregular and inadequate supply of milk, unavailability of fodder throughout the years and low average milk yield of milk animals in area. Besides, these DPCS faced problems of not having the provision of advance payment for milk to milk producers, which was sometime available with PDUs. The top two infrastructure related constraints were unavailability of chilling facilities at village level for milk preservation and lack of training facilities. Few of them also faced Lack of necessary space required for dairy operation. While competition from private dairy and Inability to market for value-added products were the major marketing related constraints faced by the both groups. Besides, PDU faced the problem of unstable prices of milk. Selected milk unions have also faced the constraints, they faced the problem of labour and most of the persons do not want to work in interior areas of the district. Besides, during lean season, dairies face the problems of working capital. Overall, all the dairy unions have bright future subject to no political interfere in the working of unions.

The next chapter presents the conclusions and recommendations.

Chapter IX

Conclusions and Recommendations

From the data and discussion presented in Chapter 1 to 8, it can be concluded and suggested that

- Livestock sector occupies a pivotal position in the Indian economy and its contribution to the agricultural sector is the highest, the plan investments made so far do not appear proportionate with its contribution and future potential for growth and development. This suggests that public investment in the livestock sector should be enhanced to help the smallholder livestock producer, which deprives their larger share of income from the livestock sector.
- The livestock services like artificial insemination/natural service, vaccination, de-worming, etc are time-sensitive and government institutions are not able to deliver in time due to financial as well as bureaucratic constraints. Therefore, there is a need to re-orient the government policy for delivery of livestock services and involve major stakeholder.
- The major constraint in milk marketing is the involvement of the unorganized sector. Changing the dairy-cooperative laws and regulations can reduce the unorganized sector's role in milk marketing. Strengthening the infrastructure for milk collection, transportation, processing, packaging, pricing, and marketing through dairy co-operatives can also change the minds of the milk producers.
- Producers are not receiving a remunerative price for their produce because of the presence of middlemen in milk marketing. By reducing the number of middlemen between producer and consumer, the consumers' share to the producer

can be increased. In other words, bridging the gap between the producer and the consumer can increase the producer's share.

- Shortage of quality fodder and feeds is another major constraint for India's livestock sector growth. The gap between the requirement and availability of feed and fodder is increasing due to decreasing area under fodder cultivations and reduced availability of crop residues as fodder. Also there is continuous shrieking of common property resources leading to over grazing ion the existing grass land. Therefore, there is a need to work out the strategies for sufficient good quality feed and fodder for efficient utilisation of genetic potential; of the various livestock species and for sustainable improvement in productivity.
- It was observed that the awareness about the dairy schemes among selected households was very poor. Therefore, there is a need to increase use advanced technology such as mobile phones in dairying for effective dissemination of livestock related information in general and dairying in particular.
- The selected households seldom aware about the livestock insurance. As insurance of livestock is the best safeguard for minimising the risk especially small holder producers, there is a need to increase the awareness and mandatory provision of the companies to undertaken livestock insurance of interested milk producers.
- Though livestock health situation in India is improving, Foot and Mouth Disease remains the issue of concern. There is a serious need for protection of animals against diseases and parasite which is one of the pre-requisites for sustainable livestock production and milk production.
- The four major infrastructural constraints faced by selected households were unavailability of emergency veterinary services, infrequent visit of veterinary staff, unavailability of cattle feed

and fodder seed on credit, and low average milk yield of the milk animals. Non availability of veterinary services at the village level in time is the major constraints. The animal husbandry departments must be rejuvenated to act as drivers of growth for dairy sector.

- Given the fact that stress due to climate variability and availability of feed will be increasing constraints, more emphasis is required in promoting indigenous breeds. The data on animal genetic resources need to be generated and preserved properly for future use.
- The role of institutions in dairy farming especially district dairy cooperatives need to be strengthened and there should be less bureaucratic and political interference in managing cooperative run dairies in India.
- The environmental security and sustainability must be made integral measures taken in the Indian dairy sector in arena of increase in milk production, storage, value addition, improving the genetics of local breed and reducing the risk in operation.
- There is a need of more modern semen stations across India operated by both private and controlled by government agencies. Dairy cooperatives and private players must be allowed too to start their own centers to supply quality semen. Farmers must be educated about the available semen profile which will help them to make informed choice.
- The state and Central Governments have initiated various development programmes and policies for promoting livestock sector in the country. However, a number of concerns about effectiveness and impact of these programmes and policies have been raised.
- The convergence of all state and central government schemes at the implementation level, in a given territory, would bring about

improvement in milk production sector in a manner that will be sustainable, while ensuring social and economic improvements of the dairy farmers. As suggested by Working Group for 12th five year plan, all the ongoing schemes should be classified under three mega schemes; a) Animal Production, b) Livestock Health and c) Dairy Development.

- The co-operative structure is very weak in Saurashtra and Kachchh regions of the state. Therefore, presence of Milk Producer Company's sales & distribution network is spread across Saurashtra & Kutch region support the dairy development in this regions. Therefore, there is a need to support the MPCs in all the areas for balanced development of dairy sector.
- The major milk supply related constraints faced by selected primary dairy cooperative societies and private dairy units were high numbers of small producers, irregular and inadequate supply of milk, unavailability of fodder throughout the years and low average milk yield of milk animals in area. Besides, these DPCS faced problems of not having the provision of advance payment for milk to milk producers, which was sometime available with PDUs.
- Besides the milk producers, milk unions have also faced the constraints such as problem of labour as most of the persons do not want to work in interior areas of the tribal district. Besides, during lean season, this dairy faces the problems of working capital.

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Appendix I

Comments on the Draft Report received from
Agro-Economic Research Centre, Gokhale Institute of Politics and Economics (Deemed University), Pune, Maharashtra

Comments on draft report

1.	Title of report	Assessment of the status of Dairying and Potential to improve Socio-Economic Status of the Milk Producers and Convergence of all Central & State Schemes at District Level in Gujarat
2.	Date of receipt of the Draft report	22nd June 2017
3.	Date of dispatch of the comments	23rd June 2017
4.	Comments on the Objectives of the study	Objectives of the study have been satisfied.
5.	Comments on the methodology	Proper sampling and methodology have been used.
6.	Comments on analysis, organization, presentation etc.	Detailed analysis is undertaken. Minor editing is required. For example "fed" instead of feeded. On page 163, it may be clarified that net return is Rs 32 per animal per day, although it is clear from text.
7.	References:	Major references covered
8.	General remarks:	The study is a comprehensive study on dairy sector in Gujarat and appropriate policy measures have been suggested.

9. Overall view on acceptability of report: The report is acceptable and with minor editing, if necessary, it may be treated as final.

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Appendix II

Action taken by the authors based on the comments received

- All the comments made by the Coordinator of the study have been addressed at the appropriate places in the final report.

S. S. Kalamkar

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