Final Report

Breakeven Analysis in Dairy Farm Enterprises and Strategies for its Sustainable Growth under National Dairy Plan-I in Selected States of India

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Foreword

Dairying has become an important secondary source of income for millions of poor and rural households and has assumed an important role in providing employment and income generating opportunities particularly for marginal and women farmers. This sector has created a significant impact on providing equity in terms of employment and poverty alleviation as well. It cannot be merely a co-incidence that the 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 deriving benefits from growth generated in other sectors of the economy. Besides milk has always played a critical role in addressing hunger and malnutrition.

Cost plays an important role in portraying economic viability of a dairy enterprise. It is a critical economic indicator for milk producers, consumers and policy makers in order to provide an effective linkage between the milk producers and consumers for fixing the price of milk rationally. Generally, a milk producer can increase his dairy income in two ways either by increasing the milk production or by reducing cost of milk production. Cost of milk production often becomes a policy issue, when milk producers complain that the price of milk they are getting does not the cover cost of milk production. One of the main problems identified is that many dairy producers, especially small operators, are unaware of their costs of production and financial breakeven point. During these tough times, it is important for producers to see how they can reduce costs without reducing milk production. Therefore, there is a need to know the break-even point to estimate the minimum quantity of milk to be produced to cover the total cost on all the size groups of household for both the cow and buffaloes. Breakeven point is a point where no profit no loss status is achieved. The costs that have to be covered by the milk price determine the break-even point, or price. Keeping the above background in mind, it was felt necessary to study the comparative analysis of per liter cost of milk production as well as break even analysis for two groups - members and non-members of dairy cooperative society for two categories of dairy farmers (small and medium) in case of milch Cow and buffalo. In view of above, as desired by the NDDB, Anand, the present study was undertaken in selected milk unions of four states to know the break-even point to estimate the minimum quantity of milk to be produced to cover the total cost of milk production for both the cows and buffaloes. The study came out with important and relevant policy implications which would help to adopt strategic interventions to enhance net income of the milk producers.

I am thankful to authors and the research team for putting in a lot of efforts to complete this excellent piece of work. I also thank the National Dairy Development Board, Anand for giving us an opportunity to undertake this study. I hope this report will be useful for policy makers and researchers.

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List of Abbreviations

ACZ	-	Agro Climatic Zone
A.I	-	Artificial Insemination
ADP	-	Annual Development Plan
AN	-	Animal Nutrition
ASMM	-	Area Specific Mineral Mixture
Av.	-	Average
CB	-	Cross Breed
DCS	-	Dairy Cooperative Society households
DM	-	Dry Matter
EIA	-	End Implementing Agency
FGD	-	Focus Group Discussion
GOI	-	Government of India
ha	-	Hectare
HH/hh	-	Household
LTPD	-	Litres per day
MAAHI	-	Maahi Milk Producer Company Limited, Rajkot
M.T./mt	-	Metric Tone
MCLR		Marginal Cost of Funds Based Lending Rate
MGNREGA	-	Mahatma Gandhi National Rural Employment Guarantee Act
mha	-	Million hectares
MU	-	Milk Union (district level)
NA	-	Not Available/ Not Applicable
NDCS	-	Non-Dairy Cooperative Society households
NDDB	-	National Dairy Development Board
NDP	-	National Dairy Plan
NITI Ayog	-	National Institution for Transforming India
No./Nos	-	Number
PDCS	-	Primary Dairy Cooperative Society (village level)
PMC	-	Project Management Cell
PMU	-	Project Management Unit

Prodvty.	-	Productivity
Rs.	-	Rupees
SAUs	-	State Agricultural University
SC	-	Scheduled Caste
SF/MF/AL	-	Small Farmer, Marginal Farmer, Agricultural Laborer
ST	-	Scheduled Tribe
ST	-	Scheduled Tribe
TC	-	Total Cost
TR	-	Total Revenue
Y	-	Yield

Executive Summary

Breakeven Analysis in Dairy Farm Enterprises and Strategies for its Sustainable Growth under National Dairy Plan-I in Selected States of India

Cost plays an important role in portraying economic viability of a dairy enterprise. It is a critical economic indicator for milk producers, consumers and policy makers in order to provide an effective linkage between the milk producers and consumers for fixing the price of milk rationally. Cost of milk production often becomes a policy issue, when milk producers complain that the price of milk they are receiving does not cover the cost of milk production. In this context, one of the main problems identified is the lack of awareness among dairy producers, especially small operators, regarding their costs of production and financial breakeven point. It is important for producers to identify how they can reduce costs without reducing milk production. Break-even point is often used to estimate the minimum quantity of milk to be produced to cover the total cost of milk production. A comparison across all size of household groups for both the cow and buffaloes can be resourceful in various decision making. Breakeven point is a point where 'no-profit-no-loss' status is reached. The costs that have to be covered by the milk price determine the break-even point. With these considerations, it was felt necessary to study the comparative analysis of per litre cost of milk production as well as break even analysis for two groups- members and non-members of dairy cooperative society for two categories (small and medium) for milch cows and buffaloes. In view of above, the present study was undertaken to know the break-even point to estimate the minimum quantity of milk to be produced to cover the total cost of milk production for both the cows and buffaloes by dairy members and non-member households during lactation and cycle period considering both paid-out cost and imputed costs. The study is based on primary level data pertaining to all the costs that are incurred in production of milk, using the data collected from 6000 sample dairy households across four states each from North, South, East and West region of India.

Main Findings:

- *The profile of selected sample dairy households indicates that the average family size of selected DCS (Dairy Cooperative Society) Households was around 5.4 members which was little higher than the NDCS households (5.0 members). The family composition from both the groups (DCS & NDCS) indicates that adult males and females accounted for around 37-40 per cent of total members in each family while remaining were children.*
- *Majority of the respondents were male while few female DCS respondents had provided the information. In fact, female respondents accounted for almost one-fourth of total respondents of DCS group while same was hardly 6 per cent in case of NDCS group, which indicates the empowerment of women through development of organised dairy sector under three tier cooperative structure, especially considering that the data collection was done on random basis. The average age of respondents was between 41-47 years.*
- *The data related to level of education indicates that around three fourth of both DCS and NDCS household heads were educated up to secondary level of education. The NDCS households had relatively more number of illiterate persons than the DCS households, which is significant in number (i.e. one-fifth of total respondents in both the groups). Around 49 per cent of members from DCS family and 53 per cent of members of NDCS family were engaged in dairy activity, wherein dominance of female members was observed. At overall level, it was observed that out of total time engagements by the family members, lion share as estimated for woman members, ranges between 60-82 percent.*
- *Out of the total selected samples of DCS and NDCS households (HHs), around 80-81 percent were from Hindu religion followed by around 18-19 per cent being Sikh (i.e. from Punjab state) and around 1 per cent were Muslim. Few Christian households were observed in NDCS group as well. The distribution of selected households as per social group indicates that around 78 per cent of total households collectively belonged to Open and Other Backward Class (OBC) category, in which members belonging to OBC category was found to be greater in DCS category while members from Open category were in greater number in the NDCS households group. The share*

of Scheduled Caste and Scheduled Tribe category ranged between 13-20 per cent. The SC households were higher in NDCS group than DCS group while opposite picture was found in case of Scheduled Caste population.

- *Around 71 per cent of selected DCS households were from Above Poverty Line (APL) as compared to 64 per cent of NDCS households, the economic threshold line which indicate relatively well-off HHs in term of income and standard of living.*
- *The average experience of dairy farming amongst selected households was around 18 years for both groups which indicates long association of selected households with dairy business. It was observed that around 30 per cent of total households maintained farm financial record as well as dairy business records.*
- *On an average, most of the dairy members had joined the dairy society about 11 years ago. More than 92 per cent households from both groups had toilets at home while DCS households had more number of biogas plants than NDCS households.*
- *The details regarding occupation of selected fodder grower households indicate that the main occupation for the selected DCS households was agriculture and 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 majority of NDCS household in Gujarat reported to be engaged in animal husbandry and dairying followed by agriculture. In the state of Punjab, selected households were engaged in other activities along with agriculture and dairy activities. The subsidiary occupation for both DCS and NDCS was dairy followed by agriculture labour. Thus, significant numbers of dairy producers were involved in dairy farming as a secondary and support activity.*
- *Around 92 per cent of DCS households possessed the agricultural land holding with average land holdings of 1.6 ha, while corresponding figure for NDCS household was about 85 per cent with 2.2 ha area of holdings. The DCS households have marginally greater experience in farming (of 19 years) than NDCS households (17 years).*
- *The details regarding herd strength and cattle shed shows that the DCS category 2894 HHs had up to 2 milch animals (Small) and 1106 DCS HHs had 3 to 5 milch animals (Medium). Similarly, in the NDCS category 1495 HHs had up to 2 milch animals (Small) and 505 NDCS HHs had 3 to 5 milch animals (Medium). Across all DCS households, share of buffaloes was highest followed by local cows, and then cross bred cows, while in case of NDCS households, cross bred cows were higher followed by buffaloes and the lowest was local cows.*
- *The DCS Households had more number of cattle shed than NDCS households, while opposite picture was recorded in case of fodder storage structures. On an average, very few had cattle shed in both group mostly of both the types (Kachcha and Pucca) with its cost around Rs. 12,000/- for kachcha cattle shed while cost of Pucca cattle shed constructed ranged between Rs.41,000-Rs.64,000/-. The NDCS households had less number of fodder storage structures than DCS households, cost of which was around Rs. 25,000/-. Few DCS and NDCS households had borrowed funds while few of them had received subsidy for the construction of cattle sheds and fodder storage.*
- *The holding of productive assets by selected fodder grower households suggests that DCS households had relatively more number of assets than NDCS group. Overall, as can be expected, each of the household under survey had milk can along with other assets like fodder chaffer, grass cutter, etc. Around 173 DCS households and 90 NDCS households had purchased the animals during the period under study.*
- *The information collected regarding gross income of the sample households indicates that share of dairy business in total income of the household ranged between 39-45 per cent in case of DCS household while same was between 30-32 per cent for NDCS households. The correlation analysis of the income received from all sources and income received from dairy business indicated a very high positive correlation and association between these two variables in DCS dairy households as compared to NDCS dairy households. This may be due to the fact that milk pouring in dairy*

cooperative society has regular sale and income while NDCS households might be facing irregularity in sale of milk.

- *The details on fodder crops grown by the selected households during the agriculture year 2018-19 indicates that Jowar was the main fodder crop grown in kharif while Berseem, and Maize were grown more in rabi season. The assured and timely availability of fodder at home through fodder crops grown on the field as mentioned above has effect on the milk yield of the dairy animals. On an average milk yield was recorded higher in winter season followed by yield in rainy season and the lowest milk yield was realised during summer season. The milk rate accumulatedfor NDCS households was higher than DCS households.*
- *On an average, price for local cows ranged between Rs. 32,000-Rs. 34,000;for cross bred prices were between Rs. 36,000- Rs. 39,000; while buffalo price ranged between Rs. 45,000 to Rs. 49000. With selected households the average age of milch animals with 2-3 lactation period completed was between 5-7 years.*
- *The average age of calving was relatively higher in case of NDCS as compared to DCS which was around 28-38 months. During the milk cycle, around 267-282 days lactation period was recorded while dry period ranged between 75-87 days across the breeds. The milk yield was recorded to be around 4-6 litres per day for local cow, 7-10 litres per day for cross breed and 6-7 litres per day for buffalo for both groups (DCS & NDCS).*
- *The details on feed and fodder fed by the selected households at the time of survey as well as during earlier two seasons indicate that, for both groups of animals (dry and in-milk), a mixed trend was observed in quantity of feed (dry and green fodder) given across animal type as well as type of feed and fodder. Quantity of fodder was estimated to be higher in case of NDCS households for crossbred cows, while same was higher for DCS households for local cows. DCS households had fed less to dry dairy animals than toin-milk animals as compared to NDCS households. Quantity of green fodder was fed more to in-milk animals by both groups(except for buffaloes). The selected households used fodder from both sources (self-cultivated& purchased fodder), while self-cultivated fodderwas used more (more than 95 per cent). The animals were also fed with concentrates which were mostly purchased from the market. Besides feeding the animals at stall in shed, very few selected households could send their animals for grazing out every day for few hours on their own agriculture land or common grazing land of the village.*
- *The season-wise comparison of the fodder fed to the milch animals indicates that more quantity of green fodder was fed during the flush season while during lean season, dry fodder was used more. The DCS members used more concentrates for milch animals than NDCS households, which may be due to the availability and support of dairy society in providing concentrates at the village level.*
- *As dairy activities are carried out as complementary activity to agricultural activities, the labour use pattern by the selected sample households indicatesa complete dominance of use of family labour who were engaged in both the activities. Out of total time worked in a day by family members, most of the time was spent on field and household activities while some time was also spent for dairy activities. Very few households had reported use of hired casual labour. Thus, activities of dairy were largely carried out by the household members. Significant involvement of women in dairy activity can be seen from the data which indicates that female play a pivotal role in all the operations, for both DCE and NDCS groups.*
- *The details on other expenditures such as veterinary and breeding expenditure; transport cost, repair and maintenance, lights and water charges incurred during the year prior to the study period by DCS and NDCS households shows that DCS households had incurred marginally more expenditure on the veterinary services than NDCS households. Besides, some of the selected households had incurred expenditure on medicine and doctor as and when some animals fell sick. On an average DCS household had incurred cost on medicine plus doctor fee ranging between Rs..*
- *During field visits and discussions with the selected households, it was observed that despite various efforts made by the government; availability of veterinary doctor is one of the bottlenecks in dairy development. Thus, most of the households depended on the alternate sources such as*

veterinary advisory and medical support for their animals. All other expenditure was relatively same across the groups and types of animals..

- *The details regarding sale of milk by selected households indicate that on an average around 25 per cent of total milk of local cow produced was preferred for consumption at home by DCS households while corresponding figure for NDCS households was about 32 per cent. While 20-21 per cent of total buffaloes' milk was kept at home for consumption in both cases, very few DCS households preferred to sell milk directly to consumers. The NDCS households sold milk to consumers along with major share was sold to agents/private dairy.*
- *The milk rate received by the DCS members towards sale of milk to dairy cooperatives ranged between Rs. 24– Rs. 40 per litre while same was higher in case of sale of milk by NDCS members to agents or directly to consumers (Rs. 25 to Rs. 46 per litre). The average sales rate realised by the NDCS households for all the types of animals was higher than the rate received by the DCS households. The rate of milk was the highest for the buffalo milk followed by the local cow milk and then for cross breed cows.*
- *The cost of production of milk and net income realised by the sample households indicate that on an average net income realised by the DCS households was higher than NDCS households. Across the species, net return realised by the DCS and NDCS households was much higher for buffaloes followed by cross bred cows. The DCS realised lower returns for local cows as compared to buffaloes and cross breeds while same was negative for NDCS. High margins for buffalo dairy producers may be due to high rate of sale price in both groups as compared to rate per litre of milk realised for the milk of local cows and cross bred cows and that may be due to fat variation. Therefore, there is a huge scope to enhance producers' income from dairy by enhancing animals' productivity, improving management practise, and ensuing remunerative prices.*
- *The dairy farm business has several feasible options for that can induce positive impact, all of which are very sensitive to alterations in milk prices, milk yield and variable costs. In order to suggest suitable measures for sustainable growth in dairy, Sensitivity Analysis was carried out with seven scenarios/possibilities (viz. Scenario I: Decrease in fodder cost by 5% & Increase in milk yield by 5%; Scenario II: Decrease in fodder cost by 15% (Bihar and Punjab) & 13% (Gujarat and Karnataka) with increase in milk yield by 5%; Scenario III: Only increase in milk yield by 15%; Scenario IV: Increase in fodder cost by 5% & Increase in milk yield by 20%; Scenario V: Increase in fodder cost by 15% & Increase in milk yield by 25% ; Scenario VI: Increase in fodder cost by 15% & Increase in milk yield by 25% with increase in milk days (up to 30 days as case may be) having minimum 60 days dry period in a cycle); Scenario VII- Same milk rate. An improvement in net income per day can be realized by the DCS dairy households by adopting different strategies of reduction in fodder cost and increase in milk yield per day through various interventions, which can be used for policy formulations. The highest increase in net income was recorded when assumed that fodder cost was increased by 5 percent along with increase in milk yield by 20 per cent.*
- *The breakeven level of the DCS and NDCS milk producers during lactation period indicate that break-even output of milk was lowest for buffaloes and was the highest for cross bred cows during the lactation period. The high rate of milk from buffalo resulted in lower levels of BEP as compared to the cross bred and local cows. While in case of NDCS milk producers, mixed picture was observed. BEP level was lesser in DCS group than NDCS except in case of buffalo. While in case of paid out BEP, as it was expected the DCS households again recorded a higher net income and low level of BEP than NDCS households. During the cycle period, break even output increased while trend was observed to be the same across breeds and groups during lactation. Thus cost on labour and fodder which are important determinant of economics of milk production are actually disguised costs, not paid and are major hidden costs. Because of this reason, dairy households continue in dairy without realising the actual economics of same.*
- *The performance of the dairy sector depends on many factors including input supply (particularly feed) and service provision (veterinary service and Artificial Insemination (AI) or breeding) or output services. DCS households recorded adequate supply of cattle feed and availability of emergency veterinary services while NDCS households did not have facility to get any support*

from the dairy cooperatives in vicinity. Accordingly, NDCS were fully dependent on the agent or private agency to get support for input and output service systems.

- *Half of the of DCS respondents have mentioned that lack of finance to invest in dairy business for quality milk production/inadequate finance, low average milk yield of animals and high feed cost as major constraints in milk production. Besides the other constrains reported by respondents were low milk rate, and poor knowledge about feeding and health care of animals. Similarly, NDCS households also experienced problems of high cost of veterinary medicines.*
- *DCS households had faced the constraints in the form of high cost & low return on fodder production; lack of necessary space for tying the milking animals, scarce land holdings and its competitive uses such that they could not afford to put more land under fodder seed/crop production and high cost of cattle feed and mineral mixture. Noticeably high cost of cattle feed and mineral mixture was the biggest constraint faced by NDCS households. In addition to the constraints highlighted by DCS households, no provision of quality seed on credit was an additional major constraint faced by the NDCS household.*
- *The DCS households recorded adequate supply of cattle feed while most of the households mentioned that cost of cattle feed and mineral mixtures was high. Around half of the DCS respondents mentioned that cattle feed and mixtures were available on credit from the cooperative society and loan was also made available for purchase of cattle. Technical guidance was also provided by the society. NDCS households did not have any access in the form of any support from the dairy cooperatives in their area, they were fully dependent on the agent or private agency to get support for input and output service systems. The supply of cattle feed and fodder was inadequate. Feed and fodder was not available on credit for majority of the NDCS households. Most of the households mentioned about non availability of emergency veterinary services and lack of technical guidance. Available emergency veterinary services were expensive.*
- *In case of output delivery, DCS households mentioned that the milk price received by them was low and they used to get the payment on fortnightly/monthly basis. Around two third of the households mentioned that incentives or bonus for supplying milk were adequate, while three fifth of selected households mentioned that cross bred cow milk was not acceptable in family. Some of the DCS households had benefitted from the system of advance payment for milk while some of the agent or private agency had provided this facility in selected area. NDCS families also felt that the milk price received by them was low. The payment was immediate for about ten percent of the families. As can be expected, most of the NDCS households felt that the incentives or bonus for supplying milk was low.*

Policy implications and beneficial interventions

1. *The field survey highlighted some very important aspects of dairy business. The rearing of local cows for milk production can be made viable by increasing the prices given to the milk producers or wherever the production environment suits, the milk yield need to be improved. The crossbred animals and buffaloes are economically viable in all the regions. But if the productivity of these animals does not increase it is likely that in the times to come, the returns will not be even sufficient to cover the rising feed and fodder costs.*
2. *Wherever there is better infrastructure endowment and land is available for cultivation of green fodder, yet the farm-gate prices of milk are quite low, the net economic margin resulted into negative outcome. In the transient region of Saurashtra in Gujarat and Belgaum in Karnataka, lack of remunerative prices to farmers is a serious issue. Although the cooperative network in Gujarat has been strengthened but the prices paid to the farmers is not commensurate with their cost of production. The economics of milk is viable only during lactation period but same turns out to be having lower margin when dry period is included to calculate the costs for entire cycle (inter calving period).*
3. *There is a need to increase milk prices as open market milk rates are higher than those offered by cooperatives. Though it is well-known that in co-operative sector 15-17 per cent profit of milk sold goes back to farmers in the form of bonuses and dividend, there is around 71 per cent producers' share in every rupee spent by the consumer.*

4. *Dairy industry can serve as a cushion in the form of continuous flow of income as an industry complementary to the agricultural sector. While both agriculture and dairy industry if simultaneously operate it can improve not only farmer's income but also compensate for unexpected losses faced due to agriculture especially for poor small and marginal farmers. Besides such complementarity protects against seasonal and disguised unemployment and acts as a shield to protect farmer against the negative impact of climate change on agriculture.*
5. *Ration Balancing Program (RBP) results in better health of animal, improves the milk composition and the yield, improves conception rate and thereby lactation cycle improves due to reduction in the dry rate. Hence it is suggested that if the local educated youth of the village are involved in the form of Local Resource Persons (LRPs) it would result in the optimum utilization of the locally available resources in the form of fodder and labor as also the rural employment rate will improve. In the process, such positive interventions would have multi-fold effect in net dairy income and reduction in the quantity of BEP through reduction in cost and improvement in income through improved quality of milk. Such benefits can be assured through proper assessment mechanism from RBP.*
6. *Improvement in nutritional rationed balanced diet can create a positive impact on yield thereby improving net income and reducing the BEP quantity.*
7. *If the numbers of lactation days in a cycle are increased, it can create a positive impact on yield thereby improving net income and reducing the BEP quantity.*
8. *Fodder forms a major component of the variable cost in the dairy industry. If the feed and fodder cost is reduced it can result in improvement in net income and reduce the BEP quantity.*
9. *Increase in yield by any means can create a positive impact on improvement in net income and reduce the BEP quantity.*
10. *Mostly family labour is involved in dairy industry. Women comprise of a major proportion of family labour.*
11. *Dairy farmers need to be educated that rather than purchasing a lactating animal it would be better to rear a calf. Rearing a calf closer to the mother improves the mental health (by reducing the stress levels of the calf since it is closer to the mother) and physical health of the calf (since it is entirely in the control of farmer, how to rear the calf carefully).*
12. *As observed during the primary data collection if the resources are adequate it would be beneficial for the dairy farmer to add additional livestock beyond two animals in the herd. Resource efficiency between group of farmers can also create a positive impact on net income and reduce the quantity of BEP.*
13. *Fodder is the major component of the variable cost. Hence fodder community farming farms should be encouraged, benefits assessed, and should be effectively communicated to the dairy farmers. Co-operative farming of fodder, particularly on the barren land of the village, can assure sufficient local availability of the fodder, thereby reduce the variable cost, create a positive impact on net income and reduce the quantity of BEP.*
14. *Good quality of milk should be assured by properly educating the dairy farmers regarding the hygiene in the entire shade maintenance, hygienic maintenance of the equipment and utensils used in the milk procurement and delivery, maintenance of the animal by taking proper veterinary care of the animal and assuring good quality fodder inputs. This can result in good quality milk and thereby assure good returns for the farmers, create a positive impact on net income and reduce the quantity of BEP.*
15. *The indigenous milch & breedable cattle and Buffalo number should be increased in Punjab and also in other hot and humid climatic regions. It is well known that these animals can tolerate higher temperature more than the cross bred. The cost of milk production is very high for cross bred rearing as compared to indigenous cattle and buffalo in the regions of the study area.*

Chapter I
Introduction

1.1 Introduction:

Importance of livestock in general and dairying in particular hardly needs to be emphasized in a country like India. Dairying is one of the important sub-sectors of agriculture, next only to field crops. While about two-third of total value of output from livestock sector during 2016-17 was accounted by milk group followed by about one-fifth share by meat group, the use of dung as fuel with a contribution of 5.54 per cent also significantly contributed in total value derived from livestock sector at current prices[1]. India ranks first in the world in terms of milk production, which has increased from 17 million tonnes in 1950-51 to 176.35 million tonnes in 2017-18. 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 farmers, 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. The dairy co-operatives have created a strong positive impact on the social and economic life of the rural India. In India, 80 million women were engaged in the dairy farm activities and thus it is a pivotal means of livelihood for the poor in India[2]. 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 fact that dairying could play a more constructive role in promoting rural welfare and reducing poverty is increasingly being recognized.

It is generally believed that farmers who integrate dairy with farming do not commit suicide because small dairy operations supplement their income[2]. However, during the last few years, production has been steadily increasing. Therefore, over-production of milk resulted in a price crash and milk prices have reduced by 20 to 30

[1] https://www.nddb.coop/information/stats/outputvalue
[2] https://www.rediff.com/business/interview/why-indias-milk-producers-are-angry/20180717.htm

per cent thereby slashing of profit margins. While dairy farmers are suffering from low prices, consumers are paying a high price for milk. Recently a protest by Farmers organisations in Maharashtra[2] came to limelight in which a hike of Rs 5 per litre in the milk procurement price was demanded. Alternately it was threatened to suspend milk supply to Mumbai and Pune. In several districts milk tankers were blocked by protesters, even emptying milk on the roads. Many farmers with cows and buffaloes seem helpless in overcoming the situation of the oversupply of milk which seems to be destroying their livelihood. Given such scenario the profitability of dairy farms on the basis of activity indices and economic analysis is very important to get optimal decisions in investments in these sectors.

1.2 Need of the Study:

Milk production alone involves more than 70 million producers, each raising mostly one or two cows/buffaloes primarily for milk production (Meena et al, 2015). Generally, a milk producer can increase his dairy income in two ways either by increasing the milk production or by reducing cost of milk production. Cost plays an important role in portraying economic viability of a dairy enterprise. It is a critical economic indicator for milk producers, consumers and policy makers in order to provide an effective linkage between the milk producers and consumers for fixing the price of milk rationally. Cost of milk production often becomes a policy issue, when milk producers complain that the price of milk they are getting does not cover cost of milk production. One of the main problems identified is the lack of awareness among dairy producers, especially small operators, regarding their costs of production and financial breakeven point. It is important for producers to identify how they can reduce costs without reducing milk production (Seitzer[3], 2018). Break-even point is often used to estimate the minimum quantity of milk to be produced to cover the total cost of milk production. A comparison across all size of household groups for both the cow and buffaloes can be resourceful in various decision-making. Breakeven point is a point where 'no-profit-no-loss' status is reached. The costs that have to be covered by the milk price determine the break-even point. With these considerations, it was felt necessary to study the comparative analysis of per litre cost of milk production as well

[3] https://www.apec.umn.edu/sites/apec.umn.edu/files/breakeven-analysis-and-projected-future-earnings-for-a-standard-dairy-operation.pdf

as break even analysis for the two groups - members and non-members of dairy cooperative society for two categories (small and medium) in case of milch cows and buffaloes. In view of above, the present study was undertaken with the following specific objectives.

1.3 Objectives of the study:

The specific objectives of the study are as follows:

i) To analyse the fixed and operational expenses in dairy farming, and use this data to compute the break-even output of milk for cows and buffaloes.

ii) To explore differences between opportunity cost of dairy enterprise vis-a-vis prevailing market rate and its impact on breakeven analysis.

iii) To examine the constraints in milk production and feeding management and suggest suitable measures for sustainable growth in dairy.

iv) Explore whether dairy production is strongly and positively associated with improvement in rural livelihoods, in terms of income per capita, across all landholding / landless groups.

The details of the sampling and analytical framework for fulfilling the above objectives are presented further.

1.4 Data Sources

The main focus of the study was to know the break-even point to estimate the minimum quantity of milk to be produced to cover the total cost of milk production for both the cows and buffaloes by dairy members and non-member households. The study is based on primary level data pertaining to all the costs that are incurred in production of milk, using the sampling design described further.

1.5 Survey Design

1.5.1 Sampling Framework

The primary data was collected from the randomly selected members of Primary Dairy Cooperative Society (DCS) and Non-Member Dairy Society Households (NDCS), on recall basis, using pre-tested structured schedules/questionnaires for the year 2018-19. The schedules were pre-tested through personal interviews as well as

through focus group discussion. Focus group discussion was conducted in each selected village cluster to get clarity regarding the local scenario related to various aspects of dairy in selected study area before conducting the personal interviews.

Selection of States and Milk Unions:

NDP I was being implemented in 18 major milk producing states. The study was undertaken in one state in each of the four regions of the country, i.e. North, South, East and West. Accordingly, Punjab, Karnataka, Bihar and Gujarat states were selected. Two typical districts / milk unions from each selected State were selected from the different agro-climatic zones in each State. In total, 8 districts / milk unions were selected for the study. Accordingly, the selected States and Milk Unions are presented in Tables 1.1 and 1.2 and the area is depicted in Map 1.1 using a round box area.

Table 1.1: Selected States and Milk Unions for the study

Sr. No.	Selected States	Selected Milk Unions
1	Punjab	Ludhiana and Ropar
2	Karnataka	Bengaluru and Belgaum
3	Bihar	Mithila and Barauni
4	Gujarat	Surat and Maahi, Rajkot/ Junagadh

Map 1.1: Location Map of Selected States for the Study

Table 1.2: Details of Selected Milk Producers' Cooperative Unions in Selected States of India

Sr No	Name of Milk Producers' Cooperative Union	District	ACZ[4]	Region
(I)	**Punjab**			
1	The Ropar Dist. Cooperative Milk Producers Union Ltd. Opp. ISBT Mohali, Phase 6, Near Dara Studio, Mohali, Punjab	Mohali/ Ropar	II	Undulating plain zone
2	The Ludhiana Dist. Coop. Milk Producers Union Ltd. Verka Ludhiana Dairy Jagraon Road, Ludhiana-141004, Punjab	Ludhiana	III	Central plain zone
(II)	**Karnataka**			
1	The Bangalore Urban & Rural District Coop. Milk Producers Society Union Ltd., MH Marigowda Road, Bangalore, Karnataka	Bangalore	V	Eastern Dry Zone
2	Belgaum District Co-operative Milk Producers' Societies' Union Limited, Belagavi Dairy Premises, Kanbargi Road, Belgaum /Belagavi - 590 016. Karnataka	Belgaum	III	Northern Dry Zone
(III)	**Bihar**			
1	Mithila Dugdh Utpadak Sahakari Sangh Ltd., Industrial Area, P.O. Harpur Alowth, Dist: Samastipur	Samastipur	I	North Western
2	Deshratna Dr.Rajendra Prasad Dugdh Utpadak Sahkari Sangh Ltd., Barauni Dairy Makhan Sala Road Begusarai Bihar 851112	Barauni/ Begusarai	II	North Western
(IV)	**Gujarat**			
1	Maahi Milk Producer Company Limited, Rajkot	Junagadh/ Porbandar	VII/ VII	South Saurashtra
2	Surat District Cooperative Milk Producer's Union Ltd., Post Box No. 501, Sumul Dairy, Surat 395 008, Gujarat	Surat	II	South Gujarat

Selection of Villages

Considering that there were less number of milk producers in one village (sample size of 250 to be taken, and generally villages had less than 250 dairy owners having milch animals less than or equal to 5) as observed during the pilot survey as well as observed while discussing with other state dairy officers, it was decided to select a village cluster comprising of 1-3 villages (one main village and two nearby villages) to accomplish the number of sample respondents per village. The village clusters were formed and then three clusters were selected in each milk union randomly from different areas in consultation with the respective milk union keeping in view total number of sample households.

Two village clusters in the area were the ones having strong cooperative structure and all selected farmers were cooperative dairy member, while the remaining one village cluster was selected from area where cooperative structure did not exist. From

[4] Agro-Climatic Zones, See, Annexure I for Map.

this area, dairy owners were selected and considered as control group in the study (the non-members of cooperative). Acknowledging the fact that there were less number of non-member DCS dairy households in one village, more than three villages were visited. Wherever sample non-DCS were lesser than the requisite number in one milk union area, same were covered in non-DCS cluster of another milk union of the same state. Total six village clusters[5] were selected from two unions in each state (four village clusters of DCS members and two village clusters of non DCS members).

Selection of members DCS and NDCS/Control group Respondents

The Village census list was collected from the selected village DCS and wherever it was not available; village census was conducted in the selected DCS villages. The village census was conducted in the selected NDCS village cluster also (one cluster having up to three villages). The data on number of milch animals for each dairy household ('in-milk' and 'dry' animals) on the day of survey was recorded. Village cluster census list included details of all dairy households of villages in that village cluster. The village census list of dairy households in village/village cluster were segregated as those having milch animals less than or equal to 5 and more than 5 animals. The dairy households having more than 5 milch animals were excluded from population. The animals that had at least calved once were included while unproductive animals were excluded from the population. The dairy households having less than or equal to 5 milch animals were divided into two groups, i.e. Small dairy household having 1-2 milch (dry + in-milk) animals and Medium household having 3-5 milch (dry + 'in-milk') animals. The proportion of small and medium dairy households was estimated and as per their proportion in total households, same proportion was adopted while selecting 250 dairy households in selected village cluster/village. Stratified Random Sampling, without Replacement method, was used in selection of sample households for primary data collection. After survey, the selected households were categorised as landless/land holders groups. The information was collected on recall basis from selected sample households covering the three seasons of agriculture year June 2018 to May 2019. Details regarding feed, milk production, sale, dairying assets, income, etc. were inquired using an elaborate questionnaire[6].

[5] See Annexure II.
[6] See Annexures VI-IX.

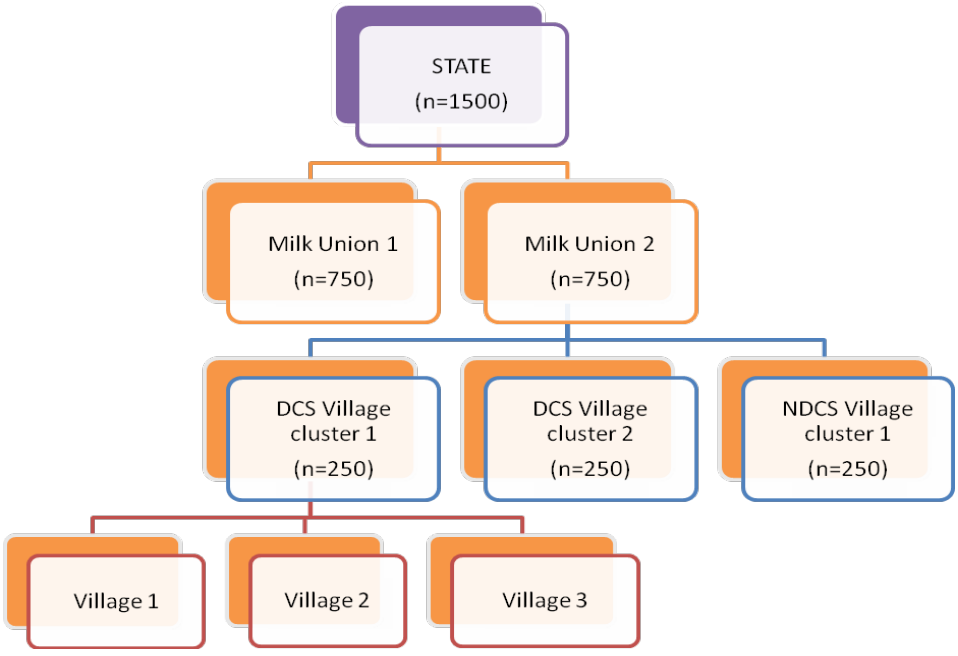
Sample Size:

Total 6000 dairy households from both project and control area in the ratio of 2:1 comprised of the total sample size for the survey. Thus total 4000 sample households were from DCS members while 2000 were non-members of DCS. From each state, total 1500 sample dairy owners were selected (Table 1.3 and Fig. 1.1). Thus, sample size for the study was selected as follows:

Table 1.3: Sampling Framework of the Study

Sr. No	States & Selected EIAs	Total Milk Producers		Total
		Cooperative Member Milk Producers (DCS)	Non-Member Milk Producers (NDCS)	
		Village Clusters-02 (250 in each village)	Village Cluster-01	
1	**Punjab**			
(i)	Ropar	500	250	750
(ii)	Ludhiana	500	250	750
2	**Karnataka**			
(i)	Belgaum	500	250	750
(ii)	Bengaluru	500	250	750
3	**Bihar**			
(i)	Mithila	500	250	750
(ii)	Barauni	500	250	750
4	**Gujarat**			
(i)	Junagadh (Maahi)	500	250	750
(ii)	Surat	500	250	750
	Overall Total	4000	2000	6000

Fig. 1.1: Sampling Framework of Study



1.5.2 Development of Survey schedule:

The survey schedule for the collection of primary data collection was developed. Four types of survey schedules were canvassed in the study area:

- **Village Census Schedule 1.0:** detailed all dairy households with number of dairy animals in selected villages.
- **Focus Group Discussion (FGD):** Before primary data collection, FGD was conducted in each village cluster (6 FGD in one State). Details inquired included certain aspects such as current practice of replacing animal in the farm for cows and buffaloes separately - cost of induction of animals at first calving, selling price at the end of productive life, and method of disposal of old animals after productive life; in case if farmer was rearing calf for selling, then cost of rearing as well as selling price of calf was captured; lactation length in months; average number of lactation in the life time of animals; age at first heat (in months); age at first calving in months; average inter-calving period in months; salvage value by animal type; average productive life of animal in years; average consumption of feed and fodder by cows and buffaloes (season-wise and variety-wise, when in lactation and when dry); dividend received from dairy society (Rs./litre); agriculture season; cattle shed land cost; milk price[7] offered by different agencies, etc.
- **PDCS Members 3.0:** for collecting detailed information about milk production from the sample dairy member households.
- **Non-members/Control Group 4.0:** for collecting detailed information about milk production from the sample non-member dairy households.

1.6 Data Analysis

Simple analytical tools like tabular analyses and graphical plots are used to present the data effectively in the report. Statistical Software such as 'R', and SPSS was used for processing of data. In order to achieve the objectives of the study, the following method/procedures were used.

1.6.1 Operational Expenses/ Variable/Paid out Cost/Direct Cost:

In order to analyze the operational expenses/variable cost/paid out cost/direct cost in dairy farming and to compute the break-even output of milk for cows and buffaloes, the following details were tabulated.

[7] In case of DCS, milk rate includes per litre rate paid plus support/bonus and or profit shared.

- *Feed Cost:* The cost incurred on green fodder, dry fodder, concentrate and supplements to feed the animals constitutes feed cost. It was calculated by multiplying quantities of feed and fodder consumed by animals with the respective prevailing market rate/s for feed and fodder in the study area. Seasonal variations, lactation/dry variations were captured for three different seasons separately, which was averaged out in total consumption. Also fodder consumption of in-milk and dry animals was adopted during visit to each household. In case if all animals were fed together, the joint cost of feed was apportioned applying standard animal units approach[8] (Ghule, et al, 2012; Bairwa, et al., 2016).
- *Labour Cost:* It includes family labour as well as paid hired labour. The hired labour cost was calculated considering time utilised in various dairy activities and wages paid. In case of family labour, prevailing wage rate of casual labour in the study area was considered.
- *Veterinary Cost:* It includes the annual cost incurred on natural service, Artificial Insemination (A.I.), vaccination, de-worming, medicines and other charges/fees of veterinary doctors.
- *Insurance Premium paid[9]:* Payment made towards insurance of animal (Rs. /animal / per annum)
- *Miscellaneous Costs:* The cost on water charges, electricity, repairs of machines, bucket, transport cost, rope, etc constituted this cost.

1.6.2 Fixed Cost

- Depreciation cost on animals per annum
- Depreciation cost on cattle sheds and fodder storage, productive assets/equipments and machinery
- Interest on Fixed capital

[8] Common Cost was apportioned on the basis of Standard Animal Units (SAU)

Type of Animal	SAU
Local Cow	1.00
Crossbred Cow	1.40
Buffalo	1.30
Buffalo /Local Cow (>1 yr)	0.50
Other Claves (<1 yr)	0.33
Crossbred heifer (>1 yr)	1.00
Crossbred heifer (>2 yr)	0.75

[9] Lal and Chandel , 2016

Depreciation:

(a) Animals

- For calculation of depreciation in the value of cows and buffaloes, the cows and buffaloes are graded according to the stages of lactation. The cows and buffaloes for I, II and III lactations are not subjected to depreciation (Sivakumar, 1993). In IV, V, VI and VII lactation periods, cows and buffaloes are subjected to a stipulated rate of depreciation on the market value (Box 1.1).

Box 1.1: Depreciation rate for Dairy Animals[10]

Particulars	Depreciation rate (%) IV & Vth lactation	Depreciation rate[11] (% per lactation) VI lactation and above
Local Cow	8	20
Crossbred Cow	12.5	20
Buffalo	10	20

(b) Animal Shed and Dairy equipment[12]

The depreciation rate for buildings and dairy equipments are given in Box 1.2. Accordingly the proportion of depreciation for lactation days and inter-calving period days were calculated

Box 1.2: Deprecation rate for Buildings and Dairy Equipments

Particulars	Depreciation rate (% per annum)
Pucca building	2
Semi-pucca building	5
Chaff cutter	5
Dairy equipments-Milk cans and petty items	5

(c) Interest on Fixed Capital

The interest on fixed capital (market value of animals, cattle shed, fodder storage and instruments used in milk production) is calculated at the rate of 8.80 per cent (MLCR[13] + 0.10%[14]).

1.6.3 Estimation of Opportunity Cost:

To explore the difference between opportunity costs of dairy enterprise vis–a-vis prevailing market rate of costs and its impact on breakeven analysis, with and without comparison is done having considered the imputed value of factors of production (home fodder & family labour). While wages under MGNREGA were also obtained, considered and compared, wages prevailing in same village in particular

[10] Sivakumar, T. (1993), https://shodhganga.inflibnet.ac.in/bitstream/10603/133344/10/10_chapter%204.pdf
[11] Depreciation rate per lactation
[12] Rao, 1991; Bairwa et al., 2016
[13] https://rbidocs.rbi.org.in- calculated av of twelve month rate of interests for June 2018 to May 2019)
[14] https://www.unionbankofindia.co.in/pdf/InterestRateofRural-AgriBusiness.pdf

period was found most appropriate to be considered for calculations and thus considered in analysis (Annexure III).

1.6.4 Estimation of Association between Dairy and Rural Households:

To explore whether dairy production is strongly and positively associated with improvement in rural livelihoods, in terms of income, across all groups, the selected households were asked to provide the details regarding sources of annual gross income for the agriculture year 2018-19. Pearson Correlation Coefficient between the income of households received from the dairy and total income were estimated to find out the association between dairy income and thus its role in rural livelihoods. The formula used was as described below:

$$r = \frac{N\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{[N\Sigma x^2 - (\Sigma x)^2][N\Sigma y^2 - (\Sigma y)^2]}}$$

Where:

- N = number of pairs of scores
- Σxy = sum of the products of paired scores
- Σx = sum of x scores
- Σy = sum of y scores
- Σx^2 = sum of squared x scores
- Σy^2 = sum of squared y scores

1.6.5 Estimation of Weighted Average:

Where-ever DCS member had sold milk to more than one agency, weighted average of price was estimated by using following formula.

$$\text{Weighted Average} = \frac{\sum Wi\, Xi}{\sum Wi}$$

where, Xi = Weighted value of an item,Wi = Weight of Xi such as sale of milk

1.6.6 Standard Error of the Mean

It is the standard deviation of the sampling distribution of the mean. The formula for the standard error of the mean is:

$$SE_{\bar{x}} = \frac{s}{\sqrt{n}}$$

where, SE- Standard Error, S = estimated Standard Deviation

1.6.7 Estimation of Break Even Point:

The studies conducted on approach and methodologies of breakeven point of dairy enterprise were reviewed. The purpose of break-even analysis is to provide a fair estimate of the impact of a marketing activity on earnings. The break-even level or

break-even point represents the sales amount, in either unit or revenue terms, that is required to cover total costs (both fixed and variable). Profit at break-even is zero. Break-even is only possible if a firm's prices are higher than its variable costs per unit. If so, then each unit of the product sold will generate some "contribution" toward covering fixed costs. In economics and business, specifically cost accounting, the Break-Even Point (BEP) is the point at which cost or expenses and revenue are equal: there is no net loss or gain, and one has "broken even." A profit or a loss has not been made, although opportunity costs have been "paid," and capital has received the risk-adjusted, expected return. In short, all costs that need to be paid are paid by the firm but the profit is equal to zero (Mahmoodieh et al, 2012; Gamechu and Meskel, 2019).

Break-even point in litres of milk $BEP_{\text{Milch Animal}} = TFC_{MA} / (ASP_{MA} - AVC_{MA})$

where, BEP_{MA} = Break-even point in litres of milk.

TFC_{MA} = Total fixed cost per milk animal in rupees (lactation or cycle).

ASP_{MA} = Average selling price per liter of milk (Rs.).

AVC_{MA} = Average variable cost per litre of milk (Rs.)

Accordingly following variety of BEPs have been estimated.

BEP calculations	Variety of animal	at market price	Opportunity Cost	at market price without Family Labour
For lactation period	Local cow	BEP (LC, MP)	BEP (LC, OC)	BEP (LC, MP-NFL)
	Cross bred cow	BEP (CB, MP)	BEP (CB, OC)	BEP (CB, MP-NFL)
	Buffalo	BEP (B, MP)	BEP (B, OC)	BEP (B, MP-NFL)
For whole cycle	Local cow	BEP (LC, MP)	BEP (LC, OC)	BEP (LC, MP-NFL)
	Cross bred cow	BEP (CB, MP)	BEP (CB, OC)	BEP (CB, MP-NFL)
	Buffalo	BEP (B, MP)	BEP (B, OC)	BEP (B, MP-NFL)

Considering no imputed cost of family labour, BEP was also estimated for per day as well as for lactation and cycle period.

BEP provides only the quantity of milk during lactation /dry period to cover fixed cost (as variable cost is already covered directly from sale price). Thus, when variable cost is more than selling price, BEP estimation cannot be done. Thus, the level of BEP, can be also reached by estimating

- Total Cost = Total Revenue…….
- BEP Actual= (TC in lactation or cycle period / TR per litre)

1.6.8 Sensitivity Analysis:

The dairy farm business has several feasible options for that can induce positive impact, all of which are very sensitive to alterations in milk prices, milk yield

and variable costs. In order to suggest suitable measures for sustainable growth in dairy, Sensitivity Analysis was carried out with six scenarios/possibilities. A sensitivity analysis determines how different values of selected independent variable affect a particular dependent variable under a given set of assumptions[15]. This model is also referred to as a 'what-if' or 'simulation analysis'. The tool helps in answering the question: "What if…?" or "What would happen if?" What if our cost decreases or milk yield increases by a certain percentage? What if the cost of an input changes? What if the family labor is not considered? This technique quantifies the outcome of a change in a single variable or a combination of selected variables that can affect the dairy enterprise profitability. It can be used to identify the critical variables and their effect on projected profitability. Sensitivity analysis allows for forecasting using true data. By studying all the variables and the possible outcomes, important decisions can be made about businesses, the economy, and about making investments.

Conducting sensitivity analysis provides a number of benefits for decision-makers. First, it acts as an in-depth study of all the variables. Because it's more in-depth, the predictions may be far more reliable. Secondly, it allows decision-makers to identify where they can make improve in future. But there are some disadvantages of using such a model. The outcomes are all based on assumptions because the variables are all based on data already collected. Hence some caution is advisable while applying the analysis for future predictions. For the current study, sensitivity analysis[16] is undertaken using following eight scenarios:

1. Scenario I: Decrease in fodder cost by 5% & Increase in milk yield by 5%
2. Scenario II: Decrease in fodder cost by 15% (Bihar and Punjab) & 13% (Gujarat and Karnataka) with increase in milk yield by 5%
3. Scenario III: Only increase in milk yield by 15%
4. Scenario IV: Increase in fodder cost by 5% & Increase in milk yield by 20%
5. Scenario V: Increase in fodder cost by 15% & Increase in milk yield by 25%
6. Scenario VI: Increase in fodder cost by 15% & Increase in milk yield by 25% with increase in milk days (up to 30 days as case may be) having minimum 60 days dry period in a cycle.
7. Scenario VII: Considering same rate for per litre of milk across the States.

[15] Reddy and Ram (1996); Becker et. al.(2007).
[16] See Annexure IV.

1.6.9 Constraints Analysis:

To examine the constraints faced during milk production and feeding management, selected households were requested to rank the listed constraints faced in milk production and feeding management (Box 1.3) which was further analyzed.

Box 1.3: Constraint in milk production and feeding management

Milk Production- Constraints

- High Feed cost
- Non Availability of Fodder
- High price for milch animal
- Low average milk yield of the milk animals
- Low milk price (Rs./lit)
- High cost of veterinary medicines
- Lack of nutritious feed for quality milk production
- Poor knowledge about feeding and healthcare
- Lack of finance to invest in dairy business for quality milk prod/Inadequate finance
- Lack of veterinary services in villages for quality milk production

Feeding Management -Constraints

- Unavailability of green/ dry fodder throughout the year
- Majority of grazing lands are either degraded or encroached
- Irregular & inadequate supply of cattle feed by PDCS
- Non availability of improved fodder seed in the market / PDCS
- High cost of cattle feed and mineral mixture
- No provision of quality seed on credit
- High Cost & Low return on fodder production
- Diversion of feed and fodder ingredients for industrial use
- Lack of necessary space required for tying the milking animals/ Poor housing
- Land is very less therefore cannot afford to put more land under fodder seed/crop production

1.7 Organization of Report

The present report is divided into six 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, data and methodology used for selection of districts/blocks/sample households, sample selection design, data analysis tools used in the study. Chapter II presents the profile of selected sample respondents. Chapter III presents the details regarding herd strength, purchase of animals, milk yield level, fixed and operational expenses/ Variable Cost/Paid out Cost/Direct Cost in dairy farming, cost of milk production and six scenarios of sensitivity analysis. Chapter IV presents the results of break even analysis under different situations. Chapter V covers the constraints faced by the milk producers. The last chapter presents summary and conclusions.

The next chapter presents the socio-economic background of the selected sample respondents.

Chapter II

Profile of Selected Dairy Households

2.1 Introduction:

Various socio-economic factors for instance size of family, education of dairy household, availability of land and off-farm income, experience in dairy, etc have direct influence on dairy farmers' decision regarding whether they want to expand and improve their dairy operations. Besides, the availability of resources such as land and other related infrastructure plays important role in dairy business. This chapter presents the profile of the selected sample dairy households.

2.2 Profile of Selected DCS and NDCS Households

The profile of selected sample dairy households is presented in Table 2.1. It can be seen from this table that the average family size of selected DCS (Dairy Cooperative Society) Households was around 5.4 members which was little higher than the NDCS households (5.0 members). The family composition from both the groups (DCS & NDCS) indicates that adult males and females accounted for around 37-40 per cent of total members in each family while remaining were children. Majority of the respondents were male while few female DCS respondents had provided the information. In fact, female respondents accounted for almost one-fourth of total respondents of DCS group while same was hardly 6 per cent in case of NDCS group, which is suggestive of the empowerment of women through development of organised dairy sector under cooperative three tier structure, especially considering that the data was collected using random methods for selection of respondents. The average age of respondents was between 41-47 years. The data related to level of education indicate that around three-fourth of both DCS and NDCS household heads were educated up to secondary level of education. The NDCS households had relatively more number of illiterate persons than the DCS households, which is significant in number (i.e. one fifth of total respondents in both the groups). Around 49 per cent of members from DCS family and 53 per cent of NDCS family were engaged in dairy activity, wherein dominance of female members was observed.

Table 2.1: Family Profile of Selected Dairy Households in Selected States of India

Sr. No	Particulars	Family Profile of Selected Households									
		Gujarat		Punjab		Karnataka		Bihar		Average	
		DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS
	n=	1000	500	1000	500	1000	500	1000	500	4000	2000
1	Gender of HH (%)										
	Male	81.3	95.4	99.8	99.2	54.0	88.8	70.6	93.0	76.4	94.1
	Female	18.7	4.6	0.2	0.8	46.0	11.2	29.4	7.0	23.6	5.9
2	Age of HH (Year)										
	Male	46.3	46.8	52.0	47.7	49.5	48.3	33.1	44.0	45.2	46.7
	Female	47.6	41.7	41.0	47.3	45.1	49.5	32.7	43.9	41.6	45.6
3	Education of respondent/HH (%)										
	Illiterate	14.5	21.8	17.4	21.6	41.2	36.8	8.4	8.4	20.4	22.2
	Literate but no formal education	8.9	12.0	15.7	12.8	14.6	23.4	41.5	44.0	20.2	23.1
	Primary	38.5	36.6	18.5	21.9	27.9	27.0	13.3	14.2	24.6	24.9
	Secondary	33.5	23.8	43.3	40.1	14.8	11.6	35.5	32.0	31.8	26.9
	Graduate	4.6	5.4	3.7	3.6	1.5	1.2	1.2	1.2	2.8	2.9
	Post Graduate	0.0	0.4	1.4	0.0	0.0	0.0	0.1	0.2	0.4	0.2
4	Av. Household Size (Nos.)										
	Male	2.0	2.1	2.2	1.5	2.3	2.1	2.2	2.1	2.2	2.0
	Female	1.9	2.1	2.0	1.4	2.2	2.2	2.0	1.9	2.0	1.9
	Children(Below 15 Year)	1.1	1.3	1.3	0.6	1.3	1.4	1.2	1.2	1.3	1.1
	Total	5.1	5.5	5.5	3.5	5.7	5.8	5.3	5.3	5.4	5.0
5	Family members works in dairy (Nos)										
	Male	1.4	1.4	1.2	1.4	1.6	1.5	0.8	1.0	1.3	1.3
	Female	1.5	1.7	1.2	1.1	1.6	1.5	1.1	1.0	1.4	1.3
	Children(Below 15 Year)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	2.9	3.2	2.4	2.5	3.3	3.0	1.9	2.0	2.6	2.7

Note: HH/hh- Household.
Source: Field survey data.

Out of the total selected samples of DCS and NDCS households (HHs), around 80-81 percent belonged to Hindu religion followed by around 18-19 per cent being Sikh (i.e. from Punjab state) and around 1 per cent were Muslim. Few Christian households were observed in NDCS group. The distribution of selected households as per social group indicates that around 78 per cent of total households were collectively, from Open and Other Backward Class (OBC) category, in which more respondents were observed to be belonging to OBC category among the DCS respondents while the NDCS household group had more respondents from Open category (Table 2.2). The share of Scheduled Caste and Scheduled Tribe category ranged between 13-20 per cent. The SC households were higher in NDCS group than DCS group while the case was opposite for Scheduled Caste population. Around 71 per cent of selected DCS households belonged to Above Poverty Line (APL) category of income level as compared to 64 per cent of NDCS households, the economic threshold

line which indicate relatively well off HHs of these households in term of income and standard of living. It may be so because of support of dairy business in keeping income level higher through continuous and guaranteed income for livelihood provided by dairy occupation. The average experience of dairy farming with selected households was around 18 years for both groups which indicate long association of selected household and dairy business. It was observed that around 30 per cent of total households maintained farm financial record as well as dairy business records. On an average, most of the dairy members had joined the dairy society about 11 years ago. More than 92 per cent households of both groups had toilets at home while NDCS households had more number of biogas plants than NDCS households.

Table 2.2: Socio-Economic Characteristics of Selected Households

Sr. No	Particulars	Socio-Economic Characteristics of Selected Households									
		Gujarat		Punjab		Karnataka		Bihar		Average	
		DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS
1	Religion (%)										
	Hindu	98.8	98.4	22.2	29.0	99.6	99.2	98.4	98.2	79.8	81.2
	Muslim	1.2	1.4	1.8	0.0	0.4	0.6	1.6	1.8	1.3	1.0
	Christian	0.0	0.2	0.0	0.2	0	0	0.0	0.0	0.0	0.1
	Sikh	0.0	0.0	76.0	70.8	0	0.2	0.0	0.0	19.0	17.8
	Other	0.0	0.0	0	0	0	0	0.0	0.0	0.0	0.0
2	Social Group (%)										
	Scheduled Tribe	50.2	42.4	1.7	2.2	2.8	3.2	0.0	0.0	13.7	12.0
	Scheduled Caste	5.6	13.8	32.4	35.0	8	11.4	18.6	19.8	16.2	20.0
	Other Backward Class	43.1	38.8	22.7	19.0	14.9	15.4	71.5	54.0	38.1	31.8
	General/Open	1.1	5.0	43.2	43.8	74.3	70	9.9	26.2	32.1	36.3
3	Income Group (%)										
	BPL	43.8	49.6	59.6	38.4	97.2	95.4	82.4	72.4	70.8	64.0
	APL	55.4	49.8	40.4	27.2	2.5	4.4	17.6	27.6	29.0	27.3
	AAY	0.8	0.6	0.0	34.4	0.3	0.2	0.0	0.0	0.3	8.8
4	Experience in Dairy (Av. years)	22.05	20.99	19.6	15.7	25.2	26.6	6.2	6.2	18.3	17.4
5	Since how long member of dairy cooperative (Av. Year)	11.92	-	11.8	-	14.2	-	6.1	-	11.0	-
6	Do you maintain farm financial record (Yes)	28.1	29.8	50.5	1.9	46.2	87.4	0.0	0.0	31.2	29.8
7	Have Facility at home (%)										
	Biogas	6.1	1.2	0.3	20.6	1.1	1.4	0.0	0.0	1.9	5.8
	Toilet	93.5	89.6	98.6	99.2	96.0	94.3	97.1	87.4	96.3	92.6

Source: Field survey data

The details regarding occupation of respondent households are presented in Table 2.3. It can be seen from the table that the main occupation of the selected DCS

households was agriculture and 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 majority of NDCS household in Gujarat reported to be engaged in animal husbandry and dairying followed by agriculture. In the state of Punjab, selected households were engaged in other activities along with agriculture and dairy activities. The subsidiary occupation for both DCS and NDCS members was dairy followed by agriculture labour. Thus, significant numbers of dairy producers are involved in dairy farming as a secondary and support activity. As noted above, around 92 per cent of DCS households possessed the agricultural land with average land holdings of 1.6 ha, while corresponding figure for NDCS household was about 85 per cent with 2.2 ha area of holdings. The DCS households have marginally higher experience in farming (of 19 years) than NDCS households (17 years).

Table 2.3: Details on Occupation and Land Holdings Size of Selected Households

Sr. No	Particulars	Occupation and Land Holdings Size of Selected Households									
		Gujarat		Punjab		Karnataka		Bihar		Average	
		DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS
1	Occupation (%)										
	Principal										
	Cultivator	70.1	42.6	47.3	47.2	93.5	95.8	96.1	90.6	76.8	69.1
	AH & Dairying	25.5	45.4	15.2	8.0	3.6	4.0	3.6	3.8	12.0	15.3
	Agri. Labour	2.9	8.8	10.7	12.8	2.6	0.2	0.3	5.6	4.1	6.9
	Nonfarm Labour	0.0	0.6	20.2	15.2	0.0	0.0	0.0	0.0	5.8	5.1
	Own Non-Farm Establishment	0.0	0.4	0.8	2.6	0.3	0.0	0.0	0.0	0.3	0.8
	Trade	0.1	0.2	1.1	2.8	0.0	0.0	0.0	0.0	0.3	0.8
	Employee in Service	1.4	2.0	1.9	6.8	0.0	0.0	0.0	0.0	0.8	2.2
	Subsidiary										
	Cultivator	17.8	8.4	20.4	20.2	1.3	0.8	3.4	3.8	10.7	8.3
	AH & Dairying	72.9	54.2	77.4	75.0	92.9	94.2	96.4	96.2	84.9	79.9
	Agri. Labour	6.9	33.6	0.5	4.8	4.9	3.4	0.2	0.0	3.1	10.5
	Nonfarm Labour	1.0	1.4	1.2	0.0	0.4	1.6	0.0	0.0	0.7	0.8
	Own Non-Farm Establishment	0.9	1.2	0.0	0.0	0.5	0.0	0.0	0.0	0.4	0.3
	Trade	0.0	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.2
	Employee in Service	0.5	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2
2	Households having land (% to total)	92.3	27.7	82.2	96.8	92.9	92.8	99.5	95.4	91.7	85.1
3	Landless hh (% to total)	7.7	22.3	17.8	3.2	7.1	7.2	0.5	4.6	8.3	14.9
4	Total Operational land holding (Av. area in ha)	1.6	2.1	3.30	4.92	1.1	1.4	0.4	0.3	1.6	2.2
5	Experience in Farming (Av. years)	21.7	15.8	14.59	12.51	26.4	27.0	12.2	13.5	18.7	17.2

Source: Field survey data

2.3 Herd Strength

India holds more than a quarter of world's bovine population (Kishore et al., 2016). From 1951 to 2012, livestock population in the country increased significantly from 292.8 million to 512.1 million. However, in the recent past, the total livestock in the country registered a decline from 529.70 million in 2007 to 512.1 million in 2012. There were some changes in the composition of livestock at national level in 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% in 1951 to 39.11% in 2012. The population of bovine stock consisting of cattle and buffalo increased at zero rate during 1992-1997 and then registered decline in 2003, increased in 2007 and then again declined in 2012. Between these two species, stock of buffaloes increased at a much faster rate than that of cattle population. The livestock density per hectare of net sown area has increased from 2.45 in 1951 to 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 point of view of milk production. 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. The adult females among cattle account for about 38.4 per cent, while for buffalo, it was 52 per cent. The rise in numbers of buffaloes is apparently noticeable in terms of ratio of buffalo to cows in the stock of adult females, or the milch animals.

It is important to have information on distribution of local and crossbred cows and buffaloes amongst selected households. The details regarding herd strength and cattle shed are presented in Table 2.4. In the DCS category 2894 HHs had up to 2 milch animals (Small) and 1106 DCS HHs had 3 to 5 milch animals (Medium). Similarly, in the NDCS category 1495 HHs had up to 2 milch animals (Small) and 505 NDCS HHs had 3 to 5 milch animals (Medium)[17]. It can be seen from the table that, across all DCS households share of buffaloes was highest followed by local cows, and then cross bred cows, while in case of NDCS households, cross bred cows were higher followed by buffaloes and the lowest was local cows.

[17] The detailed table showing the absolute number of animals is mentioned in Annexure V.

Table 2.4: Herd Strength of Selected Households (No. of Animals/household)

Sr. No	Particulars	In milk		Dry		Heifer		Calves		Total Adult Male	All Animals	Milch Animals
		n milk not Pregnant	In milk and Pregnant	Dry and pregnant	Dry and not Pregnant	Not Calved even once	Pregnant Heifer	Male	Female			
A	Gujarat											
1	DCS											
	Local Cattle	0.06	0.04	0.03	0.00	0.01	0.01	0.03	0.06	0.06	0.29	0.14
	Cross Bread	0.39	0.27	0.14	0.05	0.03	0.01	0.10	0.40	0.00	1.37	0.84
	Buffalo	0.48	0.40	0.39	0.07	0.07	0.04	0.09	0.53	0.01	2.09	1.35
	Total	0.93	0.71	0.56	0.12	0.11	0.06	0.21	0.98	0.07	3.75	2.32
2	NDCS											
	Local Cattle	0.13	0.10	0.08	0.01	0.01	0.01	0.08	0.16	0.19	0.77	0.33
	Cross Bread	0.20	0.14	0.08	0.07	0.00	0.01	0.06	0.19	0.00	0.75	0.49
	Buffalo	0.59	0.42	0.33	0.12	0.04	0.05	0.18	0.63	0.02	2.39	1.46
	Total	0.92	0.67	0.50	0.21	0.05	0.07	0.31	0.98	0.21	3.91	2.29
B	Punjab											
1	DCS											
	Local Cattle	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.05	0.03
	Cross Bread	0.39	0.18	0.12	0.03	0.07	0.04	0.05	0.12	0.13	1.13	0.72
	Buffalo	0.79	0.32	0.30	0.07	0.11	0.06	0.12	0.35	0.03	2.15	1.47
	Total	1.18	0.52	0.42	0.10	0.18	0.10	0.18	0.48	0.16	3.33	2.22
2	NDCS											
	Local Cattle	0.04	0.02	0.01	0.00	0.04	0.02	0.01	0.04	0.00	0.18	0.07
	Cross Bread	0.56	0.28	0.06	0.01	0.10	0.04	0.02	0.14	0.08	1.29	0.91
	Buffalo	0.87	0.32	0.16	0.03	0.18	0.06	0.22	0.20	0.03	2.06	1.38
	Total	1.47	0.62	0.23	0.04	0.32	0.12	0.24	0.38	0.11	3.53	2.37
C	Karnataka											
1	DCS											
	Local Cattle	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.03
	Cross Bread	2.60	0.84	0.49	0.02	0.49	0.09	0.08	0.35	0.00	4.96	1.59
	Buffalo	0.64	0.17	0.19	0.01	0.05	0.04	0.06	0.17	0.00	1.34	0.46
	Total	3.26	1.01	0.69	0.03	0.54	0.13	0.14	0.53	0.01	6.34	2.08
2	NDCS											
	Local Cattle	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.02
	Cross Bread	0.65	0.20	0.18	0.01	0.06	0.14	0.06	0.23	0.00	1.53	1.05
	Buffalo	0.45	0.04	0.14	0.01	0.02	0.06	0.05	0.27	0.00	1.05	0.64
	Total	1.12	0.25	0.32	0.02	0.09	0.20	0.11	0.51	0.00	2.61	1.70
D	Bihar											
	DCS											
	Local Cattle	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.06
	Cross Bread	0.70	0.55	0.25	0.22	0.00	0.00	0.03	0.27	0.00	2.01	1.71
	Buffalo	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.04
	Total	0.73	0.58	0.28	0.23	0.00	0.00	0.03	0.27	0.00	2.11	1.82
	NDCS											
	Local Cattle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Cross Bread	0.34	0.19	0.63	0.41	0.00	0.00	0.03	0.27	0.00	1.87	1.58
	Buffalo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	0.35	0.20	0.64	0.41	0.00	0.00	0.03	0.27	0.00	1.88	1.59
E	Average											
1	DCS	0.03	0.02	0.01	0.00	0.00	0.00	0.01	0.02	0.02	0.11	0.07
	Local Cattle	1.02	0.46	0.25	0.08	0.15	0.04	0.06	0.29	0.03	2.37	1.22
	Cross Bread	0.48	0.22	0.22	0.04	0.06	0.04	0.07	0.26	0.01	1.41	0.83
	Buffalo	1.52	0.70	0.49	0.12	0.21	0.07	0.14	0.57	0.06	3.88	2.11
	Total	0.03	0.02	0.01	0.00	0.00	0.00	0.01	0.02	0.02	0.11	0.07
2	NDCS											
	Local Cattle	0.05	0.03	0.02	0.00	0.01	0.01	0.02	0.05	0.05	0.24	0.11
	Cross Bread	0.44	0.20	0.24	0.12	0.04	0.05	0.04	0.21	0.02	1.36	1.01
	Buffalo	0.48	0.20	0.16	0.04	0.06	0.04	0.11	0.28	0.01	1.38	0.87
	Total	0.96	0.43	0.42	0.17	0.12	0.10	0.17	0.54	0.08	2.98	1.99

Source: Field survey data

It can be observed from the Tables 2.5 and 2.6 that the DCS Households had more number of cattle shed than NDCS households, while opposite picture was recorded in case of fodder storage structures. On an average, very few dairy farmers had cattle shed in both group and both the types (Kachcha and Pucca) of cattle shed were observed, with its cost around Rs. 12000/- for kachcha cattle shed while cost of Pucca cattle shed ranged between Rs.41000-64000/-. The NDCS households had less number of fodder storage structures than DCS households, cost of which was around Rs. 25000/-. Few DCS and NDCS households had borrowed funds while few of them had received subsidy in construction of cattle sheds and fodder storage.

Table 2.5: Details on Cattle Shed of Selected dairy Households

Sr No	Items	Gujarat		Punjab		Karnataka		Bihar		Average	
		Av. No./ HH	Value /shed (Rs.)	Av. No./ HH	Value /shed (Rs.)	Av. No./ HH	Value /shed (Rs.)	Av. No./ HH	Value /shed (Rs.)	Av. No. / HH	Value /shed (Rs.)
	DCS										
1	Pucca										
	Owned fund	0.59	59639	0.8	29505	0.7	96500	0.04	70286	0.5	63983
	Borrowed fund	0.01	40833	0.0	17333	0.0	0	0.00	0	0.0	14542
	Subsidy received	0.00	6875	0.0	4000	0.0	0	0.00	0	0.0	2719
2	Kachcha										
	Owned fund	0.41	10779	0.1	5589	0.3	21728	0.21	10926	0.3	12256
	NDCS									0.0	0
1	Pucca										
	Owned fund	0.32	30333	0.3	28769	0.7	107305	0.00	0	0.3	41602
	Borrowed fund	0.00				0.0	0	0.00	0	0.0	0
	Subsidy received	0.00	30000			0.0	0	0.00	0	0.0	7500
2	Kachcha										
	Owned fund	0.58	14449	0.2	6138	0.2	20267	0.66	10166	0.4	12755

Table 2.6: Fodder Storage with Selected dairy Households

Sr No	Items	Gujarat		Punjab		Karnataka		Bihar		Average	
		Av. No./ HH	Value /shed (Rs.)	Av. No./ HH	Value /shed (Rs.)	Av. No./ HH	Value /shed (Rs.)	Av. No./ HH	Value /shed (Rs.)	Av. No./ HH	Value /shed (Rs.)
	DCS										
1	Pucca										
	Owned fund	0.35	43724	1.2	39886	0.07	14364	0	0	0.4	24494
	Borrowed fund	0	55333	0	12541	0	0	0	0	0.0	16969
	Subsidy received	0.02	25150			0	0			0.0	6288
2	Kachcha										
	Owned fund	0.08	16872	0.1	2977	0.2	13256	0.25	11972	0.2	11269
	NDCS										
1	Pucca										
	Owned fund	0.31	48188	0.2	31668	0.03	18846	0	0	0.1	24676
	Borrowed fund	0	110000			0	0	0	0	0.0	27500
	Subsidy received	0	35000			0	0			0.0	8750
2	Kachcha							0	0		
	Owned fund	0.16	19763	0.1	5877	0.11	9618	0	0	0.1	8815

Source: Field survey data

Table 2.7: Holding of Productive Assets by Selected Fodder Growers Households

Sr. No	Assets per household	Productive Assets/ household (Average) No./HH									
		Gujarat		Punjab		Karnataka		Bihar		Average	
		DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS
A	**Small**										
1	Milk cans (aluminium / steel) 10 lit	0.98	0.52	0.978	0.62	1.0	0.8	0.22	1.00	0.59	0.54
2	Milk cans (aluminium / steel) 20 lit	0.10	0.07	0.083	0.01	0.6	0.3	0.003	0.00	0.10	0.05
3	Milk cans (aluminium / steel) 40 lit	0.00	0.00	0.001	0.00	0.0	0.0	0.00	0.00	0.00	0.00
4	Milking Machine	0.00	0.00	0.003	0.00	0.0	0.0	0.22	0.00	0.06	0.00
5	Grass Cutter	0.00	0.00	0.001	0.00	0.0	0.0	0.22	0.00	0.06	0.00
6	Fodder Chaffer-Manual	0.00	0.00	0.726	0.34	0.1	0.0	0.00	0.00	0.21	0.09
7	Fodder Chaffer Power	0.00	0.00	0.298	0.33	0.0	0.0	0.00	0.00	0.07	0.08
8	Fodder Harvester/mowers	0.00	0.00	0.000	0.0	0.0	0.0	0.00	0.00	0.00	0.00
9	Feed Mixer	0.00	0.00	0.000	0.0	0.0	0.0	0.00	0.00	0.00	0.00
10	Grass Chopper	0.00	0.00	0.000	0.0	0.0	0.0	0.00	0.00	0.00	0.00
11	Fan	0.33	0.11	0.776	0.65	0.0	0.0	0.00	0.00	0.28	0.19
12	Fogger	0.00	0.00	0.000	0.0	0.0	0.0	0.00	0.00	0.00	0.00
13	Biogas unit	0.00	0.00	0.000	0.0	0.0	0.0	0.00	0.00	0.00	0.00
14	Tractor Trolley	0.01	0.04	0.228	0.10	0.1	0.1	0.00	0.00	0.08	0.06
15	Mosquito net	0.01	0.01	0.004	0.00	0.1	0.0	0.00	0.00	0.03	0.00
B	**MEDIUM**									0.00	0.00
1	Milk cans (aluminium / steel) 10 lit	0.94	0.46	1.04	0.74	0.7	0.8	0.41	1.00	0.62	0.55
2	Milk cans (aluminium / steel) 20 lit	0.19	0.05	0.12	0.06	1.0	0.6	0.03	0.00	0.19	0.10
3	Milk cans (aluminium / steel) 40 lit	0.01	0.00	0.01	0.00	0.0	0.0	0.00	0.00	0.01	0.00
4	Milking Machine	0.00	0.00	0.00		0.0	0.0	0.43	1.00	0.11	0.25
5	Grass Cutter	0.00	0.00	0.00		0.0	0.0	0.36	0.00	0.09	0.00
6	Fodder Chaffer-Manual	0.00	0.00	0.54	0.23	0.0	0.0	0.02	0.00	0.14	0.06
7	Fodder Chaffer Power	0.01	0.00	0.47	0.38	0.0	0.0	0.00	0.00	0.12	0.10
8	Fodder Harvester/mowers	0.00	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00
9	Feed Mixer	0.00	0.00	0.00		0.0	0.0	0.00	0.00	0.00	0.00
10	Grass Chopper	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00	0.00	0.00
11	Fan	0.17	0.08	0.92	0.84	0.0	0.0	0.00	0.00	0.27	0.23
12	Fogger	0.00	0.00	0.00	0.02	0.0	0.0	0.00	0.00	0.00	0.01
13	Biogas unit	0.01	0.00	0.00	0.03	0.0	0.0	0.00	0.00	0.00	0.01
14	Tractor Trolley	0.05	0.03	0.33	0.26	0.1	0.2	0.00	0.00	0.12	0.07
15	Mosquito net	0.00	0.00	0.01	0.00	0.2	0.0	0.00	0.00	0.05	0.00
C	**Total**									0.00	0.00
1	Milk cans (aluminium / steel) 10 lit	0.97	0.50	1.00	0.67	0.9	0.8	0.24	1.00	0.60	0.54
2	Milk cans (aluminium / steel) 20 lit	0.13	0.06	0.10	0.03	0.6	0.3	0.01	0.00	0.11	0.10
3	Milk cans (aluminium / steel) 40 lit	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00	0.13	0.13
4	Milking Machine	0.00	0.00	0.00	0.00	0.0	0.0	0.25	1.00	0.16	0.30
5	Grass Cutter	0.00	0.00	0.00	0.00	0.0	0.0	0.24	0.00	0.11	0.03
6	Fodder Chaffer-Manual	0.00	0.00	0.66	0.30	0.1	0.0	0.02	0.00	0.17	0.08
7	Fodder Chaffer Power	0.00	0.00	0.36	0.35	0.0	0.0	0.00	0.00	0.09	0.09
8	Fodder Harvester/mowers	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00	0.00	0.00
9	Feed Mixer	0.00	0.00	0.00		0.0	0.0	0.00	0.00	0.03	0.00
10	Grass Chopper	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00	0.00	0.00
11	Fan	0.27	0.10	0.82	0.72	0.0	0.0	0.00	0.00	0.27	0.21
12	Fogger	0.00	0.00	0.00	0.01	0.0	0.0	0.00	0.00	0.00	0.00
13	Biogas unit	0.00	0.00	0.00	0.01	0.0	0.0	0.00	0.00	0.00	0.00
14	Tractor Trolley	0.03	0.04	0.26	0.16	0.1	0.1	0.00	0.00	0.07	0.05
15	Mosquito net	0.01	0.01	0.01	0.00	0.1	0.0	0.00	0.00	0.01	0.00

The holding of productive assets by selected dairy households is presented in Table 2.7. It can be seen from the table that DCS households had relatively more number of assets than NDCS group. Overall, each of the household under survey had milk can. Around 173 DCS households and 90 NDCS households had purchased the animals during the period under study (Table 2.8).

Table 2.8: Purchase of Animal during 2018-19 by selected Households

Sr. No	Particulars	All Total Nos.- Purchase of Animal during 2018-19									
		Gujarat		Punjab		Karnataka		Bihar		Average	
		DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS
A	Small										
1	Local Cattle	3	7	0	2	-	-	0	0	3	9
2	Cross Bread	6	3	10	7	36	9	1	4	53	23
3	Buffalo	15	19	58	14	11	6	0	0	84	39
B	Medium										
1	Local Cattle	12	6	0	0	-	-	0	0	12	6
2	Cross Bread		2	20	7	37	0	3	0	60	9
3	Buffalo	34	21	52	29	3	1	0	0	89	51
C	ALL										
1	Local Cattle	15	13	0	2	-	-	0	0	15	15
2	Cross Bread	6	5	30	14	73	9	4	4	113	32
3	Buffalo	49	40	110	43	14	7	0	0	173	90

Note: Other animals- other than in-milk animals.
Source: Field survey data

2.4 Source-wise Farmers' Income

The information collected regarding gross income of the sample households presented in Table 2.9 indicate that share of dairy business in total income of the household ranged between 39-45 per cent in case of DCS household while same was between 30-32 per cent for NDCS households. The correlation analysis of the income received from all sources and income received from dairy business indicate very high positive correlation and association between these two variables in DCS dairy households than NDCS dairy households. This may be due to the fact that milk pouring in dairy cooperative society has regular sales and income while NDCS households might have faced irregularity in sale of milk.

Table 2.9: Source-wise Farmer's Households Gross Income (2018-19)

Sr. No	Particulars	Source-wise Farmer's Households Gross Average Income (2018-19)-(Rs./household)									
		Gujarat		Punjab		Karnataka		Bihar		Average	
		DCS	NDCS	DCS	NDCS	DCS	DCS	NDCS	DCS	NDCS	DCS
1	Agriculture/ Cultivation	135169	87608	171080	166636	101753	109612	19990	10401	106998	93564
2	Agril Labour/ Wages	10342	23478	20265	9289	13455	10144	3113	7798	11794	12677
3	Animal farming (Sale of milk, Dung/FYM, Urine	150848	114402	40119	35848	117763	76223	115260	49266	105998	68935
4	Animal farming- sale of animal	4026	5253	5685	4743	2495	2087	560	0	3192	3021
5	Non-Farm Employment-business/ Self Employment	3496	7055	5558	10043	37610	34512	0	0	11666	12903
6	Service (Job)	6449	7157	11044	15372	25700	11858	5216	0	12102	8597
7	Any Other	1809	3758	335	11456	23004	10089	0	0	6287	6326
	Gross Annual Income	312137	248711	254087	343726	321739	254526	144139	67465	258026	228607

Table 2.10: Correlation of Dairy Income and Total Income

Sr. No	Particulars	Pearson Correlation -Correlation of Dairy Income and Total Income									
		Gujarat		Punjab		Karnataka		Bihar		Average	
		DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS	DCS	NDCS
1	Landless	0.907**	0.831**	0.338**	0.782**	0.639**	0.427**	0.998**	0.902**	0.751**	0.795**
2	Marginal (up to 1 ha)	0.906**	0.769**	0.395	0.108	0.585**	0.616**	0.786**	0.915**	0.690**	0.604**
3	Small (1-2 ha)	0.823**	0.813**	0.487**	0.064	0.605**	0.361**	0.964**	--	0.716**	0.490**
4	Semi Medium (2-4 ha)	0.810**	0.643**	0.535**	0.148	0.636**	0.361**	1.000**	--	0.792**	0.466**
5	Medium (4-10 ha)	0.653**	0.526*	0.097	0.416**	0.796**	0.191	--	--	0.343**	0.386**
6	Large (above 10 ha)	0.904*	-0.568	0.277*	0.057	-0.030	0.583	--	--	0.225*	0.029
7	ALL Significant (2 tailed)	0.741**	0.426**	0.358**	0.189**	0.492**	0.403**	0.787**	0.334**	0.690**	0.213**
8	Standard Error (%)	2.89	3.29	2.51	3.20	2.31	3.16	1.77	2.41	1.42	1.96

Notes ** Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed); NS- Not significant.

2.5 Fodder Crop Production by Dairy Farmers

The details on fodder crops grown by the selected households during the agriculture years 2018-19 are presented in Table 2.11. Jowar was the main fodder crop grown in kharif while Berseem, Maize were in rabi season.

Table 2.11: Details on Fodder Crops Grown by the Selected DCS & NDCS Households

Sr. No.	Crops	Area in ha per household (R+W+S)	
		DCS	NDCS
1	Gujarat		
	Jowar	0.36	0.19
	Maize	0.09	0.07
	Napier	0.06	0.01
	Bajra fodder	0.01	0.00
	Marvel grass	0.01	0.03
	Lucerne	0.13	0.08
	Groundnut fodder	0.00	0.03
	Total	0.65	0.42
2	Punjab		
	Jowar	0.04	0.34
	Maize	0.24	0.17
	Bajra fodder	0.20	0.29
	Berseem	0.28	0.29
	Total	0.76	1.09
3	Karnataka		
	Gini grass	0.77	-
	Napier	0.03	0.1
	Sorghum	0.41	0.9
	Total	0.44	1.0
4	Bihar		
	SSG	0.04	0.02
	Maize fodder	0.00	0.00
	Oat	0.05	0.02
	Berseem	0.00	0.00
	Total	0.10	0.03

Notes: R-Rainy; W- Winter and S- Summer seasons.

The assured and timely availability of fodder at home through fodder crops grown on the field as mentioned above has effect on the milk yield of the dairy animals. It can be seen from the Table 2.12 that average milk yield was recorded higher in winter season followed by yield in rainy season and the lowest milk yield was realised during summer season. The milk rate was higher for NDCS households than DCS households.

Table 2.12: Season-wise Milk Yield (Lit/day) and Milk rate (Rs/lit) realised by Selected HH

Sr. No	Particulars	Small				Medium				ALL			
		Rainy	Winter	Summer	Av. Milk Rate (Rs./lit)	Rainy	Winter	Summer	Av. Milk Rate (Rs./lit)	Rainy	Winter	Summer	Av. Milk Rate (Rs./lit)
I	Gujarat												
A	DCS												
1	Local cow	6.28	7.61	5.19	27.60	5.53	7.72	4.99	27.75	5.91	7.67	5.09	27.68
2	Cross Bred	9.20	10.19	7.46	24.88	10.16	11.29	8.09	25.06	9.68	10.74	7.78	24.97
3	Buffalo	8.45	9.46	6.56	44.85	8.44	9.91	6.86	45.31	8.45	9.69	6.71	45.08
B	NDCS												
1	Local cow	6.11	8.40	5.79	32.09	5.58	8.60	5.69	31.40	5.85	8.50	5.74	31.75
2	Cross Bred	8.52	9.65	6.84	27.25	8.20	9.51	6.93	29.84	8.36	9.58	6.89	28.55
3	Buffalo	8.27	9.25	7.36	44.76	8.19	9.42	7.38	45.47	8.23	9.34	7.37	45.12
II	Punjab												
A	DCS												
1	Local cow	6.0	6.3	5.7	26.6	6.0	6.2	6.3	26.6	6.0	6.2	6.0	26.6
2	Cross Bred	10.7	12.4	9.2	22.7	13.0	12.8	10.0	22.9	11.8	12.6	9.6	22.8
3	Buffalo	8.0	9.6	7.0	40.6	8.2	9.9	7.2	40.3	8.1	9.7	7.1	40.4
B	NDCS												
1	Local cow	5.8	6.2	5.2	29.1	6.0	6.7	6.1	29.4	5.9	6.4	5.7	29.2
2	Cross Bred	10.2	10.5	8.9	31.2	10.4	10.3	9.2	31.7	10.3	10.4	9.1	31.5
3	Buffalo	7.4	9.2	6.6	45.3	7.9	9.8	7.2	45.4	7.7	9.5	6.9	45.4
III	Karnataka												
A	DCS												
1	Local cow	5.43	5.43	4.21	22.21	5.67	5.67	4.00	21.67	5.55	5.55	4.11	21.94
2	Cross Bred	10.61	10.60	8.88	22.78	11.62	11.61	9.80	22.96	11.12	11.11	9.34	22.87
3	Buffalo	4.08	4.08	2.99	34.40	4.16	4.15	3.18	32.91	4.12	4.12	3.09	33.66
B	NDCS												
1	Local cow	5.70	5.70	4.20	23.90	0.00	0.00	0.00	0.00	5.70	5.70	4.20	23.90
2	Cross Bred	8.67	9.15	7.54	23.02	10.00	10.00	8.19	22.85	9.34	9.58	7.86	22.93
3	Buffalo	3.79	3.79	2.79	34.26	3.83	3.83	2.73	34.36	3.81	3.81	2.76	34.31
IV	Bihar												
A	DCS												
1	Local cow	4.76	6.76	3.95	26.67	4.78	6.72	3.89	27.89	4.77	6.74	3.92	27.23
2	Cross Bred	8.71	6.88	5.67	28.07	8.20	6.45	5.24	27.33	8.64	6.82	5.61	27.97
3	Buffalo	7.21	6.25	4.79	33.59	8.00	6.00	4.00	34.00	7.23	6.24	4.77	33.60
B	NDCS												
1	Local cow	5.45	4.45	4.00	24.55	5.40	4.40	4.00	24.60	5.44	4.44	4.00	24.56
2	Cross Bred	6.18	5.00	3.88	24.60	6.19	5.03	3.97	24.60	6.18	5.00	3.89	24.60
3	Buffalo	8.00	6.00	5.00	32.00	7.00	5.00	4.00	36.00	7.50	5.50	4.50	34.00
v	Average												
A	DCS												
1	Local cow	5.6	6.5	4.8	25.8	5.5	6.6	4.8	26.0	5.6	6.5	4.8	25.9
2	Cross Bred	9.8	10.0	7.8	24.6	10.7	10.5	8.3	24.6	10.3	10.3	8.1	24.6
3	Buffalo	6.9	7.3	5.3	38.3	7.2	7.5	5.3	38.1	7.0	7.4	5.4	38.2
B	NDCS												
1	Local cow	5.8	6.2	4.8	27.4	4.2	4.9	3.9	21.4	5.7	6.3	4.9	27.4
2	Cross Bred	8.4	8.6	6.8	26.5	8.7	8.7	7.1	27.2	8.5	8.6	6.9	26.9
3	Buffalo	6.9	7.1	5.4	39.1	6.7	7.0	5.3	40.3	6.8	7.0	5.4	39.7

Table 2.13: Standard Error (%) estimated for Seasonwise Milk Yield (Lit/day) and Milk rate

SL	Bred	DCS				NDCS			
		Rainy	Winter	Summer	Av. Milk Rate	Rainy	Winter	Summer	Av. Milk Rate
1	Local cow	2.20	2.24	2.69	0.82	0.23	0.25	0.23	0.47
2	Cross Bred	0.63	0.80	0.81	0.44	0.09	0.17	0.12	0.11
3	Buffalo	1.15	1.30	1.52	0.40	0.11	0.14	0.10	0.19

2.6 Chapter Summary

The chapter presented the profile of the respondent sample households. The profile of selected sample dairy households indicate that the average family size of selected DCS Households was around 5.4 members which was little higher than the NDCS households. The family composition from both the groups indicates that adult males and females account for around 37-40 per cent of total members in each family while remaining were children. Majority of the respondents were male while few female DCS respondents had provided the information. In fact, female respondents accounted for almost one-fourth of total respondents of DCS group while same was hardly 6 per cent in case of NDCS group, which indicate the empowerment of women through development of organised dairy sector under cooperative three tire structure. The average age of respondents was between 41-47 years. The data related to level of education indicate that around three-fourth of both DCS and NDCS household heads were educated up to secondary level of education. The NDCS households had relatively more number of illiterate persons than the DCS households. Around 49 per cent of members from DCS family and 53 per cent of NDCS family were engaged in dairy activity, while greater involvement of female members was observed.

Out of the total selected samples of DCS and NDCS households (HHs), around 80-81 percent were Hindus while around 18-19 per cent were Sikh (i.e. from Punjab state) and around 1 per cent were Muslims. Few Christian households were observed in NDCS group. The distribution of selected households as per social group indicates that around 780 per cent of total households were from Open and OBC category collectively, in which OBC category dominance was found in DCS category while Open category dominate the NDCS households group. The share of SC and ST category ranges between 13-20 per cent. The SC households were higher in NDCS group than DCS group while opposite picture was found in case of Scheduled Caste population. Around 71 per cent of selected DCS households were from APL as compared to 64 per cent of NDCS households, the economic threshold line which indicate relatively well off HHs in term of income and standard of living. It may be so because of support of dairy business in keeping income level higher through continuous and guaranteed income for livelihood provided by dairy occupation. The average experience of dairy farming with selected households was around 18 years in both groups which indicate long association of selected household and dairy business. It was observed that around 30

per cent of total households maintained farm financial record as well as dairy business records. On an average, most of the dairy members had joined the dairy society about 11 years ago. The details regarding occupation of selected fodder grower households indicate that the main occupation of the selected DCS households was agriculture comprised of cultivation of land as a farmer along with supportive allied activity of animal husbandry and dairying. As noted above, around 92 per cent of DCS households possessed the agricultural land holding with average land holdings of 1.6 ha, while corresponding figure for NDCS household was about 85 per cent with 2.2 ha area of holdings. The DCS households have marginally higher experience in farming (of 19 years) than NDCS households (17 years).

The details regarding herd strength and cattle shed shows that the DCS category 2894 HHs had up to 2 milch animals (Small) and 1106 DCS HHs had 3 to 5 milch animals (Medium). Similarly, in the NDCS category 1495 HHs had up to 2 milch animals (Small) and 505 NDCS HHs had 3 to 5 milch animals (Medium)[18]. It can be seen from the table that, across all DCS households share of buffaloes was highest followed by local cows, and then cross bred cows, while in case of NDCS households, cross bred cows were higher followed by buffaloes and the lowest was local cows.

The information collected regarding gross income of the sample households indicate that share of dairy business in total income of the household ranges between 39-45 per cent in case of DCS household while same was between 30-32 per cent for NDCS households. The correlation analysis of the income received from all sources and income received from dairy business indicate a very high positive correlation and association between two variables in DCS dairy households as compared to NDCS dairy households. This may be due to the fact that milk pouring in dairy cooperative society has regularised sale and income while NDCS households must have faced irregularity in sale of milk. Jowar was the main fodder crop grown in kharif while Berseem, Maize were in rabi season. The assured and timely availability of fodder at home through fodder crops grown on the field as mentioned above has effect on the milk yield of the dairy animals. On average milk yield was recorded higher in winter season followed by yield in rainy season and the lowest milk yield was realised during summer season. The milk rate was higher for NDCS households than DCS households.

The next chapter presents the details on cost of milk production.

[18] The detailed table showing the absolute number of animals is mentioned in Annexure III.

Chapter III

Cost of Milk Production & Sensitivity Analysis

3.1 Introduction

Milk is a raw material for the dairy industry. Therefore, feasibility and development potential of a dairy project depends upon efficient milk production and its marketing. The economic viability of livestock husbandry is dependent on the genetic potential for production, good health care, balanced feeding of animals and efficient marketing of the produce. While genetic improvement and health care are the prerequisites for sustainability, efficient feeding and marketing help in increasing the profitability. The cooperatives and private dairies procure about 20 per cent of the milk produced in the country while 32 per cent is sold in the unorganised market and about 48 per cent is consumed locally. About 40 per cent of the milk sold is handled by the organised sector and the remaining 60 per cent by the unorganised sector. However, in most of the developed nations, 90 per cent of the surplus milk is processed through organised sector (GOI, 2019). While Rajendran and Mohanty (2004) has noted that even though co-operatives provide a remunerative price to the producer, the unorganized sector also 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 buffalo. The crossbred cow population has increased over the years because of artificial insemination and improvements in management practices implemented in livestock farming. The third factor is payment policy. The private sector can pay their producers every day, whereas the co-operatives pay weekly or fortnightly. 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. Comparatively cooperatives pay back the highest share of consumer rupee to the milk producer. Besides, input services are also provided to member milk producer.

Cost plays an important role in portraying economic viability of a dairy enterprise. It is a critical economic indicator for milk producers, consumers and policy makers in order to provide an effective linkage between the milk producers and consumers for fixing the price of milk rationally. Generally, a milk producer can increase his dairy income in two ways either by increasing the milk production or by reducing cost of milk production. Cost of milk production often becomes a policy issue, when milk producers complain that the price of milk they are getting does not cover cost of milk production. Keeping the above background in mind, it is necessary to study the comparative analysis related to per litre cost of milk production for both group of member and non members of dairy cooperative society in case of milch Cow (local and cross bred cows) and buffalo.

3.2 Details of Milch Animals

There were 218 breeds[19] of livestock species in 18th livestock census[20]. India has total 137 breeds of domesticated animals, of which about 18 breeds, included some internationally recognised ones. The details on the milch animals with the selected households are presented in Table 3.1. It can be seen from the table that on an average, price for local cow ranged between Rs. 32000 to Rs. 34000, price for cross breed ranged between Rs. 36000 to Rs. 39000, while buffalo price ranged between Rs. 45000 to Rs. 49000. The average age of milch animals with selected households having 2-3 lactation period completed was between 5-7 years. The average age of calving was relatively higher in case of NDCS as compared to DCS which was around 28-38 months. During the milk cycle, around 267 to 282 days of lactation period is recorded while dry period ranged between 75 to 87 days across the breeds. Across the breed, dry period was the highest for local cows, followed by cross bred cows and the lowest was for buffaloes. The milk yield was recorded to be around 5 litres in case of local cow, 7-9 litres in cross bred and 5-6 litres for buffaloes in both groups at overall level.

[19] http://dahd.nic.in/sites/default/filess/Breding%20Survey%20Book%20-%20Corrected.pdf
[20] All scientifically accepted breds i.e. 143 breds of livestock species were considered in bred survey.

Table 3.1: Details of Milch Animals (Dry + In Milk) on Survey Date

Sr. No.	Group	Animal& Type	Details of Milch Animals[21]							
			Estimated Present Market value (Rs./ animal)	Av. Age of Animal (Years)	Av. Age at first calving (months)	Present No. of Lactation Order (Av.)	Dry Period (days)	In Milk (days)	Milk Drawn (lit/day) two times (for whole CYCLE)	Av. Milk Drawn (lit/day) two times-when 'IN MILK'
I	Gujarat									
A	DCS	LC	36126	6.9	27.2	3.4	84.3	255.6	4.2	5.7
		CB	30868	6.0	35.6	2.8	71.4	275.7	6.5	8.3
		B	60622	7.1	33.3	3.3	86.6	246.4	4.4	6.7
B	NDCS	LC	30967	6.7	38.8	3.9	72.2	267.5	4.2	5.9
		CB	29316	6.9	35.5	3.0	64.7	270.5	5.2	7.5
		B	47199	6.0	44.6	3.3	81.5	248.7	4.9	7.2
II	Punjab									
A	DCS	LC	21776	6.7	35.4	3.3	91.3	259.3	4.2	5.7
		CB	39729	6.4	37.4	3.3	77.5	286.3	7.4	9.4
		B	51297	6.8	42.8	3.2	89.3	275.7	5.2	6.9
B	NDCS	LC	28607	8.4	41.4	4.2	70.5	294.2	4.6	5.7
		CB	35722	6.2	41.0	2.5	74.2	290.8	7.6	9.6
		B	52636	6.9	46.8	2.7	75.8	289.2	5.0	6.3
III	Karnataka									
A	DCS	LC	41154	5.4	29.2	2.3	94.0	270.8	3.6	4.9
		CB	42105	5.3	29.9	2.5	106.6	257.6	7.8	11.1
		B	41916	5.7	36.3	2.2	67.7	297.3	3.6	4.4
B	NDCS	LC	30625	5.7	32.3	2.8	93.8	271.3	3.1	4.2
		CB	42894	5.1	28.6	2.4	102.4	262.1	6.0	8.3
		B	44679	5.9	36.4	2.4	66.7	298.2	2.2	2.7
IV	Bihar									
A	DCS	LC	36350	4.3	23.2	2.3	76.4	285.9	3.8	4.8
		CB	42604	4.3	23.3	2.3	76.2	285.8	4.6	5.8
		B	39366	4.1	22.7	2.0	79.8	280.6	4.6	5.9
B	NDCS	LC	40750	3.5	22.0	1.5	83.8	280.0	3.5	4.5
		CB	39873	4.2	23.4	2.2	76.0	286.1	2.5	3.1
		B	38000	4.0	24.0	2.0	75.0	290.0	4.0	5.0
V	Average									
A	DCS	LC	33852	5.8	28.7	2.8	86.5	267.9	4.0	5.3
		CB	38827	5.5	31.5	2.7	82.9	276.3	6.6	8.6
		B	48300	5.9	33.8	2.7	80.8	275.0	4.4	6.0
B	NDCS	LC	32737	6.1	33.6	3.1	80.1	278.2	3.9	5.1
		CB	36951	5.6	32.1	2.5	79.3	277.4	5.3	7.1
		B	45629	5.7	37.9	2.6	74.7	281.5	4.0	5.3

Source: Field Survey data.

3.3 Cost of Feed and Fodder:

There is a direct relation between the nutritional status of the animals and the type of feed. For getting the best results, feeding of animal need planned scientific, practical as well as economic approach. Livestock feeds are generally classified as roughages and concentrates. Roughages are further classified into green fodder and dry fodder. Green fodder is cultivated and harvested for feeding the animals in the

[21] For details, please see Annexure III.

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 fed 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.

At present, there is huge gap between demand and supply of animal feed and fodder. The increased growth of livestock population 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 fed to animals. The details on feed and fodder fed by the selected households at the time of survey as well as during earlier two seasons are presented in Tables 3.2 and 3.3. It can be seen from the tables, for both groups (dry and in-milk) mixed trend was observed in quantity of feed (dry and green fodder) given across animal type as well as type of feed and fodder. Quantity of fodder was estimated to be higher in case of NDCS households for crossbred cows, while same was higher for DCS households for local cows. DCS households prefer to feed less to dry dairy animals than in-milk animals as compared to NDCS households. Quantity of green fodder was fed more to in-milk animals by both groups (except in case of buffaloes). The selected households used fodder from both sources (self-cultivated & purchased fodder), while dominance was of self cultivated fodder (more than 95 per cent). The animals were also fed with concentrates which were mostly purchased from the market. Besides feeding the animals at stall in shed, very few selected households could send their animals for grazing out every day for few hours on their own agriculture land or common grazing land of the village.

The season-wise comparison of the fodder fed to the milch animals indicates that more quantity of green fodder was fed during the flush season while during lean season, dry fodder was used. The DCS members used more concentrates for milch animals than non-beneficiary households, which may be due to the availability and support of dairy society in providing concentrates at the village level.

Table 3.2: Details of Total Cost of Feed and Fodder- DCS- Summer season

Sr. No.	Particulars DCS-Summer	Feed Market Rate (Rs./kg)	Fodder(kg/day) -In milk period			Fodder (kg/day) - Dry period		
			Local Cattle	Cross Bred	Buffalo	Local Cattle	Cross Bred	Buffalo
I	**Gujarat**							
1	Green-Fodder	3.3	11.2	13.7	13.1	9.9	14.0	9.8
2	Dry Fodder	4.9	9.6	10.4	12.0	11.6	12.5	11.9
3	Concentrates	17.1	1.4	2.6	3.1	1.0	1.3	0.3
4	Supplements	18.3	0.1	0.2	0.1	0.2	0.3	0.0
II	**Punjab**							
1	Green-Fodder	3.2	12.3	12.8	12.9	10.0	10.5	10.6
2	Dry Fodder	3.6	11.4	11.9	11.6	11.4	12.2	11.9
3	Concentrates	18.8	1.5	3.1	3.9	0.0	0.0	0.0
4	Supplements	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III	**Karnataka**							
1	Green-Fodder	1.5	7.4	9.0	10.7	9.3	8.4	9.5
2	Dry Fodder	4.4	12.4	12.9	11.7	11.5	13.2	12.4
3	Concentrates	28.8	2.0	2.0	1.6	2.1	2.0	1.6
4	Supplements	37.1	0.9	0.4	0.8	0.5	0.5	0.7
IV	**Bihar**							
1	Green-Fodder	3.4	6.9	6.5	7.9	5.9	6.4	6.7
2	Dry Fodder	6.32	12.7	12.7	12.2	13.0	13.1	13.6
3	Concentrates	20.4	2.2	3.2	3.3	0.0	0.0	0.0
4	Supplements	9.8	0.0	0.1	0.0	0.0	0.0	0.0
V	**Average**							
1	Green-Fodder	2.9	9.4	10.5	11.1	8.7	9.8	9.1
2	Dry Fodder	4.8	11.5	12.0	11.9	11.9	12.7	12.5
3	Concentrates	21.3	1.8	2.7	3.0	0.8	0.8	0.5
4	Supplements	16.3	0.2	0.1	0.2	0.2	0.2	0.2

Source: Field Survey data.

Table 3.3: Details of Total Cost of Feed and Fodder- NDCS- Summer season

Sr. No.	Particulars DCS-Summer	Feed Market Rate (Rs./kg)	Fodder(kg/day) -In milk period			Fodder (kg/day) - Dry period		
			Local Cattle	Cross Bred	Local Cattle	Cross Bred	Local Cattle	Cross Bred
I	**Gujarat**							
1	Green-Fodder	3.2	12.8	13.5	13.0	9.7	15.4	11.5
2	Dry Fodder	4.6	11.4	10.6	12.1	11.8	12.2	12.1
3	Concentrates	17.3	1.4	2.5	3.2	1.0	1.2	0.3
4	Supplements	19.1	0.1	0.2	0.1	0.0	0.2	0.0
II	**Punjab**							
1	Green-Fodder	3.3	12.6	12.6	12.8	9.4	10.1	10.6
2	Dry Fodder	3.6	11.5	12.2	12.7	12.2	12.3	12.0
3	Concentrates	21.1	2.6	3.8	3.9	0.0	0.0	0.0
4	Supplements	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III	**Karnataka**							
1	Green-Fodder	1.8	6.3	9.1	9.8	8.0	7.9	10.9
2	Dry Fodder	5.0	12.5	13.1	11.5	12.0	13.0	12.5
3	Concentrates	29.0	2.0	1.5	1.5	2.0	1.4	1.2
4	Supplements	35.5	0.2	0.5	0.4	0.5	0.4	0.3
IV	**Bihar**							
1	Green-Fodder	3.4	6.8	6.9	0.0	6.8	6.5	**6.5**
2	Dry Fodder	6.2	13.3	12.8	0.0	13.0	12.8	13.5
3	Concentrates	20.6	0.0	**2.2**	0.0	0.0	1.0	0.5
4	Supplements	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	**Average**							
1	Green-Fodder	3.0	9.6	10.5	8.9	8.5	10.0	9.9
2	Dry Fodder	4.9	12.2	12.2	9.1	12.3	12.5	12.5
3	Concentrates	22.0	1.5	2.5	2.2	0.8	0.9	0.5
4	Supplements	13.6	0.1	0.2	0.1	0.1	0.1	0.1

Table 3.4: Fodder Consumption as per Rainy Seasons (kg / day) - DCS Households

Sr. No.	Particulars DCS-Summer	Feed Cost - Market Rate (Rs./kg)	Fodder(kg/day) -In milk period-RAINY -DCS		
			Local Cattle	Cross Bred	Buffalo
I	**Gujarat**				
1	Green-Fodder	2.8	12.0	13.5	12.0
2	Dry Fodder	4.3	7.9	7.5	11.0
3	Concentrates	17.1	2.5	4.7	2.0
4	Supplements	17.5	0.2	0.7	0.3
II	**Punjab**				
1	Green-Fodder	3.6	12.9	13.2	14.2
2	Dry Fodder	3.9	11.2	11.5	11.5
3	Concentrates	18.6	2.3	3.5	3.3
4	Supplements	25.7	0.0	0.0	0.0
III	**Karnataka**				
1	Green-Fodder	1.6	9.0	8.1	9.3
2	Dry Fodder	4.3	12.4	12.6	12.3
3	Concentrates	28.9	0.2	1.2	1.3
4	Supplements	36.3	0.0	0.1	0.1
IV	**Bihar**				
1	Green-Fodder	3.4	12.4	8.3	14.5
2	Dry Fodder	4.8	11.7	11.8	12.4
3	Concentrates	20.7	0.0	0.7	0.0
4	Supplements	10.0	0.1	0.0	0.0
V	**Average**				
1	Green-Fodder	2.9	11.5	10.8	12.5
2	Dry Fodder	4.3	10.8	10.9	11.8
3	Concentrates	21.3	1.2	2.5	1.7
4	Supplements	22.4	0.1	0.2	0.1

Note: Few households have also sent animals for grazing @ 200-300 per month.
Source: Field Survey data.

Table 3.5: Fodder Consumption as per Rainy Seasons (kg / day) - NDCS Households

Sr. No.	Particulars DCS-Summer	Feed Cost - Market Rate (Rs./kg)	Fodder(kg/day) -In milk period-RAINY -NDCS		
			Local Cattle	Cross Bred	Buffalo
I	**Gujarat**				
1	Green-Fodder	2.8	12.4	13.9	11.6
2	Dry Fodder	4.1	8.3	9.2	11.6
3	Concentrates	17.3	2.4	3.3	2.2
4	Supplements	18.8	0.2	0.7	0.2
II	**Punjab**				
1	Green-Fodder	3.5	13.7	13.6	13.5
2	Dry Fodder	3.9	12.9	11.6	12.0
3	Concentrates	20.5	2.2	3.9	3.5
4	Supplements	22.7	0.0	0.0	0.0
III	**Karnataka**				
1	Green-Fodder	1.6	9.7	8.6	9.1
2	Dry Fodder	4.7	11.6	12.7	12.2
3	Concentrates	28.9	0.9	1.6	1.2
4	Supplements	34.2	0.0	0.1	0.0
IV	**Bihar**				
1	Green-Fodder	3.4	13.8	8.3	12.0
2	Dry Fodder	5.2	12.5	11.9	13.0
3	Concentrates	20.4	0.0	2.3	3.0
4	Supplements	18.8	0.0	0.1	3.0
V	**Average**				
1	Green-Fodder	2.8	12.4	11.1	11.5
2	Dry Fodder	4.5	11.3	11.3	12.2
3	Concentrates	21.8	1.4	2.8	2.5
4	Supplements	23.6	0.1	0.2	0.8

Table 3.6: Fodder Consumption as per Winter Seasons (kg / day) - DCS Households

Sr. No.	Particulars DCS-Summer	Feed Cost - Market Rate (Rs./kg)	Fodder(kg/day) -In milk period-WINTER- DCS		
			Local Cattle	Cross Bred	Buffalo
I	**Gujarat**				
1	Green-Fodder	2.5	12.2	13.6	15.3
2	Dry Fodder	3.6	8.9	9.6	11.0
3	Concentrates	16.9	1.8	1.8	2.0
4	Supplements	17.7	0.6	0.6	0.8
II	**Punjab**				
1	Green-Fodder	3.3	12.1	13.4	14.1
2	Dry Fodder	3.9	12.3	12.0	11.5
3	Concentrates	19.6	2.3	3.5	3.5
4	Supplements	25.7	0.0	0.0	0.0
III	**Karnataka**				
1	Green-Fodder	1.3	11.4	10.8	12.5
2	Dry Fodder	4.4	10.9	12.6	10.7
3	Concentrates	28.9	1.6	2.0	1.7
4	Supplements	30.9	0.0	0.1	0.1
IV	**Bihar**				
1	Green-Fodder	3.4	15.5	12.8	18.8
2	Dry Fodder	4.8	11.4	11.5	11.1
3	Concentrates	20.7	0.0	1.0	1.1
4	Supplements	10.0	0.0	0.0	0.1
V	**Average**				
1	Green-Fodder	2.6	12.8	12.6	15.2
2	Dry Fodder	4.2	10.9	11.4	11.1
3	Concentrates	21.5	1.4	2.1	2.1
4	Supplements	21.1	0.2	0.2	0.3

Table 3.7: Fodder Consumption as per Winter Season (kg / day) - NDCS Households

Sr. No.	Particulars DCS-Summer	Feed Cost - Market Rate (Rs./kg)	Fodder(kg/day) -In milk period-WINTER- NDCS		
			Local Cattle	Cross Bred	Buffalo
I	**Gujarat**				
1	Green-Fodder	2.5	15.9	16.0	15.2
2	Dry Fodder	3.6	9.2	9.6	11.0
3	Concentrates	17.2	1.7	2.1	3.0
4	Supplements	17.4	0.6	0.6	0.8
II	**Punjab**				
1	Green-Fodder	3.7	12.5	12.9	12.5
2	Dry Fodder	4.0	13.3	12.0	12.0
3	Concentrates	20.7	2.2	3.8	3.6
4	Supplements	22.7	0.0	0.0	0.0
III	**Karnataka**				
1	Green-Fodder	1.5	11.9	11.2	12.8
2	Dry Fodder	4.7	11.6	13.4	11.2
3	Concentrates	28.9	2.1	2.0	1.6
4	Supplements	28.9	0.0	0.1	0.1
IV	**Bihar**				
1	Green-Fodder	3.4	10.0	12.6	20.5
2	Dry Fodder	4.7	11.0	11.7	12.0
3	Concentrates	20.4	0.0	1.0	1.0
4	Supplements	18.8	0.0	0.0	0.0
V	**Average**				
1	Green-Fodder	2.8	12.6	13.2	15.2
2	Dry Fodder	4.2	11.3	11.7	11.6
3	Concentrates	21.8	1.5	2.2	2.3
4	Supplements	22.0	0.2	0.2	0.2

3.4 Labor Use and Other Expenditure

As dairy activities are carried out as a complementary activity to agriculture activities, the labour use pattern by the selected sample households indicate a complete dominance of use of family labour who were engaged in both the activities. Out of total time worked in a day by family members, most of the time was spent on field and household activities while some time was also spent for dairy activities. Very few households had reported use of hired casual labour. Thus, activities of dairy were carried out by the household members. Significant involvement of women in dairy activity can be seen from the data which indicate that female play a pivotal role in all the operations. The same trend has been recorded for NDCS too.

Table 3.8: Labour Use for dairy activities by Selected Households (Rs./day/animal)

Sr. No	Particulars	Family Human Labor		Hired Human Labor	
		Male	Female	Male	Female
A	Gujarat				
1	DCS	23.65	38.52	0.13	0.04
2	NDCS	21.73	36.73	0.17	0.17
B	Punjab				
1	DCS	12.68	27.51	1.15	0.93
2	NDCS	15.08	25.78	0.37	0.42
C	Karnataka				
1	DCS	15.37	13.08	0.20	0.00
2	NDCS	22.81	8.46	0.09	0.00
D	Bihar				
1	DCS	14.62	14.46	1.86	1.65
2	NDCS	14.19	12.64	0.07	0.04
E	Average				
1	DCS	16.60	23.40	0.80	0.70
2	NDCS	18.50	20.90	0.20	0.20

Note: Average without weightage.

The details on other expenditures such as veterinary and breeding expenditure; transport cost, repair and maintenance, lights and water charges, incurred during last one year by DCS and NDCS households are presented in Table 3.9. It can be seen from the table that DCS households had incurred marginally more expenditure on the veterinary services than NDCS households. Besides, some of the selected households had incurred expenditure on medicine and doctor as and when some animals fell sick. On an average DCS household had incurred cost on medicine plus doctor fee ranging between Rs. 2.20 to Rs. 2.80/- per day/animal during the year, while corresponding figure for NDCS households was lesser and ranged between Rs. 1.0 to Rs. 2.2 per day per animal. During the visit to the field and discussion with the respondents, it was observed that despite of various efforts made by the government; availability of

veterinary doctor is one of the bottlenecks in dairy development. Thus, most of the households depend on the alternative source of veterinary advisory and medical support for their animals. All other expenditure was relatively same across the groups and types. On an average, total expenditure on other items as mentioned in the table was estimated to range between Rs. 4.66 per animal per day in case of DCS while corresponding figure was Rs. 4.48 per animal per day for NDCS households.

Table 3.9: Other Expenditures incurred by Selected Households

Sr. No	Particulars	Milch Other Expenditures (Rs./ animal/year)- all animals				
		Veterinary Cost plus vaccination, de-worming, etc	AI Cost Rs / Year	Transport Cost	Repair/ Maintenance Cost of equipment/ Home	Light, Water Charges & Insurance
A	Gujarat					
1	DCS	887.0	281.1	131.4	178.9	84.0
2	NDCS	573.1	277.4	116.8	120.5	131.4
B	Punjab					
1	DCS	1003.8	102.2	76.7	635.1	332.2
2	NDCS	854.1	310.3	0.0	843.2	197.1
C	Karnataka					
1	DCS	1106.0	47.5	0.0	0.0	98.6
2	NDCS	1617.0	73.0	0.0	0.0	164.3
D	Bihar					
1	DCS	1722.8	142.4	18.3	47.5	0.0
2	NDCS	1255.6	164.3	0.0	0.0	0.0
E	Average					
1	DCS	1179.0	142.4	58.4	215.4	128.7
2	NDCS	1076.8	208.1	29.2	240.9	123.2

3.5 Sale of Milk and Other Income:

The details on sale of milk by selected households are presented in Table 3.10. It can be seen from the table that on an average around 25 per cent of total milk produced by local cow was preferred for consumption at home by DCS households while corresponding figure for NDCS households was about 32 per cent. While 20-21 per cent of total buffaloes' milk was kept at home for consumption in both cases, very few DCS households preferred to sell milk directly to consumers. The NDCS households rather sold significant amount of milk to consumers along with major share sold to agents/private dairy. The milk rate towards sale of milk to dairy received by the DCS members ranged between Rs. 24 to Rs. 40 per liter while same was higher in case of sale of milk by NDCS members to agents or directly to consumers (Rs. 25 to Rs. 46 per liter). Thus, the sale rate realized by the non-member households on an

average for all the types of animals was higher than the rate received by the DCS households. The rate of milk was the highest for the buffalo milk followed by the local cow milk and then cross bred cows.

Table 3.10: Details on Sale of Milk by Selected households

	Particulars		Milk HH Use/ day (% of total)	Sale of Milk					
				DCS		NDCS/ Agent		Consumer, Hotel, etc.	
				Qty (% of total)	Rate Rs/Lit	Qty (% of total)	Rate Rs/Lit	Qty (% of total)	Rate Rs/Lit
A	Gujarat								
	DCS	LC	22.1	77.9	26.1	0.0	0.0	0.0	0.0
		CB	8.1	91.5	25.1	0.0	0.0	0.4	30.0
		B	19.2	80.4	43.8	0.0	0.0	0.3	50.0
	NDCS	LC	25.9	0.0	0.0	69.1	29.4	5.0	35.7
		CB	7.1	0.0	0.0	82.9	26.9	10.0	29.7
		B	17.3	0.0	0.0	71.5	47.6	11.2	53.5
B	Punjab								
	DCS	LC	38.4	58.9	25.4	1.3	30.0	1.3	25.0
		CB	27.7	72.3	23.3	0.0	0.0	0.0	0.0
		B	21.1	78.2	42.8	0.7	46.0	0.0	0.0
	NDCS	LC	26.0	0.0	0.0	70.1	30.7	3.9	30.0
		CB	21.3	0.0	0.0	71.8	23.7	6.9	28.6
		B	18.3	0.0	0.0	81.7	46.4	0.0	0.0
C	Karnataka								
	DCS	LC	19.6	80.4	23.4	0.0	0.0	0.0	0.0
		CB	6.9	93.1	24.1	0.0	0.0	0.0	0.0
		B	23.2	76.8	35.5	0.0	0.0	0.0	0.0
	NDCS	LC	32.5	0.0	0.0	67.5	24.5	0.0	0.0
		CB	12.0	0.0	0.0	88.0	24.6	0.0	0.0
		B	15.5	0.0	0.0	84.5	41.7	0.0	0.0
D	Bihar								
	DCS	LC	20.7	79.3	23.7	0.0	0.0	0.0	0.0
		CB	7.0	93.0	24.4	0.0	0.0	0.0	0.0
		B	23.4	76.6	35.9	0.0	0.0	0.0	0.0
	NDCS	LC	47.2	0.0	0.0	52.8	25.0	0.0	0.0
		CB	12.0	0.0	0.0	88.0	24.6	0.0	0.0
		B	29.1	0.0	0.0	70.9	46.8	0.0	0.0
E	Average								
	DCS	LC	25.2	74.1	24.6	0.3	30.0	0.3	25.0
		CB	12.4	87.5	24.2	0.0	0.0	0.1	30.0
		B	21.7	78.0	39.5	0.2	46.0	0.1	50.0
	NDCS	LC	32.9	0.0	0.0	64.9	27.4	2.2	32.9
		CB	13.1	0.0	0.0	82.7	24.9	4.2	29.2
		B	20.1	0.0	0.0	77.1	45.6	2.8	26.8

Table 3.11: Details of Other Income in Dairy (Annual) by Selected Households

Particulars		Milch-Self Use / Sale of FYM / Cow dung (Rs/Annum/animal)				
DCS		Gujarat	Punjab	Karnataka	Bihar	Average
Small	LC	1442	1226	1320	1704	1429
	CB	1813	1150	1286	1631	1470
	B	1958	1058	1588	1694	1575
Medium	LC	1456	975	1333	1738	1376
	CB	1838	799	1271	1528	1359
	B	2011	840	2579	1600	1758
All	LC	1453	1209	1323	1719	1426
	CB	1822	934	1279	1605	1410
	B	1993	940	1951	1692	1644
NDCS						
Small	LC	1438	511	1333	-	1094
	CB	1840	889	1289	1657	1419
	B	1981	928	1434	-	1448
Medium	LC	1425	753	1325	1625	1282
	CB	1813	662	1270	1508	1313
	B	2039	885	1813	1600	1584
All	LC	1431	618	1331	1625	1251
	CB	1827	732	1282	1614	1364
	B	2013	903	2655	1600	1793

3.6 Cost of Milk Production:

The cost of production of milk and net income realised by the sample households are presented in Tables 3.12 and 3.13. It can be seen from the tables that on an average net income realised by the DCS households was higher than NDCS households. Across the species, net return realised by the DCS and NDCS households was much higher for buffaloes followed by cross bred cows. The DCS have realised lower return on local cows than buffalo and cross bred while same was negative in case of NDCS. High margins for buffalo dairy producers may be due to high rate of sale price in both groups than rate for per litre of milk realised for the milk of local cows and cross bred cows. Therefore, there is a huge scope to enhance producers' income from dairy by enhancing animals' productivity, and ensuing remunerative prices[22].

Low productivity of milk animals is a serious constraint to dairy development. The productivity of dairy animals could be increased by cross breeding low-yielding non-descript cows with high-yielding selected indigenous pure breeds or suitable exotic breeds in a phased manner. Upgrading non-descript buffalo through selective breeding with high-yielding pure breeds should be given high priority in all areas where buffalo are well-adapted to the agro-climatic conditions.

[22] Remunerative prices determination should consider nutritional value and demand for milk for certain bred like cows and thereby increase accordingly the remunerative prices.

3.7 Sensitivity Analysis

Sensitivity analysis is an instrument that can help dairy households analyze the sensitivity of a dairy enterprise to changes in factors such as milk yield, feed cost, labor cost and market price. Six scenarios are considered for the policy formulations which can be possibly worked out and be adopted for the sustainable development of dairy sector. Tables 3.14 to 3.19 present the changes in net income per day that is possible to be realized by the DCS dairy households by adopting different strategies of reduction in fodder cost and increase in milk yield per day through various interventions, which can be used for policy formulations.

Table 3.12: Cost of Milk Production (per day per animal) in DCS HH

Sr. No	Particulars	Cost of Milk Production (Rs. per day per animal) in DCS households														
		Gujarat			Punjab			Karnataka			Bihar			Average		
		L	CB	B	L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost (VC)															
	Fodder & Feed	103.4	138.7	166.7	125.7	154.8	160.2	109.9	125.1	123.7	121.0	129.5	123.3	115.0	137.0	143.5
	Labor	47.3	66.2	61.5	48.7	68.2	63.3	20.9	29.2	27.1	23.6	33.0	30.6	35.1	49.1	45.6
	Vet. Cost	2.4	3.4	3.2	2.3	3.2	3.0	2.3	3.2	3.0	3.7	5.2	4.8	2.7	3.7	3.5
	Other	0.8	1.1	1.1	2.2	3.0	2.8	0.2	0.3	0.3	0.1	0.2	0.2	0.8	1.2	1.1
	Total	154.0	209.4	232.4	178.9	229.2	229.3	133.3	157.8	154.1	148.3	167.8	158.9	153.6	191.0	193.7
B	Fixed Cost (FC)	15.3	16.2	28.0	13.1	22.7	25.7	15.7	20.7	18.5	17.6	20.9	23.3	15.4	20.1	23.9
C	Total Cost	169.2	225.6	260.4	191.9	251.9	255.0	149.0	178.5	172.6	165.9	188.7	182.2	169.0	211.2	217.6
D	Revenue															
	Sale of Milk	194.9	269.1	403.6	191.2	304.4	393.3	141.6	303.8	149.7	146.3	202.6	212.5	168.5	270.0	289.8
	Other Income	4.0	5.0	5.5	3.0	2.7	2.7	3.6	3.5	5.3	4.7	4.4	4.6	3.8	3.9	4.5
E	Total Income	198.9	274.1	409.1	194.3	307.0	395.9	145.2	307.3	155.0	151.0	207.0	217.1	172.3	273.9	294.3
F	Net Income	**29.7**	**48.5**	**148.7**	**2.3**	**55.1**	**140.9**	**-3.8**	**128.7**	**-17.6**	**-14.9**	**18.3**	**34.9**	**3.3**	**62.7**	**76.7**
G	Cost of milk (Rs./liter)	27.2	24.0	31.4	31.6	22.2	30.7	29.4	17.0	45.7	32.2	26.9	30.0	30.0	22.1	32.9
H	Milk Yield (lit/ani/day	6.2	9.4	8.3	6.1	11.3	8.3	5.1	10.5	3.8	5.1	7.0	6.1	5.6	9.6	6.6
I	Fodder Cost (Rs./lit)	16.6	14.8	20.1	20.7	13.6	19.3	21.7	11.9	32.8	23.5	18.4	20.3	20.4	14.3	21.7
J	Ratio (MSP to FC/lit)	1.9	2.0	2.5	1.5	2.0	2.5	1.3	2.5	1.3	1.2	1.6	1.8	1.5	2.0	2.0
K	Feed Cost to VC (%)	67.2	66.2	71.7	70.3	67.5	69.9	82.5	79.3	80.3	81.5	77.2	77.6	74.9	71.7	74.1
L	Ratio of VC to Sell Price	0.8	0.8	0.6	0.9	0.7	0.6	0.9	0.5	1.0	1.0	0.8	0.7	0.9	0.7	0.6

Notes: Sale of Milk=Milk production (Home consumption + Sale)* Price; et Income =Total income – Total cost; Ratio (Milk Sale Price to Fodder Cost/litre)

The highest increase in net income was obviously recorded when assumed that fodder cost was increased by 5 percent along with milk yield increase by 20 per cent. In fact, small percentage increase in milk yield level and / or by reduction in feed and fodder cost, relatively higher percentage change in net income can be realised by the dairy households. These results highlight the need to carefully feed animals as per requirement and strategies for increase in milk yield. The main conclusion is that the

relationship between net income with milk yield and feed costs is critical. A small change in this relationship has large effects, negative or positive, on the important economic, financial and net worth measures of dairy performance.

Table 3.13: Cost of Milk Production (per day per animal) in NDCS HH

Sr. No	Particulars	Cost of Milk Production (Rs. per day per animal) in DCS households														
		Gujarat			Punjab			Karnataka			Bihar			Average		
		L	CB	B	L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost (VC)															
	Fodder & Feed	124.5	132.2	156.1	144.3	156.0	172.5	117.0	142.9	125.6	99.1	132.7		121.2	140.9	151.4
	Labor	46.0	64.4	59.8	31.3	43.9	40.7	23.1	32.3	30.0	19.3	27.0		29.9	41.9	43.5
	Vet. Cost	1.8	2.6	2.4	2.4	3.4	3.1	3.4	4.8	4.4	2.8	3.9		2.6	3.6	3.3
	Other	0.8	1.1	1.0	2.1	3.0	2.8	0.3	0.5	0.4	0.0	0.0		0.8	1.1	1.4
	Total	173.1	200.3	219.3	180.2	206.2	219.1	143.8	180.4	160.5	121.2	163.6		154.6	187.6	199.6
B	Fixed Cost – (FC)	13.2	13.3	20.5	14.3	15.2	20.2	17.4	23.3	22.1	19.8	19.7		16.2	17.9	20.9
C	Total Cost	186.3	213.6	239.8	194.4	221.4	239.3	161.2	203.7	182.6	141.0	183.3		170.7	205.5	220.6
D	Revenue															
	Sale of Milk	212.6	236.3	375.0	175.4	311.5	364.6	124.3	204.7	118.7	113.6	123.6		156.5	219.0	286.1
	Other Income	3.9	5.0	5.5	1.7	2.0	2.5	3.6	3.5	4.1	4.5	4.4		3.4	3.7	4.0
E	Total Income	216.5	241.3	380.5	177.1	313.5	367.1	127.9	208.2	122.8	118.1	128.1		159.9	222.8	290.2
F	Net Income	**30.2**	**27.7**	**140.7**	**-17.4**	**92.2**	**127.8**	**-33.3**	**4.5**	**-59.7**	**-23.0**	**-55.2**		**-10.9**	**17.3**	**69.6**
G	Cost of milk (Rs./liter)	27.8	25.8	28.9	32.4	22.4	29.8	31.0	22.8	52.8	30.5	36.5		30.4	26.9	37.1
H	Milk Yield (lit/ani/day	6.7	8.3	8.3	6.0	9.9	8.0	5.2	8.9	3.5	4.6	5.0		5.6	8.0	6.6
I	Fodder Cost (Rs./lit)	18.6	16.0	18.8	23.5	17.5	21.7	22.5	16.0	36.3	21.4	26.4		21.5	17.5	22.9
J	Ratio (MSP to FC/lit)	1.7	1.8	2.4	1.3	1.8	2.1	1.1	1.5	1.0	1.2	1.0		1.3	1.5	1.4
K	Feed Cost to VC (%)	71.9	66.0	71.2	79.7	77.5	78.9	81.4	79.2	78.3	81.8	81.1		78.4	75.1	75.8
L	Ratio of VC to Sell Price	0.8	0.8	0.6	1.0	0.7	0.6	1.1	0.9	1.3	1.0	1.3		0.8	0.7	0.6

Notes: as per Table 3.12.

Table 3.14: Sensitivity Analysis for Changes in Fodder Cost (reduction by 5%) and Milk Yield (increase by 5%) in DCS HH

Sr No	Particulars	DCS- Cost of Milk Production (Rs. per day per animal)- Decrease in fodder cost by 5% & Increase in milk yield by 5%											
		Gujarat			Punjab			Karnataka			Bihar		
		L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost												
	Fodder	98.3	131.7	158.4	119.4	147.1	152.2	104.4	118.8	117.6	114.9	123.0	117.1
	Labour	47.3	66.2	61.5	48.7	68.2	63.3	20.9	29.2	27.1	23.6	33.0	30.6
	Vet. Cost	2.4	3.4	3.2	2.3	3.2	3.0	2.3	3.2	3.0	3.7	5.2	4.8
	Other	0.8	1.1	1.1	2.2	3.0	2.8	0.2	0.3	0.3	0.1	0.2	0.2
	Total	148.8	202.5	224.1	172.6	221.5	221.3	127.8	151.5	147.9	142.3	161.3	152.7
B	Fixed Cost	15.3	16.2	28.0	13.1	22.7	25.7	15.7	20.7	18.5	17.6	20.9	23.3
C	Total Cost	164.1	218.7	252.1	185.6	244.1	247.0	143.5	172.3	166.4	159.9	182.2	176.0
D	Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sale of Milk	204.7	282.6	423.8	200.8	319.6	412.9	148.7	319.0	157.2	153.6	212.7	223.1
	Other Income	4.0	5.0	5.5	3.0	2.7	2.7	3.6	3.5	5.3	4.7	4.4	4.6
E	Total Income	208.7	287.6	429.3	203.8	322.2	415.6	152.3	322.5	162.5	158.3	217.1	227.8
F	Net Income	**44.6**	**68.9**	**177.2**	**18.2**	**78.1**	**168.6**	**8.8**	**150.2**	**-3.9**	**-1.6**	**34.9**	**51.7**
G	Net Income Increase By (%)	50.2	42.0	19.2	682.0	41.6	19.6	-330.3	16.7	-77.8	-89.5	90.6	48.1

Table 3.15: Sensitivity Analysis for Changes in Fodder Cost (reduction by 15% in Bihar and Punjab & 13% in Gujarat and Karnataka) and Milk Yield (increase by 5%) in DCS HH

Sr No	Particulars	DCS- Cost of Milk Production (Rs. per day per animal)- Changes in Fodder Cost (reduction by 15% in Bihar and Punjab & 13% in Gujarat and Karnataka) and Milk Yield (increase by 5%)											
		Gujarat			Punjab			Karnataka			Bihar		
		L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost												
	Fodder	90.0	120.7	145.1	106.8	131.6	136.2	95.6	108.8	107.7	102.8	110.0	104.8
	Labour	47.3	66.2	61.5	48.7	68.2	63.3	20.9	29.2	27.1	23.6	33.0	30.6
	Vet. Cost	2.4	3.4	3.2	2.3	3.2	3.0	2.3	3.2	3.0	3.7	5.2	4.8
	Other	0.8	1.1	1.1	2.2	3.0	2.8	0.2	0.3	0.3	0.1	0.2	0.2
	Total	140.5	191.4	210.7	160.0	206.0	205.3	119.0	141.5	138.0	130.2	148.4	140.4
B	Fixed Cost	15.3	16.2	28.0	13.1	22.7	25.7	15.7	20.7	18.5	17.6	20.9	23.3
C	Total Cost	155.8	207.6	238.7	173.1	228.7	231.0	134.7	162.3	156.5	147.8	169.3	163.7
D	Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sale of Milk	204.7	282.6	423.8	200.8	319.6	412.9	148.7	319.0	157.2	153.6	212.7	223.1
	Other Income	4.0	5.0	5.5	3.0	2.7	2.7	3.6	3.5	5.3	4.7	4.4	4.6
E	Total Income	208.7	287.6	429.3	203.8	322.2	415.6	152.3	322.5	162.5	158.3	217.1	227.8
F	Net Income	**52.9**	**80.0**	**190.6**	**30.7**	**93.6**	**184.6**	**17.6**	**160.2**	**6.0**	**10.5**	**47.9**	**64.0**
G	Net Income Increase By (%)	78.1	64.9	28.1	27.2	19.2	26.5	-561.2	24.4	-134.1	-170.5	161.3	83.4

Table 3.16: Sensitivity Analysis for Changes in Milk Yield (increase by 15%) in DCS HH

Sr No	Particulars	DCS- Cost of Milk Production (Rs. per day per animal)- Changes in Milk Yield (increase by 15%)											
		Gujarat			Punjab			Karnataka			Bihar		
		L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost												
	Fodder	103.4	138.7	166.7	125.7	154.8	160.2	109.9	125.1	123.7	121.0	129.5	123.3
	Labour	47.3	66.2	61.5	48.7	68.2	63.3	20.9	29.2	27.1	23.6	33.0	30.6
	Vet. Cost	2.4	3.4	3.2	2.3	3.2	3.0	2.3	3.2	3.0	3.7	5.2	4.8
	Other	0.8	1.1	1.1	2.2	3.0	2.8	0.2	0.3	0.3	0.1	0.2	0.2
	Total	154.0	209.4	232.4	178.9	229.2	229.3	133.3	157.8	154.1	148.3	167.8	158.9
B	Fixed Cost	15.3	16.2	28.0	13.1	22.7	25.7	15.7	20.7	18.5	17.6	20.9	23.3
C	Total Cost	169.2	225.6	260.4	191.9	251.9	255.0	149.0	178.5	172.6	165.9	188.7	182.2
D	Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sale of Milk	224.2	309.5	464.2	219.9	350.0	452.2	162.8	349.3	172.1	168.2	233.0	244.4
	Other Income	4.0	5.0	5.5	3.0	2.7	2.7	3.6	3.5	5.3	4.7	4.4	4.6
E	Total Income	228.2	314.5	469.6	222.9	352.7	454.9	166.5	352.8	177.5	172.9	237.4	249.0
F	Net Income	**58.9**	**88.9**	**209.2**	**31.0**	**100.8**	**199.9**	**17.4**	**174.3**	**4.9**	**7.0**	**48.7**	**66.8**
G	Net Income Increase By (%)	98.5	83.2	40.7	1234.5	82.8	41.9	-557.8	35.4	-127.7	-146.9	165.9	91.3

Table 3.17: Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 5%) and Milk Yield (increase by 20%) in DCS HH

Sr No		DCS- Cost of Milk Production (Rs. per day per animal)- **Assumption of** Increase in fodder cost by 5% and **increase in milk yield by 20%**											
		Gujarat			Punjab			Karnataka			Bihar		
	Particulars	L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost												
	Fodder	108.6	145.6	175.1	132.0	162.5	168.2	115.4	131.3	129.9	127.0	135.9	129.5
	Labour	47.3	66.2	61.5	48.7	68.2	63.3	20.9	29.2	27.1	23.6	33.0	30.6
	Vet. Cost	2.4	3.4	3.2	2.3	3.2	3.0	2.3	3.2	3.0	3.7	5.2	4.8
	Other	0.8	1.1	1.1	2.2	3.0	2.8	0.2	0.3	0.3	0.1	0.2	0.2
	Total	159.1	216.3	240.7	185.1	237.0	237.3	138.8	164.0	160.3	154.4	174.2	165.1
B	Fixed Cost	15.3	16.2	28.0	13.1	22.7	25.7	15.7	20.7	18.5	17.6	20.9	23.3
C	Total Cost	174.4	232.5	268.7	198.2	259.6	263.0	154.5	184.8	178.8	172.0	195.2	188.4
D	Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sale of Milk	233.9	323.0	484.3	229.5	365.2	471.9	169.9	364.5	179.6	175.5	243.1	255.0
	Other Income	4.0	5.0	5.5	3.0	2.7	2.7	3.6	3.5	5.3	4.7	4.4	4.6
E	Total Income	237.9	328.0	489.8	232.5	367.9	474.6	173.5	368.0	185.0	180.2	247.5	259.6
F	Net Income	**63.5**	**95.4**	**221.1**	**34.3**	**108.3**	**211.6**	**19.0**	**183.2**	**6.2**	**8.3**	**52.4**	**71.3**
G	Net Income Increase By (%)	113.9	96.6	48.7	1375.5	96.4	50.1	-599.5	42.3	-135.1	-155.4	185.9	104.0

Table 3.18: Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS HH

Sr No		DCS- Cost of Milk Production (Rs. per day per animal)- **Assumption of** Increase in fodder cost by 15% and **increase in milk yield by 25%**											
		Gujarat			Punjab			Karnataka			Bihar		
	Particulars	L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost												
	Fodder	118.9	159.5	191.7	144.6	178.0	184.2	126.4	143.8	142.3	139.1	148.9	141.8
	Labour	47.3	66.2	61.5	48.7	68.2	63.3	20.9	29.2	27.1	23.6	33.0	30.6
	Vet. Cost	2.4	3.4	3.2	2.3	3.2	3.0	2.3	3.2	3.0	3.7	5.2	4.8
	Other	0.8	1.1	1.1	2.2	3.0	2.8	0.2	0.3	0.3	0.1	0.2	0.2
	Total	169.5	230.2	257.4	197.7	252.4	253.3	149.8	176.5	172.7	166.5	187.2	177.4
B	Fixed Cost	15.3	16.2	28.0	13.1	22.7	25.7	15.7	20.7	18.5	17.6	20.9	23.3
C	Total Cost	184.7	246.4	285.4	210.8	275.1	279.1	165.5	197.3	191.2	184.1	208.1	200.7
D	Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sale of Milk	243.7	336.4	504.5	239.0	380.5	491.6	177.0	379.7	187.1	182.8	253.2	265.6
	Other Income	4.0	5.0	5.5	3.0	2.7	2.7	3.6	3.5	5.3	4.7	4.4	4.6
E	Total Income	247.7	341.4	510.0	242.1	383.1	494.3	180.6	383.2	192.5	187.5	257.6	270.3
F	Net Income	**62.9**	**95.0**	**224.6**	**31.3**	**108.0**	**215.2**	**15.1**	**185.9**	**1.3**	**3.5**	**49.5**	**69.6**
G	Net Income Increase By (%)	111.9	95.8	51.0	1246.0	95.9	52.7	-496.7	44.4	-107.3	-123.4	170.5	99.1

Table 3.19: Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS HHe with increase in milk days

Sr No	Particulars	DCS- Cost of Milk Production (Rs. per day per animal)- Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS hh with increase in milk days (up to 30 days as case may be) having minimum 60 days dry period in a cycle											
		Gujarat			Punjab			Karnataka			Bihar		
		L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost												
	Fodder	121.0	160.1	190.3	144.6	178.0	184.2	126.4	143.8	142.3	139.1	148.9	141.8
	Labour	47.3	66.2	61.5	48.7	68.2	63.3	20.9	29.2	27.1	23.6	33.0	30.6
	Vet. Cost	2.4	3.4	3.2	2.3	3.2	3.0	2.3	3.2	3.0	3.7	5.2	4.8
	Other	0.8	1.1	1.1	2.2	3.0	2.8	0.2	0.3	0.3	0.1	0.2	0.2
	Total	171.5	230.8	256.0	197.7	252.4	253.3	149.8	176.5	172.7	166.5	187.2	177.4
B	Fixed Cost	15.3	16.2	28.0	13.1	22.7	25.7	15.7	20.7	18.5	17.6	20.9	23.3
C	Total Cost	186.8	247.0	283.9	210.8	275.1	279.1	165.5	197.3	191.2	184.1	208.1	200.7
D	Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sale of Milk	243.7	336.4	504.5	239.0	380.5	491.6	177.0	379.7	187.1	182.8	253.2	265.6
	Other Income	4.0	5.0	5.5	3.0	2.7	2.7	3.6	3.5	5.3	4.7	4.4	4.6
E	Total Income	247.7	341.4	510.0	242.1	383.1	494.3	180.6	383.2	192.5	187.5	257.6	270.3
F	Net Income	**60.9**	**94.4**	**226.1**	**31.3**	**108.0**	**215.2**	**15.1**	**185.9**	**1.3**	**3.5**	49.5	69.6
G	Net Income Increase By (%)	105.1	94.6	52.0	986.1	96.7	51.6	-408.4	55.6	-105.4	-121.8	4940.3	92.2

Table 3.20: Sensitivity Analysis Fixed Milk Rate across the States

Sr No	Particulars	DCS- Cost of Milk Production (Rs. per day per animal)- **Assumption of** Fixed Milk Rate across the States											
		Gujarat			Punjab			Karnataka			Bihar		
		L	CB	B	L	CB	B	L	CB	B	L	CB	B
A	Variable Cost												
	Fodder	103.4	138.7	166.7	125.7	154.8	160.2	109.9	125.1	123.7	121.0	129.5	123.3
	Labour	47.3	66.2	61.5	48.7	68.2	63.3	20.9	29.2	27.1	23.6	33.0	30.6
	Vet. Cost	2.4	3.4	3.2	2.3	3.2	3.0	2.3	3.2	3.0	3.7	5.2	4.8
	Other	0.8	1.1	1.1	2.2	3.0	2.8	0.2	0.3	0.3	0.1	0.2	0.2
	Total	154.0	209.4	232.4	178.3	229.5	228.2	134.4	167.0	160.2	149.5	187.1	157.6
B	Fixed Cost	15.3	16.2	28.0	13.1	22.7	25.7	15.7	20.7	18.5	17.6	20.9	23.3
C	Total Cost	169.2	225.6	260.4	191.4	252.1	253.9	150.1	187.8	178.7	167.0	208.0	180.9
D	Revenue												
	Fixed rate of milk (Rs. /litre)	29.2	29.0	40.9	29.2	29.0	40.9	29.2	29.0	40.9	29.2	29.0	40.9
	Sale of Milk	181.3	272.6	338.9	177.0	329.2	340.1	141.6	303.8	149.7	150.0	203.7	248.9
	Other Income	4.0	5.0	5.5	3.0	2.7	2.7	3.6	3.5	5.3	4.7	4.4	4.6
E	Total Income	185.3	277.6	344.4	180.0	331.9	342.8	145.2	307.3	155.0	154.7	208.1	253.5
F	Net Income	**16.1**	**52.0**	**84.0**	**-11.4**	**79.8**	**88.8**	**-4.9**	**119.5**	**-23.6**	**-12.3**	**0.1**	**72.6**
G	Net Income (as per prices prevails in respective dairy)	29.7	48.5	148.7	2.3	55.1	140.9	-3.8	128.7	-17.6	-14.9	18.3	34.9
H	Net Income Increase By (%)	-45.8	7.2	-43.5	-495.6	45.3	-37.5	0.0	0.0	0.0	-23.3	-111.1	100.6

3.8 Chapter Summary:

The chapter presents the details regarding animals, milk production, consumption and marketable surplus at sample households. It was observed that on an average, price for local cows ranged between Rs. 32000 to Rs. 34000/-, cross breed price between Rs. 36000 to Rs. 39000/-, while buffalo price ranged between Rs. 45000 to Rs. 49000/-. The average age of milch animals with selected households having 2 to 3 lactation period completed was between 5 to 7 years. The average age of calving was relatively higher in case of NDCS as compared to DCS which was around 28 to 38 months. During the milk cycle, around 267 to 282 days lactation period is recorded while dry period ranged between 75 to 87 days across the breeds. The milk yield was recorded to be around 5 litres in case of local cow, 7 to 9 litres for cross breed cows and 5 to 6 litres for buffalo in both groups at overall level.

For both groups (dry and in-milk) mixed trend was observed in quantity of feed (dry and green fodder) given across animal type as well as type of feed and fodder. Quantity of fodder was estimated to be higher in case of NDCS households for crossbred cows, while same was higher for DCS households for local cows. DCS households prefered to feed less to dry dairy animals than milch animals as compared to NDCS households. Quantity of green fodder was fed more to in-milk animals by both groups (except in case of buffaloes). The selected households used fodder from both sources (self-cultivated & purchased fodder), while self cultivated fodder was used more (more than 95 per cent). The animals were also fed with concentrates which were mostly purchased from the market. Besides feeding the animals at stall in shed, very few selected households could send their animals for grazing out every day for few hours. The season-wise comparison of the fodder fed to the milch animals indicates that more quantity of green fodder was fed during the flush season while during lean season, dry fodder was used more. DCS members have used more concentrates than non-beneficiary households, which may be due to the availability and support of dairy society in providing concentrates at the village level.

As dairy activities are carried out as complementary activity to agriculture activities, the labour use pattern by the selected sample households indicate a complete dominance of use of family labour who were engaged in both the activities. Out of total time worked in a day by family members, most of the time was spent on field and household activities while some time was also spent for dairy activities. Very

few households had reported use of hired casual labour. Thus, activities of dairy were carried out by the household members. Significant involvement of female in dairy activity can be seen from the data which indicates that female play a pivotal role in all the operations. The same trend has been recorded in case of NDCS. The details on other expenditures such as veterinary and breeding expenditure; transport cost, repair and maintenance, lights and water charges incurred during last one year by DCS and NDCS households shows that on an average DCS household had incurred cost on medicine plus doctor fee ranging between Rs. 2.20 to Rs. 2.80/- per day/animal during the year, while corresponding figure for NDCS households was lesser and ranged between Rs. 1.0 to Rs. 2.2 per day per 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. Thus, most of the households depend on the alternative source of veterinary advisory and medical support for their animals. All other expenditure was relatively same across the groups and types. On an average, total expenditure on other items was estimated to range around Rs. 4.66 per animal per day in case of DCS while corresponding figure was Rs. 4.48/animal/day for NDCS households.

The details on sale of milk by selected households indicate that on an average around 25 per cent of total milk of local cow produced was preferred for consumption at home by DCS households while corresponding figure for NDCS households was about 32 per cent. While 20 to 21 per cent of total buffaloes' milk was kept at home for consumption in both cases, very few DCS households preferred to sell milk directly to consumers. The NDCS households rather sold significant amount of milk to consumers along with major share sold to agents/private dairy. The milk rate towards sale of milk to dairy received by the DCS members cooperatively ranged between Rs. 24 to Rs. 40 per liter while same was higher in case of sale of milk by NDCS members to agents or directly to consumers (Rs. 25 to Rs. 46 per liter). Thus, the sale rate realized by the non-member households as an average for all the types of animals was higher than the rate received by the DCS households. The rate of milk was the highest for the buffalo milk followed by the local cow milk and then cross bred cows.

The cost of production of milk and net income realised by the sample households shows that net income realised by the DCS households was higher as compared to NDCS households for all groups and for all species. Across the species,

net return realised by the DCS and NDCS households was much higher for buffalo followed by cross bred cows, while same was negative for local cows. The highest increase in net income was obviously recorded when assumed that fodder cost was increased by 5 percent along with milk yield increase by 20 per cent. High margins for buffalo dairy producers may be due to high rate of sale price in both groups than rate for per litre of milk realised for the milk of local cows and cross bred cows may be due to fat variation. Therefore, there is a huge scope to enhance producers' income from dairy by enhancing animals' productivity, improving management practise, and ensuing remunerative prices. Sensitivity analysis was carried out considering six scenarios for the policy formulations which can be possibly experimented and adopted for the sustainable development of dairy sector.

The next chapter presents the break even analysis.

Chapter IV

Break Even Analysis

4.1 Introduction:

The breakeven point analysis was done to estimate the minimum quantity of milk to be produced to cover the total cost on both the groups. For estimation of BEP for lactation period, the average fodder consumption of three season and milk sale rate were estimated. The BEP with imputed cost (e.g. home grown fodder and family labour) was also worked out.

4.2 Breakeven Level

The breakeven level of the DCS and NDCS milk producers during lactation period are presented in Table 4.1 and 4.10. It can be seen that the breakeven level of the DCS and NDCS milk producers during lactation period indicate that break-even output of milk was lowest in case of buffaloes and was the highest for cross bred cows during the lactation period. The high rate of milk for buffalo resulted in lower levels of BEP as compared to the cross bred and local cows. While in case of NDCS milk producers, mixed picture was observed. BEP level was lesser in DCS group than NDCS except in case of buffalo. While in case of paid out BEP, as it was expected the DCS households again recorded the higher net income and low level of BEP than NDCS households. During the cycle period, break even output increased while trend was observed to be the same across breeds and groups during lactation. Thus cost on labour and fodder which are important determinant of economics of milk production are actually disguised costs, not paid and are major hidden cost. Because of this reason, dairy households continue in dairy without realising the actual economics of same.

4.3 Sensitivity Analysis

As mentioned earlier, seven scenarios are considered for the policy formulations which can be possibly worked out and be adopted for the sustainable development of dairy sector. Tables 4.11 to 4.22 presents the changes in BEP level and quantity of milk required or no profit no loss positions for lactation and cycle periods.

Table 4.1: BEP of Milk Production of in milk animal/lactation of DCS households

Particulars		BEP of Milk Production of in milk animal/lactation of DCS households (Cost/Income is in Rs., Milk Yield/BEP/TMP in Litres)							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3904.4	39084.4	42988.9	1589.8	32.0	24.6	527.8	1344.2
	CB	4465.2	57869.6	62334.8	2591.1	29.2	22.3	653.4	2137.1
	B	6893.4	57352.9	64246.3	2040.2	49.4	28.1	323.7	1300.4
Punjab	L	3532.7	47829.5	51362.3	1639.2	32.0	29.2	1250.9	1604.9
	CB	6484.8	65598.8	72083.6	3247.6	27.1	20.2	946.3	2664.6
	B	7100.5	63263.8	70364.4	2292.8	47.7	27.6	354.0	1476.6
Karnataka	L	4262.2	36087.6	40349.8	1372.1	28.7	26.3	1809.8	1408.1
	CB	5341.0	40647.3	45988.3	2710.5	29.2	15.0	376.0	1574.8
	B	5497.4	45826.8	51324.2	1122.3	41.1	40.8	22855.2	1249.6
Bihar	L	5024.3	42413.0	47437.3	1471.1	29.3	28.8	9788.9	1616.6
	CB	5974.3	47955.3	53929.6	2007.3	29.5	23.9	1069.8	1829.7
	B	6541.7	44585.1	51126.8	1706.4	35.7	26.1	683.0	1431.9
Average	L	4180.9	41353.6	45534.6	1518.1	30.5	27.2	1277.6	1493.1
	CB	5566.3	53017.8	58584.1	2639.1	28.7	20.4	665.1	2039.5
	B	6508.3	52757.2	59265.4	1790.4	43.5	30.7	508.7	1363.7

Notes: TS= Total cost; TR= Total Revenue; NE- Not Estimated as variable cost exceed sale price; Cost/Income is in Rs., Milk Yield/BEP/TMP in Litres.

Table 4.2: BEP of Milk Production of in milk animal/lactation of NDCS households

Particulars		BEP of Milk Production of in milk animal/lactation of NDCS households							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3521.2	46316.7	49837.9	1790.9	32.3	25.9	543.9	1541.3
	CB	3596.5	54177.7	57774.2	2238.4	29.2	24.2	726.4	1981.6
	B	5098.8	54538.4	59637.2	2067.1	45.8	26.4	262.8	1302.6
Punjab	L	4194.4	53009.9	57204.3	1765.9	29.5	30.0	NE	1939.4
	CB	4421.0	60001.7	64422.7	2881.0	31.7	20.8	407.7	2034.1
	B	5841.2	63372.5	69213.6	2322.3	45.7	27.3	316.9	1513.9
Karnataka	L	4711.2	39013.8	43725.0	1410.5	24.6	27.7	NE	1777.3
	CB	6103.3	47294.6	53397.9	2339.7	23.3	20.2	1960.7	2289.1
	B	6591.8	47848.1	54439.9	1032.0	35.5	46.4	NE	1533.7
Bihar	L	5556.5	33926.1	39482.6	1295.0	25.5	26.2	NE	1546.8
	CB	5638.3	46790.1	52428.4	1437.5	25.5	32.6	NE	2057.3
	B	5417.1	8317.8	13735.0	1691.7	34.8	4.9	181.6	395.2
Average	L	4495.8	43066.7	47562.5	1565.6	28.0	27.4	8097	1699.3
	CB	4939.8	52066.0	57005.8	2224.1	27.4	24.4	1668.5	2079.8
	B	5737.2	43519.2	49256.4	1778.3	40.4	26.2	404	1218.1

Table 4.3: BEP of Milk Production of in milk animal/lactation of DCS households-Paid out Cost

Particulars		BEP of Milk Production of in milk animal/lactation of DCS households-Paid out Cost							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3904.4	10309.5	14214.0	1589.8	32.0	6.5	153.1	444.4
	CB	4465.2	21147.6	25612.8	2591.1	29.2	8.2	212.6	878.1
	B	6893.4	18230.8	25124.2	2040.2	49.4	8.9	170.3	508.5
Punjab	L	3532.7	15410.3	18943.0	1612.2	31.9	9.6	158.1	593.9
	CB	6484.8	19377.0	25861.7	3247.6	27.1	6.0	307.5	956.0
	B	7100.5	20086.7	27187.2	2292.8	47.7	8.8	182.6	570.5
Karnataka	L	4262.2	13473.9	17736.1	1372.1	28.7	9.8	226.3	618.9
	CB	5341.0	16305.3	21646.3	2710.5	29.2	6.0	230.3	741.2
	B	5497.4	18656.8	24154.2	1122.3	41.1	16.6	224.9	588.1
Bihar	L	5024.3	12008.8	17033.1	1471.1	29.3	8.2	237.2	580.5
	CB	5974.3	17801.7	23776.0	2007.3	29.5	8.9	289.9	806.7
	B	6541.7	10663.2	17204.9	1706.4	35.7	6.2	222.1	481.8
Average	L	4180.9	12800.6	16981.6	1511.3	30.5	8.5	190.4	557.3
	CB	5566.3	18657.9	24224.2	2639.1	28.7	7.3	259.2	843.3
	B	6508.3	16909.4	23417.6	1790.4	43.5	10.1	195.3	538.8

Note: * excluding home grown fodder and family labours.

Table 4.4: BEP of Milk Production of in milk animal/lactation of NDCS households-Paid out Cost

Particulars		BEP of Milk Production of in milk animal/lactation of NDCS households-Paid out Cost							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3521.2	16384.1	19905.3	1790.9	32.3	9.1	151.9	615.6
	CB	3596.5	22138.3	25734.8	2238.4	29.2	9.9	186.7	882.7
	B	5098.8	22937.0	28035.9	2067.1	45.8	11.1	147.0	612.4
Punjab	L	4194.4	15713.2	19907.5	1765.9	29.5	8.9	203.6	674.9
	CB	4421.0	24844.8	29265.8	3097.4	31.7	8.0	187.0	924.5
	B	5841.2	23711.4	29552.6	2322.3	45.7	10.2	164.5	646.4
Karnataka	L	4711.2	14487.8	19199.0	1410.5	24.6	10.3	328.8	780.4
	CB	6103.3	17712.6	23815.9	2339.7	23.3	7.6	387.4	1021.0
	B	6591.8	17365.9	23957.8	1032.0	35.5	16.8	353.1	674.9
Bihar	L	5556.5	5281.7	10838.2	1295.0	25.5	4.1	259.1	424.6
	CB	5638.3	15859.0	21497.3	1437.5	25.5	11	390.1	843.6
	B	5417.1	1079.6	6496.7	1691.7	34.8	0.6	158.8	186.9
Average	L	4495.8	12966.7	17462.5	1565.6	28.0	8.1	226.0	623.9
	CB	4939.8	20138.7	25078.5	2278.2	27.4	9.1	270.3	915.1
	B	5737.2	16273.5	22010.7	1778.3	40.4	9.7	186.6	544.3

Table 4.5: BEP of Milk Production of milch animal/Cycle of DCS households

Particulars		BEP of Milk Production of milch animal/Cycle of DCS households							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	53344.3	58536.5	1589.8	32.2	33.6	NE	1818.3
	CB	5621.6	71603.4	77225.0	2591.1	29.3	27.6	3363.7	2635.2
	B	9316.2	70864.4	80180.5	2040.2	49.6	34.7	625.1	1615.3
Punjab	L	4726.4	55479.9	60206.3	1639.2	32.2	33.8	NE	1871.4
	CB	8241.5	77963.0	86204.5	3247.6	27.1	24.0	2650.7	3179.1
	B	9392.2	76999.6	86391.8	2292.8	47.8	33.6	662.6	1809.0
Karnataka	L	5742.5	48322.7	54065.2	1372.1	28.9	35.2	NE	1870.5
	CB	7551.4	57701.7	65253.2	2710.5	29.3	21.3	937.8	2224.0
	B	6749.1	56124.2	62873.3	1122.3	41.4	50.0	NE	1518.9
Bihar	L	6366.1	52154.7	58520.8	1471.1	29.6	35.5	NE	1977.9
	CB	7566.4	78450.5	86016.9	2007.3	29.6	39.1	NE	2901.9
	B	8402.4	67500.5	75902.9	1706.4	35.9	39.6	NE	2112.9
Average	L	5506.8	52325.4	57832.2	1518.1	30.7	34.5	NE	1882.9
	CB	7245.2	71429.6	78674.9	2639.1	28.9	28.0	8543.4	2727.0
	B	8465.0	67872.2	76337.1	1790.4	43.7	39.5	2011.7	1747.7

Table 4.6: BEP of Milk Production of milch animal/Cycle of NDCS households

Particulars		BEP of Milk Production of milch animal/Cycle of NDCS households							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	4471.6	56997.2	61468.8	1790.9	32.5	31.8	6695.7	1891.7
	CB	4456.8	65865.2	70321.9	2238.4	29.3	29.4	NE	2400.1
	B	6769.8	67192.4	73962.1	2067.1	46.0	32.5	501.6	1607.8
Punjab	L	5199.9	64679.1	69879.0	1765.9	29.6	36.6	NE	2363.6
	CB	5545.0	70944.9	76490.0	2881.0	31.7	24.6	781.3	2411.2
	B	7370.9	73380.9	80751.8	2322.3	45.8	31.6	519.0	1763.1
Karnataka	L	6339.5	52822.6	59162.1	1410.5	24.8	37.4	NE	2381.4
	CB	8487.3	64634.8	73122.1	2339.7	23.5	27.6	NE	3114.2
	B	8065.2	58170.0	66235.2	1032.0	35.8	56.4	NE	1852.1
Bihar	L	7218.5	43972.6	51191.0	1295.0	25.8	34.0	NE	1983.1
	CB	7136.2	57580.7	64717.0	1437.5	25.7	40.1	NE	2516.4
	B	6818.1	21397.6	28215.8	1691.7	34.9	12.6	305.8	807.4
Average	L	5807.4	54617.9	60425.2	1565.6	28.2	35.0	NE	2144.4
	CB	6406.3	64756.4	71162.7	2224.1	27.6	30.4	NE	2582.6
	B	7256.0	55035.2	62291.2	1778.3	40.6	33.3	987.5	1533.2

Table 4.7: BEP of Milk Production of milch animal/Cycle of DCS households-Paid out Cost

Particulars		BEP of Milk Production of milch animal/Cycle of DCS households-Paid out Cost							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	14201.8	19394.0	1589.8	32.2	8.9	223.2	602.4
	CB	5621.6	27126.5	32748.0	2591.1	29.3	10.5	298.4	1117.5
	B	9316.2	22790.0	32106.1	2040.2	49.6	11.2	242.2	646.8
Punjab	L	4726.4	15503.1	20229.6	1612.2	32.0	9.6	210.9	631.6
	CB	8241.5	20147.1	28388.6	3247.6	27.1	6.2	394.1	1046.9
	B	9392.2	20911.1	30303.3	2292.8	47.8	9.1	243.1	634.5
Karnataka	L	5742.5	17950.5	23693.0	1372.1	28.9	13.1	362.9	819.7
	CB	7551.4	23149.2	30700.7	2710.5	29.3	8.5	363.1	1046.4
	B	6749.1	22708.0	29457.1	1122.3	41.4	20.2	318.9	711.6
Bihar	L	6366.1	14091.8	20458.0	1471.1	29.6	9.6	318.2	691.4
	CB	7566.4	24519.8	32086.2	2007.3	29.6	12.2	434.2	1082.5
	B	8402.4	15333.1	23735.5	1706.4	35.9	9.0	311.9	660.7
Average	L	5506.8	15436.8	20943.6	1511.3	30.7	10.3	270.3	682.7
	CB	7245.2	23735.6	30980.9	2639.1	28.9	9.4	371.7	1073.8
	B	8465.0	20435.5	28900.5	1790.4	43.7	12.4	270.4	661.7

Table 4.8: BEP of Milk Production of milch animal/Cycle of NDCS households-Paid out Cost

Particulars		BEP of Milk Production of milch animal/Cycle of NDCS households-Paid out Cost							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	4471.6	19620.4	24092	1790.9	32.5	11.0	207.6	741.4
	CB	4456.8	25683.5	30140.3	2238.4	29.3	11.5	250.0	1028.7
	B	6769.8	25582.2	32351.9	2067.1	46.0	12.4	201.3	703.3
Punjab	L	5199.9	21665.9	26865.8	1765.9	29.6	12.3	300.7	908.7
	CB	5545.0	25701.3	31246.3	3097.4	31.7	8.3	236.9	985.5
	B	7370.9	24571.6	31942.5	2322.3	45.8	10.6	209.3	697.4
Karnataka	L	6339.5	19652.0	25991.5	1410.5	24.8	13.9	581.0	1046.2
	CB	8487.3	23777.2	32264.5	2339.7	23.5	10.2	637.3	1374.1
	B	8065.2	20484.1	28549.3	1032.0	35.8	19.8	506.8	798.3
Bihar	L	7218.5	6836.2	14054.7	1295.0	25.8	5.3	351.5	544.5
	CB	7136.2	18622.2	25758.5	1437.5	25.7	13.0	559.1	1001.6
	B	6818.1	5174.2	11992.3	1691.7	34.9	3.1	213.8	343.2
Average	L	5807.4	16943.6	22751.0	1565.6	28.2	10.6	330.5	807.4
	CB	6406.3	23446.1	29852.4	2278.2	27.6	10.7	380.7	1083.5
	B	7256.0	18953.0	26209.0	1778.3	40.6	11.5	248.8	645.1

Table 4.9: BEP of Milk Production of milch animal/Lactation of DCS households-without Family labour

Particulars		BEP of Milk Production of milch animal/Lactation of DCS households- without family labour							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3904.4	27033.9	30938.3	1589.8	32.0	17.0	260.7	967.4
	CB	4465.2	39672.1	44137.3	2591.1	29.2	15.3	322.2	1513.2
	B	6893.4	42251.0	49144.4	2040.2	49.4	20.7	240.2	994.7
Punjab	L	3532.7	35097.9	38630.6	1639.2	32.0	21.4	333.6	1207.1
	CB	6484.8	46710.8	53195.6	3247.6	27.1	14.4	511.9	1966.4
	B	7100.5	46351.2	53451.7	2292.8	47.7	20.2	258.8	1121.7
Karnataka	L	4262.2	30475.5	34737.7	1372.1	28.7	22.2	661.3	1212.2
	CB	5341.0	33172.3	38513.3	2710.5	29.2	12.2	314.8	1318.8
	B	5497.4	37815.4	43312.8	1122.3	41.1	33.7	745.0	1054.6
Bihar	L	5024.3	37512.3	42536.6	1471.1	29.3	25.5	1306.9	1449.6
	CB	5974.3	46179.0	52153.3	2007.3	29.5	23.0	923.5	1769.4
	B	6541.7	37573.8	44115.5	1706.4	35.7	22.0	478.0	1235.5
Average	L	4180.9	32529.9	36710.8	1518.1	30.5	21.5	466.4	1203.8
	CB	5566.3	41433.5	46999.9	2639.1	28.7	16.2	445.7	1636.2
	B	6508.3	40997.9	47506.1	1790.4	43.5	24.2	337.2	1093.1

Table 4.10: BEP of Milk Production of milch animal/Cycle of DCS households-without Family labour

Particulars		BEP of Milk Production of milch animal/Cycle of DCS households-without family labour							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	37319.3	42511.5	1589.8	32.2	23.5	595.5	1320.5
	CB	5621.6	48693.2	54314.8	2591.1	29.3	18.8	534.7	1853.4
	B	9316.2	50454.8	59770.9	2040.2	49.6	24.7	374.0	1204.1
Punjab	L	4726.4	38446.1	43172.6	1639.2	32.2	23.5	542.2	1342.0
	CB	8241.5	53958.1	62199.6	3247.6	27.1	16.6	784.8	2293.9
	B	9392.2	54628.5	64020.7	2292.8	47.8	23.8	392.5	1340.5
Karnataka	L	5742.5	40761.5	46504.0	1372.1	28.9	29.7	NE	1608.9
	CB	7551.4	47133.2	54684.6	2710.5	29.3	17.4	631.8	1863.8
	B	6749.1	46288.6	53037.7	1122.3	41.4	41.2	44522.6	1281.3
Bihar	L	6366.1	46163.6	52529.7	1471.1	29.6	31.4	NE	1775.4
	CB	7566.4	81141.0	88707.4	2007.3	29.6	40.4	NE	2992.7
	B	8402.4	58902.9	67305.4	1706.4	35.9	34.5	5985.7	1873.6
Average	L	5506.8	40672.7	46179.5	1518.1	30.7	27.0	1484.2	1503.5
	CB	7245.2	57731.4	64976.6	2639.1	28.9	23.3	1306.4	2252.2
	B	8465.0	52568.7	61033.7	1790.4	43.7	31.1	671.9	1397.3

Table 4.11: BEP-Sensitivity Analysis for Changes in Fodder Cost (reduction by 5%) and Milk Yield (increase by 5%) in DCS hh (Lactation)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- Decrease in fodder cost by 5% & Increase							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3904.4	37775.9	41680.3	1669.3	32.0	22.6	418.9	1304.5
	CB	4465.2	55951.1	60416.3	2720.7	29.1	20.6	520.6	2073.1
	B	6893.4	55294.4	62187.8	2142.2	49.4	25.8	292.6	1259.5
Punjab	L	3532.7	46155.8	49688.5	1721.1	32.0	26.8	684.3	1553.8
	CB	6484.8	63383.6	69868.4	3410.0	27.0	18.6	767.1	2583.8
	B	7100.5	61054.0	68154.6	2407.4	47.6	25.4	318.7	1430.7
Karnataka	L	4262.2	34599.7	38861.9	1440.7	28.6	24.0	925.3	1357.8
	CB	5341.0	39036.4	44377.4	2846.0	29.2	13.7	345.2	1520.5
	B	5497.4	43987.2	49484.6	1178.5	41.0	37.3	1494.5	1206.8
Bihar	L	5024.3	40683.6	45707.9	1544.7	29.3	26.3	1696.2	1560.0
	CB	5974.3	46105.2	52079.5	2107.7	29.4	21.9	789.2	1768.7
	B	6541.7	42855.1	49396.8	1791.7	35.7	23.9	556.7	1384.8

Table 4.12: BEP-Sensitivity Analysis for Changes in Fodder Cost (reduction by 5%) and Milk Yield (increase by 5%) in DCS hh (Cycle)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- Decrease in fodder cost by 5% & Increase							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	51535.7	56727.9	1669.3	32.2	30.9	4056.4	1764.4
	CB	5621.6	69250.7	74872.3	2720.7	29.3	25.5	1471.6	2557.7
	B	9316.2	68414.7	77730.8	2142.2	49.6	31.9	527.6	1567.3
Punjab	L	4726.4	53666.1	58392.5	1721.1	32.1	31.2	4928.7	1816.8
	CB	8241.5	75418.0	83659.5	3410.0	27.1	22.1	1653.4	3086.9
	B	9392.2	74410.7	83802.9	2407.4	47.7	30.9	558.1	1755.5
Karnataka	L	5742.5	46332.9	52075.4	1440.7	28.9	32.2	NE	1804.5
	CB	7551.4	55412.5	62964.0	2846.0	29.3	19.5	766.8	2147.6
	B	6749.1	53872.5	60621.6	1178.5	41.3	45.7	NE	1467.4
Bihar	L	6366.1	50042.8	56408.9	1544.7	29.5	32.4	NE	1910.1
	CB	7566.4	75221.5	82788.0	2107.7	29.6	35.7	NE	2796.5
	B	8402.4	64766.7	73169.2	1791.7	35.9	36.1	NE	2039.5

Table 4.13: BEP-Sensitivity Analysis for Changes in Fodder Cost (reduction by 15% in Bihar and Punjab & 13% in Gujarat and Karnataka) and Milk Yield (increase by 5%) in DCS hh (Lactation)

Particulars		Cost of Milk Prod- Decrease in fodder cost by 15% in Bihar and Punjab & 13% in Gujarat and Karnataka and Milk Yield (increase by 5%) (Lactation)							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3904.4	35682.2	39586.6	1669.3	32.0	21.4	369.2	1239.0
	CB	4465.2	52881.5	57346.7	2720.7	29.1	19.4	460.1	1967.8
	B	6893.4	52000.8	58894.2	2142.2	49.4	24.3	274.6	1192.8
Punjab	L	3532.7	42808.2	46340.9	1721.1	32.0	24.9	497.0	1449.1
	CB	6484.8	58953.2	65438.0	3410.0	27.0	17.3	664.9	2419.9
	B	7100.5	56634.4	63734.9	2407.4	47.6	23.5	294.5	1337.9
Karnataka	L	4262.2	32218.9	36481.1	1440.7	28.6	22.4	681.0	1274.6
	CB	5341.0	36459.0	41800.0	2846.0	29.2	12.8	326.1	1432.2
	B	5497.4	41043.8	46541.2	1178.5	41.0	34.8	890.1	1135.0
Bihar	L	5024.3	37224.9	42249.2	1544.7	29.3	24.1	966.0	1442.0
	CB	5974.3	42405.0	48379.3	2107.7	29.4	20.1	640.6	1643.1
	B	6541.7	39395.1	45936.8	1791.7	35.7	22.0	478.1	1287.8

Table 4.14: BEP-Sensitivity Analysis for Changes in Fodder Cost (reduction by 15% in Bihar and Punjab & 13% in Gujarat and Karnataka) and Milk Yield (increase by 5%) in DCS hh (Cycle)

Particulars		Cost of Milk Prod- Decrease in fodder cost by 15% in Bihar and Punjab & 13% in Gujarat and Karnataka & Increase and Milk Yield (increase by 5%) (Cycle)							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	48641.9	53834.1	1669.3	32.2	29.1	1723	1674.4
	CB	5621.6	65486.5	71108.0	2720.7	29.3	24.1	1080.3	2429.1
	B	9316.2	64495.1	73811.3	2142.2	49.6	30.1	478.0	1488.3
Punjab	L	4726.4	50038.5	54765.0	1721.1	32.1	29.1	1541.3	1704.0
	CB	8241.5	70328.0	78569.6	3410.0	27.1	20.6	1272.4	2899.1
	B	9392.2	69232.9	78625.1	2407.4	47.7	28.8	494.9	1647.0
Karnataka	L	5742.5	43149.2	48891.7	1440.7	28.9	29.9	NE	1694.2
	CB	7551.4	51749.8	59301.3	2846.0	29.3	18.2	678.2	2022.7
	B	6749.1	50269.9	57019.0	1178.5	41.3	42.7	NE	1380.2
Bihar	L	6366.1	45818.9	52185.0	1544.7	29.5	29.7	NE	1767.0
	CB	7566.4	68763.7	76330.1	2107.7	29.6	32.6	NE	2578.4
	B	8402.4	59299.2	67701.6	1791.7	35.9	33.1	3022.7	1887.1

Table 4.15: BEP-Sensitivity Analysis for Changes in Milk Yield (increase by 15%) in DCS hh (lactation)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- Increase in milk yield by 15% (lactation)							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3904.4	39084.4	42988.9	1828.3	31.9	21.4	371.1	1347.7
	CB	4465.2	57869.6	62334.8	2979.8	29.1	19.4	461.4	2142.2
	B	6893.4	57352.9	64246.3	2346.2	49.3	24.4	277.1	1302.6
Punjab	L	3532.7	47829.5	51362.3	1885.1	31.9	25.4	538.1	1608.2
	CB	6484.8	65598.8	72083.6	3734.7	27.0	17.6	685.7	2667.6
	B	7100.5	63263.8	70364.4	2636.7	47.6	24.0	300.6	1477.9
Karnataka	L	4262.2	36087.6	40349.8	1577.9	28.6	22.9	748.8	1412.7
	CB	5341.0	40647.3	45988.3	3117.1	29.2	13.0	331.3	1577.1
	B	5497.4	45826.8	51324.2	1290.7	40.9	35.5	1021.5	1255.3
Bihar	L	5024.3	42413.0	47437.3	1691.8	29.2	25.1	1209.4	1623.2
	CB	5974.3	47955.3	53929.6	2308.4	29.4	20.8	693.2	1834.8
	B	6541.7	44585.1	51126.8	1962.3	35.6	22.7	507.6	1435.9

Table 4.16: BEP-Sensitivity Analysis for Changes in Milk Yield (increase by 15%) in DCS hh (Cycle)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- Increase in milk yield by 15% (Cycle)							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	53344.3	58536.5	1828.3	32.1	29.2	1787.4	1824.6
	CB	5621.6	71603.4	77225	2979.8	29.2	24.0	1083.5	2643.0
	B	9316.2	70864.4	80180.5	2346.2	49.5	30.2	482.2	1619.1
Punjab	L	4726.4	55479.9	60206.3	1885.1	32.1	29.4	1781.6	1876.5
	CB	8241.5	77963.0	86204.5	3734.7	27.1	20.9	1328.9	3183.7
	B	9392.2	76999.6	86391.8	2636.7	47.7	29.2	507.7	1811.1
Karnataka	L	5742.5	48322.7	54065.2	1577.9	28.8	30.6	NE	1878.7
	CB	7551.4	57701.7	65253.2	3117.1	29.3	18.5	701.3	2228.7
	B	6749.1	56124.2	62873.3	1290.7	41.2	43.5	NE	1527.2
Bihar	L	6366.1	52154.7	58520.8	1691.8	29.4	30.8	NE	1988.0
	CB	7566.4	78450.5	86016.9	2308.4	29.5	34.0	NE	2912.1
	B	8402.4	67500.5	75902.9	1962.3	35.8	34.4	6013.5	2120.5

Table 4.17: BEP-Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 5%) and Milk Yield (increase by 20%) in DCS hh (Lactation)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- **Assumption of** Increase in Fodder Cost (Increase in fodder cost by 5%) and Milk Yield (increase by 20%) in DCS hh (Lactation)							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3904.4	40393.0	44297.4	1907.8	31.9	21.2	364.8	1389.7
	CB	4465.2	59788.1	64253.3	3109.3	29.1	19.2	453.3	2209.6
	B	6893.4	59411.4	66304.8	2448.2	49.3	24.3	275.4	1345.0
Punjab	L	3532.7	49503.3	53036.1	1967.0	31.9	25.2	523.1	1661.5
	CB	6484.8	67814.0	74298.8	3897.1	27.0	17.4	674.6	2750.4
	B	7100.5	65473.6	72574.2	2751.3	47.6	23.8	298.3	1524.7
Karnataka	L	4262.2	37575.6	41837.8	1646.5	28.5	22.8	745.7	1466.1
	CB	5341.0	42258.2	47599.2	3252.6	29.1	13.0	330.6	1633.1
	B	5497.4	47666.5	53163.8	1346.8	40.8	35.4	1009.8	1301.9
Bihar	L	5024.3	44142.3	49166.6	1765.4	29.2	25.0	1200.2	1684.3
	CB	5974.3	49805.4	55779.8	2408.8	29.4	20.7	687.2	1899.2
	B	6541.7	46315.1	52856.8	2047.6	35.6	22.6	504.7	1485.6

Table 4.18: BEP-Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 5%) and Milk Yield (increase by 20%) in DCS hh (Cycle)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- **Assumption of** Increase in Fodder Cost (Increase in fodder cost by 5%) and Milk Yield (increase by 20%) in DCS hh (Cycle)							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	55152.9	60345.1	1907.8	32.1	28.9	1652.7	1882.8
	CB	5621.6	73956.1	79577.6	3109.3	29.2	23.8	1039.3	2725.8
	B	9316.2	73314.1	82630.2	2448.2	49.5	29.9	476.7	1669.7
Punjab	L	4726.4	57293.7	62020.1	1967.0	32.1	29.1	1611.4	1934.5
	CB	8241.5	80507.9	88749.5	3897.1	27.1	20.7	1286.2	3279.0
	B	9392.2	79588.5	88980.7	2751.3	47.7	28.9	500.7	1866.0
Karnataka	L	5742.5	50312.5	56055.0	1646.5	28.7	30.6	NE	1950.2
	CB	7551.4	59990.9	67542.4	3252.6	29.3	18.4	698	2308.2
	B	6749.1	58375.8	65124.9	1346.8	41.1	43.3	NE	1584.4
Bihar	L	6366.1	54266.6	60632.8	1765.4	29.4	30.7	NE	2062.7
	CB	7566.4	81679.4	89245.8	2408.8	29.5	33.9	NE	3024.3
	B	8402.4	70234.3	78636.7	2047.6	35.8	34.3	5755.2	2199.0

Table 4.19: BEP-Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS hh (Lactation)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- Assumption of Increase in fodder cost by 15% and increase in milk yield by 25% -Lactation							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	3904.4	43010.2	46914.6	1987.3	31.9	21.6	382.4	1472.8
	CB	4465.2	63625.1	68090.2	3238.9	29.1	19.6	474.1	2343.0
	B	6893.4	63528.4	70421.8	2550.2	49.3	24.9	282.9	1429.2
Punjab	L	3532.7	52850.9	56383.6	2049	31.9	25.8	578.2	1767.3
	CB	6484.8	72244.5	78729.2	4059.5	27.0	17.8	704.2	2915.3
	B	7100.5	69893.3	76993.8	2865.9	47.6	24.4	306.0	1617.9
Karnataka	L	4262.2	40551.5	44813.7	1715.1	28.5	23.6	875.3	1571.7
	CB	5341.0	45480.0	50821.0	3388.1	29.1	13.4	339.9	1744.3
	B	5497.4	51345.7	56843.1	1402.9	40.8	36.6	1312.1	1393.6
Bihar	L	5024.3	47601.0	52625.3	1838.9	29.2	25.9	1534.2	1804.7
	CB	5974.3	53505.7	59480.0	2509.2	29.3	21.3	744.4	2026.6
	B	6541.7	49775.1	56316.8	2133.0	35.6	23.3	535.4	1584.0

Table 4.20: BEP-Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS hh (Cycle)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- Assumption of Increase in fodder cost by 15% and increase in milk yield by 25%- Cycle							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	58770.2	63962.3	1987.3	32.0	29.6	2119.7	1997.4
	CB	5621.6	78661.4	84283.0	3238.9	29.2	24.3	1150.7	2889.2
	B	9316.2	78213.5	87529.6	2550.2	49.5	30.7	495.8	1769.7
Punjab	L	4726.4	60921.3	65647.7	2049.0	32.0	29.7	2050.0	2049.1
	CB	8241.5	85597.9	93839.4	4059.5	27.1	21.1	1380.4	3468.3
	B	9392.2	84766.3	94158.5	2865.9	47.7	29.6	519.0	1975.1
Karnataka	L	5742.5	54292.2	60034.6	1715.1	28.7	31.7	NE	2091.0
	CB	7551.4	64569.4	72120.8	3388.1	29.2	19.1	741.1	2466.0
	B	6749.1	62879.1	69628.2	1402.9	41.0	44.8	NE	1696.3
Bihar	L	6366.1	58490.5	64856.6	1838.9	29.4	31.8	NE	2209.3
	CB	7566.4	88137.3	95703.7	2509.2	29.5	35.1	NE	3246.1
	B	8402.4	75701.8	84104.3	2133.0	35.7	35.5	35607.2	2354.1

Table 4.21: BEP-Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS hh with increase in milk days (lactation)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS hh with increase in milk days (up to 30 days as case may be) having minimum 60 days dry period							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	4275.6	48000.4	52276.0	2176.2	31.9	22.1	436.4	1641.1
	CB	4649.8	66264.7	70914.5	3372.8	29.1	19.6	493.9	2440.1
	B	7637.6	69877.2	77514.8	2825.6	49.3	24.7	311.2	1573.1
Punjab	L	3925.2	59321.6	63246.7	2276.6	31.9	26.1	671.4	1982.4
	CB	6881.9	76663.2	83545.0	4308.1	27.0	17.8	747.2	3093.6
	B	7848.3	77264.9	85113.2	3167.8	47.6	24.4	338.3	1788.5
Karnataka	L	4734.5	45044.4	49778.8	1905.2	28.5	23.6	972.3	1745.8
	CB	5963.0	50776.4	56739.5	3782.7	29.1	13.4	379.5	1947.4
	B	5639.8	52675.5	58315.3	1439.3	40.8	36.6	1346.1	1429.7
Bihar	L	5311.8	50324.8	55636.5	1944.1	29.2	25.9	1622	1908.0
	CB	6312.3	56532.6	62845.0	2651.1	29.3	21.3	786.6	2141.3
	B	7003.7	53290.3	60294.0	2283.6	35.6	23.3	573.2	1695.9

Table 4.22: BEP-Sensitivity Analysis for Changes in Fodder Cost (Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS hh with increase in milk days (cycle)

Particulars		DCS- Cost of Milk Production (Rs. per day per animal)- Increase in fodder cost by 15%) and Milk Yield (increase by 25%) in DCS hh with increase in milk days (up to 30 days as case may be) having minimum 60 days dry period in a cycle							
		Fixed Cost/ Animal	Variable Cost /Animal	Total Cost/ Animal	Milk Yield	Av. Income per Litre of Milk	Av. variable cost per litre of milk	Break-even point in litres of milk	Total Milk Prod TMP (for TC=TR) (Litre)
Gujarat	L	5192.2	58689.5	63881.7	2176.2	32.0	27.0	1039.5	1998.6
	CB	5621.6	78814.3	84435.8	3372.8	29.2	23.4	972.1	2896.6
	B	9316.2	79907.1	89223.2	2825.6	49.4	28.3	441.3	1806.5
Punjab	L	4726.4	65418.3	70144.7	2276.6	32.0	28.7	1454.4	2193.1
	CB	8241.5	86993.5	95235	4308.1	27.0	20.2	1203.3	3521.7
	B	9392.2	87290.2	96682.4	3167.8	47.6	27.6	467.7	2029.5
Karnataka	L	5742.5	54401.5	60144	1905.2	28.6	28.6	71882	2100.4
	CB	7551.4	64494.1	72045.6	3782.7	29.2	17.0	621.1	2466.7
	B	6749.1	62897.1	69646.2	1439.3	41.0	43.7	NE	1698.2
Bihar	L	6366.1	58881.2	65247.3	1944.1	29.3	30.3	NE	2226.4
	CB	7566.4	65486.7	73053.2	2651.1	29.4	24.7	1593.9	2480.7
	B	8402.4	59248.8	67651.3	2283.6	35.7	25.9	863.5	1896.3

4.4 Chapter Summary

The breakeven level of the DCS and NDCS milk producers during lactation period indicate that break-even output of milk was lowest in the case of buffaloes and was the highest for cross bred cows during the lactation period. The high rate of milk for buffalo resulted in lower levels of BEP as compared to the cross bred and local cows. While in case of NDCS milk producers, mixed picture was observed. BEP level was lesser in DCS group than NDCS except in case of buffalo. While in case of paid out BEP, as it was expected the DCS households again recorded the higher net income and low level of BEP than NDCS households. During the cycle period, break even output increased while trend was observed to be the same across breeds and groups during lactation. Thus cost on labour and fodder which are important determinant of economics of milk production are actually disguised costs, not paid and are hidden major cost. Because of this reason, dairy households continue in dairy without realising the actual economics of same.

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

Chapter V

Constraints in Milk Production & Feed Management

5.1 Introduction:

After having discussed about the issues related to production and marketing of milk as well as breakeven point in milk production, attempt is made to find out the constraints faced by the dairy households in milk production and feed management. This chapter also discusses the details regarding input and output service delivery systems.

5.2 Constraints in Milk Production:

The selected respondents were asked to rank the constraints faced by them in five point scale from 1-5 as 1=SD- Strongly Disagree; 2=D-Disagree; 3=N-Indifferent/ Neutral; 4=A-Agree and 5=SA-Strongly Agree and responses are presented in Table 5.1. It can be seen from table 5.1 that half of the of respondents have mentioned that lack of finance to invest in dairy business for quality milk production/inadequate finance, low average milk yield of animals and high feed cost were major constraints in milk production. Other major constraints reported by respondents were low milk rate, and poor knowledge about feeding and health care of animals. Besides, the constraints mentioned above, NDCS households also experienced problems of high cost of veterinary medicines (Table 5.2).

5.3 Constraints in Feeding Management:

The constraints faced in feeding management by the selected DCS households are presented in Table 5.3. It can be seen from the table that DCS households had faced the constraints in the form of high cost & low return on fodder production; lack of necessary space for tying the milking animals, scarce land holdings and its competitive uses such that they cannot afford to put more land under fodder seed/crop production and high cost of cattle feed and mineral mixture. Noticeably high cost of cattle feed and mineral mixture was the biggest constraint faced by NDCS households. In addition to the constraints highlighted by DCS households, no provision of quality seed on credit was an additional big constraint faced by the NDCS household.

5.4 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 depends on many factors including input supply (particularly feed) and service provision (veterinary service and Artificial Insemination (AI) or breeding) or output services. There is a whole range of services that are required 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, artificial insemination, feed and fodder supply, 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 as they existed in the study areas and raises some issues for efficient delivery of these services to the dairy producer.

It can be seen from Table 5.5 that DCS households recorded adequate supply of cattle feed while most of the households mentioned that cost of cattle feed and mineral mixtures was high. Around half of the DCS respondent mentioned that cattle feed and mixtures were available on credit from the cooperative society and loan was also made available for purchase of cattle. Technical guidance was also provided by the society. NDCS households did not have any access in the form of any support from the dairy cooperatives in their absence in the area, they were fully dependent on the agent or private agency to get support for input and output service systems. The supply of cattle feed and fodder was inadequate. Feed and fodder was not available on credit for majority of the households. Most of the households mentioned about non-availability of emergency veterinary services and lack of technical guidance. Available emergency veterinary services were expensive.

Table 5.1: Constraints Faced in Milk Production - DCS Households

DCS		Constraints Faced in Milk Production - DCS Households									
		High Feed cost	Non Availability of Fodder	High price of milch animal	Low average milk yield of the milk animals	Low milk price (Rs./lit)	High cost of vet. medicines	Lack of nutritious feed for quality milk production	Poor knowledge about feeding and healthcare	Lack of finance to invest in dairy business for quality milk prod/ Inadequate finance	Lack of veterinary services in villages for quality milk production
Gujarat	SD	0.2	7.9	3.5	1.6	3.1	2.5	2.2	2.8	6	16.6
	D	1.4	31	5	5.6	5.2	12.6	36.5	12.6	6.6	31.3
	N	0.4	4.6	8.5	8.4	3.1	21.6	25.3	13.8	7.3	9.8
	A	25.1	19	51.9	34.6	26.3	34.8	22.2	48.3	28.2	23.2
	SA	**72.9**	37.5	31.1	49.8	**62.3**	28.5	13.8	22.5	**51.9**	19.1
Punjab	SD	1.5	1.5	0.9	1.8	4.1	2.2	0.3	1.3	1.3	2.9
	D	1.6	35.4	2.1	6.9	5.8	2.8	3.9	3.6	5.7	5.8
	N	6	29.2	16.2	16.3	11.2	20.1	24	26.7	24.4	18.5
	A	27.1	22.1	38.9	32.6	34.2	30.6	62	32.7	27.9	37.3
	SA	**63.8**	11.8	41.9	42.4	**44.7**	44.3	9.8	35.7	40.7	35.5
Karnataka	SD	0	0	0.1	0	0	1.5	3.8	13.1	2.5	38.7
	D	0	2.8	0.7	1.1	0.7	8.9	17.3	59.2	14.1	50.2
	N	2.2	28.6	34.1	19.5	5	29	38.6	21.9	26.8	7.5
	A	60.3	56.9	47	55.5	25.8	42.4	30	5	32	3
	SA	37.5	11.7	18.1	23.9	**68.5**	18.2	10.3	0.8	24.6	0.6
Bihar	SD	0	2	0	0	0	0	0	0	0	0
	D	0	96	0	0	0	0	0	0	0	0
	N	3.6	2	0.8	0	0	0	0	0	0	0
	A	92.3	0	96	5.6	94.4	94.3	93.2	5.6	4	95.5
	SA	4.1	0	3.2	**94.4**	5.6	5.7	6.8	94.4	96	4.5
Average	SD	0.4	2.9	1.1	0.9	1.8	1.6	1.6	4.3	2.5	14.6
	D	0.8	41.3	2	3.4	2.9	6.1	14.4	18.9	6.6	21.8
	N	3.1	16.1	14.9	11.1	4.8	17.7	22	15.6	14.6	9
	A	51.2	24.5	58.5	32.1	45.2	50.5	51.9	22.9	23	39.8
	SA	44.6	15.3	23.6	**52.6**	**45.3**	24.2	10.2	38.4	**53.3**	14.9

Notes: SD- Strongly Disagree; D-Disagree; N-Indifferent/ Neutral; A-Agree and **SA-Strongly Agree**; Figures is in percentage to total hh.
Source: Field Survey data.

Table 5.2: Constraints Faced in Milk Production - NDCS Households

DCS		Constraints Faced in Milk Production - DCS Households									
		High Feed cost	Non Availability of Fodder	High price of milch animal	Low average milk yield of the milk animals	Low milk price (Rs./lit)	High cost of vet. medicines	Lack of nutritious feed for quality milk production	Poor knowledge about feeding and healthcare	Lack of finance to invest in dairy business for quality milk prod/ Inadequate finance	Lack of veterinary services in villages for quality milk production
Gujarat	SD	0.0	2.2	5.8	0.2	0.0	0.6	6.8	9.0	6.4	30.2
	D	0.0	7.6	0.6	4.2	0.2	1.2	18.6	10.4	5.0	16.6
	N	0.0	9.8	8.2	3.2	6.6	12.6	19.8	6.2	8.0	10.6
	A	19.4	33.0	33.6	33.8	15.8	38.4	26.6	44.4	24.8	22.6
	SA	**80.6**	47.4	51.8	58.6	77.4	47.2	28.2	30.0	55.8	20.0
Punjab	SD	0.2	0.4	0.8	1.4	9.2	2.0	2.8	2.8	3.0	3.8
	D	5.4	40.8	11.2	55.4	9.6	19.0	11.6	36.8	10.4	4.0
	N	9.0	20.0	49.0	18.4	14.6	24.6	50.6	21.8	35.0	22.6
	A	41.0	26.2	20.0	8.2	47.6	39.0	27.8	23.4	28.2	28.0
	SA	**44.4**	12.6	19.0	16.6	19.0	15.4	7.2	15.2	23.4	41.6
Karnataka	SD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	2.6
	D	0.0	0.0	0.0	0.0	0.0	0.0	0.8	40.2	1.4	68.4
	N	1.6	0.2	0.6	2.8	1.2	0.6	9.8	37.4	34.6	11.8
	A	43.6	51.8	57.8	43.8	28.0	46.6	58.6	21.8	47.4	16.8
	SA	**54.8**	48.0	41.6	**53.4**	**70.8**	52.8	30.8	0.4	16.6	0.4
Bihar	SD	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	D	0.0	96.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	N	4.0	2.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	A	**91.8**	0.0	**96.0**	5.6	**94.2**	**94.4**	**93.4**	5.6	4.0	95.4
	SA	4.2	0.0	3.2	**94.4**	5.8	5.6	6.6	94.4	96.0	4.6
Average	SD	0.1	1.2	1.7	0.4	2.3	0.7	2.4	3.0	2.4	9.2
	D	1.4	36.1	3.0	14.9	2.5	5.1	7.8	21.9	4.2	22.3
	N	3.7	8.0	14.7	6.1	5.6	9.5	20.1	16.4	19.4	11.3
	A	49.0	27.8	51.9	22.9	46.4	54.6	51.6	23.8	26.1	40.7
	SA	46.0	27.0	28.9	**55.8**	43.3	30.3	18.2	35.0	48.0	16.7

Notes: SD- Strongly Disagree; D-Disagree; N-Indifferent/ Neutral; A-Agree and **SA-Strongly Agree**; Figures is in percentage to total hh.
Source: Field Survey data.

Table 5.3: Constraints Faced in Feeding Management - DCS Households

		Constraints Faced in Feeding Management - DCS Households									
DCS		Unavailability of green/ dry fodder throughout the year	Majority of grazing lands are either degraded or encroached	Irregular & inadequate supply of cattle feed by DCS	Non availability of improved fodder seed in the market / DCS	High cost of cattle feed and mineral mixture	No provision of quality seed on credit	High Cost & Low return on fodder production	Diversion of feed and fodder ingredients for industrial use	Lack of necessary space required for tying the milking animals/ Poor housing	Land is very less therefore cannot afford to put more land under fodder seed/crop production
	SD	10.3	4.8	51.4	10.6	2.9	7.1	1.4	18.4	11	6.6
	D	31.4	11.5	35.1	34.1	6.3	8.2	9.5	37.2	31	15.9
	N	5.6	14.8	2.8	10.8	4.4	32.4	8.3	14.9	30.7	9.5
	A	26.9	36.4	2.9	26	43.3	28.6	29.1	15.1	18.1	20.8
Gujarat	SA	25.8	32.5	7.8	18.5	**43.1**	23.7	**51.7**	14.4	9.2	47.2
	SD	1.6	0.6	2.7	2.7	1.6	1.8	1.2	1.8	1.2	3.3
	D	51.5	24.5	12.1	39.6	56.5	6	8	10.9	10.1	17.6
	N	28.7	28.4	31.3	30.5	10.7	29.5	32.1	28.2	32.1	28.7
	A	11.1	14.2	18.4	22	14.4	29	28.4	42.6	19.8	22.3
Punjab	SA	7.1	32.3	35.5	5.2	16.8	33.7	30.3	16.5	**36.8**	28.1
	SD	0.1	0.6	10	1.7	5.7	0.7	0.2	2.5	2.9	2.8
	D	2.5	39.1	37.2	21.5	6.6	26.5	7.4	29.8	36.5	31.4
	N	20.5	35.7	28.3	33.1	14	16.2	43.9	36.2	32.8	23
	A	**61.1**	20.6	23.5	41.2	**62.3**	50.7	35.5	29.3	24.3	24.2
Karnataka	SA	**15.8**	4	1	2.5	**11.4**	5.9	13	2.2	3.5	18.6
	SD	0	0	0	0	0	0	0	0	0	0
	D	0.8	94	1.2	0	0	0	95.2	94.5	0	0
	N	96.8	6	94.9	0	0	0	4.8	5.5	0	0
	A	2.4	0	3.9	**94.8**	**98**	**93.9**	0	0	5.2	**94**
Bihar	SA	0	0	0	5.2	2	6.1	0	0	**94.8**	6
Average	SD	3	1.5	16	3.8	2.6	2.4	0.7	5.7	3.8	3.2
	D	21.6	42.3	21.4	23.8	17.4	10.2	30	43.1	19.4	16.2
	N	37.9	21.2	39.3	18.6	7.3	19.5	22.3	21.2	23.9	15.3
	A	25.4	17.8	12.2	46	**54.5**	**50.6**	23.3	21.8	16.9	40.3
	SA	12.2	17.2	11.1	7.9	18.3	17.4	23.8	8.3	36.1	25

Notes: SD- Strongly Disagree; D-Disagree; N-Indifferent/ Neutral; A-Agree and **SA-Strongly Agree**; Figures is in percentage to total hh.
Source: Field Survey data.

Table 5.4: Constraints Faced in Feeding Management - NDCS Households

		Constraints Faced in Feeding Management - DCS Households									
DCS		Unavailability of green/ dry fodder throughout the year	Majority of grazing lands are either degraded or encroached	Irregular & inadequate supply of cattle feed by DCS	Non availability of improved fodder seed in the market / DCS	High cost of cattle feed and mineral mixture	No provision of quality seed on credit	High Cost & Low return on fodder production	Diversion of feed and fodder ingredients for industrial use	Lack of necessary space required for tying the milking animals/ Poor housing	Land is very less therefore cannot afford to put more land under fodder seed/crop production
	SD	9.4	0.8	33	6.4	0.2	6.2	0.4	21.8	16.4	8.8
	D	17.8	6	22.8	21.8	0.2	3.6	9.8	26.6	28.2	13.6
	N	14.8	17.8	6.2	14.2	0.6	16.6	8.2	24.2	17.8	14.8
	A	46.2	35.4	8	18	23.6	19	19	11.2	18.6	26.8
Gujarat	SA	11.8	40	30	39.6	**75.4**	**54.6**	**62.6**	16.2	19	36
	SD	1.4	5	2.4	3.2	1.4	1.8	3.2	5.4	11.4	6.4
	D	20	44.2	20.8	41.4	8.2	16.4	15	20.4	33	42.2
	N	54.4	17.4	46.8	21.2	26.4	35.8	44.6	36.2	21	16.2
	A	14.4	21	9.4	24	44	33.8	24.2	25.2	15.2	28.2
Punjab	SA	9.8	12.4	20.6	10.2	20	12.2	13	12.8	19.4	7
	SD	0.2	0	0	0	0	0	0	0	0	0.4
	D	0.6	78	3	0.2	0.6	0.2	2	60.2	67.4	42.4
	N	1.8	2.8	18.2	3.6	4	27.4	27.2	17.8	13.6	28.8
	A	56.2	17.8	49	60.4	52	50	40.2	18	18.6	26.2
Karnataka	SA	**41.2**	1.4	29.8	35.8	**43.4**	22.4	30.6	4	0.4	2.2
	SD	0	0	0	0	0	0	0	0	0	0
	D	0.8	94.4	1.2	0	0	0	95.2	94.6	0	0
	N	96.8	5.6	94.4	0	0	0	4.8	5.4	0	0
	A	2.4	0	4.4	**94.8**	**98.2**	94	0	0	5.4	94.2
Bihar	SA	0	0	0	5.2	1.8	6	0	0	94.6	5.8
Average	SD	2.8	1.5	8.9	2.4	0.4	2	0.9	6.8	7	3.9
	D	9.8	55.7	12	15.9	2.3	5.1	30.5	50.5	32.2	24.6
	N	42	10.9	41.4	9.8	7.8	20	21.2	20.9	13.1	15
	A	29.8	18.6	17.7	**49.3**	**54.5**	**49.2**	20.9	13.6	14.5	43.9
	SA	15.7	13.5	20.1	22.7	35.2	23.8	26.6	8.3	33.4	12.8

Notes: SD- Strongly Disagree; D-Disagree; N-Indifferent/ Neutral; A-Agree and **SA-Strongly Agree**; Figures is in percentage to total hh.
Source: Field Survey data.

Table 5.5: Details of Input Service Delivery experienced by selected households

Sr. No.	Supply of Cattle Feed		Gujarat			Punjab			Karnataka			Bihar			Average		
			DCS		NDCS	DCS		NDCS	DCS		NDCS	DCS		NDCS	DCS		NDCS
			PDCS	Agent	Agent	PDCS	Agent	Agent	PDCS	Agent	Agent	PDCS	Agent	Agent	PDCS	Agent	Agent
1	Supply of Cattle Feed	Adequate	**90.6**	0.0	30.4	20.5	0.0	45.0	**100**	0.0	0.6	**94.9**	0.0	94.0	**76.5**	0.0	42.5
		Inadequate	7.6	0.0	22.0	79.5	0.0	24.0	0.0	0.0	99.4	5.1	0.0	6.0	23.1	0.0	37.9
		Not Available	1.8	0.0	47.6	0.0	0.0	31.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	19.7
2	Cost of cattle feed and mineral mixture	High	**68.0**	0.0	47.2	**96.5**	0.0	45.0	**96.2**	0.0	**98.4**	69.3	24.3	93.4	**82.5**	6.1	71.0
		Ok	23.2	0.0	12.8	3.5	0.0	24.0	3.6	0.0	1.6	4.7	1.7	6.6	8.8	0.4	11.3
		Not Available	8.8	0.0	40.0	0.0	0.0	31.0	0.2	0.0	0.0	0.0	0.0	0.0	2.3	0.0	17.8
3	Cattle feed and fodder seed on Credit	Available	46.6	0.0	9.8	**96.5**	0.0	45.0	58.3	0.0	0.0	**94.0**	6.0	**94.2**	**73.9**	1.5	37.3
		Not Available	53.2	0.2	90.2	3.5	0.0	55.0	41.7	0.0	**100.0**	0.0	0.0	5.8	24.6	0.1	62.8
4	Emergency Veterinary Services	Available	**79.3**	0.0	60.6	**100**	0.0	14.2	**100**	0.0	**98.4**	5.6	**91.7**	96.4	**71.2**	22.9	67.4
		Not Available	20.7	0.0	39.4	0.0	0.0	85.8	0.0	0.0	1.6	0.8	1.9	3.6	5.4	0.5	32.6
5	Provision of loan for purchasing cattle	Adequate	38.4	0.2	1.4	**100**	0.0	100.0	4.1	24.7	0.0	0.0	0.0	0.0	35.6	6.2	25.4
		Inadequate	6.8	0.7	30.6	0.0	0.0	0.0	18.4	0.0	70.0	4.8	0.0	4.8	7.5	0.2	26.4
		Not Available	48.1	5.8	68.0	0.0	0.0	0.0	52.7	0.1	30.0	**95.2**	0.0	**95.2**	49.0	1.5	48.3
6	Technical Guidance	Available	50.5	0.0	13.4	**100**	0.0	0.0	**100**	0.0	30.0	**100.0**	0.0	**100**	**87.6**	0.0	35.9
		Not Available	49.4	0.1	86.6	0.0	0.0	100.0	0.0	0.0	70.0	0.0	0.0	0.0	12.4	0.0	64.2

Table 5.6: Details of Output Service Delivery experienced by selected households

Supply of Cattle Feed		Gujarat			Punjab			Karnataka			Bihar			Average		
		PDCS		NDCS	PDCS		NDCS	PDCS		NDCS	PDCS		NDCS	PDCS		NDCS
		PDCS	Agent	Agent	PDCS	Agent	Agent	PDCS	Agent	Agent	PDCS	Agent	Agent	PDCS	Agent	Agent
1 Milk Price (Rs./lit)	Adequate	0.0	5.2	0.8	0.60	0.0	0.00	4.4	0.0	100	0.0	0.0	0.0	2.6	0.0	25.2
	Low	0.0	**94.8**	**99.2**	**99.4**	**0.0**	**100**	**95.6**	0.0	0.0	**100**	0.0	100.0	**97.5**	0.0	74.8
2 Payment of Milk	immediate	0.0	5.5	39.6	96.5	0.0	1.60	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3
	Within 15 Days	0.0	44.8	45.8	3.5	0.0	88.60	95.6	0.0	100	**100**	0.0	100	26.6	0.0	83.6
	Within 30 Days	0.0	49.7	14.6	0.0	0.0	9.80	0.0	0.0	0.0	0.0	0.0	0.0	**61.0**	0.0	6.1
3 Incentives or bonus for supplying milk	Adequate	0.0	48.7	3.2	100	0.0	0.00	4.4	0.0	0.0	**100**	0.0	100	12.4	0.0	25.8
	Low	0.0	51.3	96.8	0.00	0.0	100.00	4.4	0.0	0.0	0.0	0.0	0.0	**63.3**	0.0	74.8
4 Acceptability of cross-bred cow Milk in family	Poor	0.5	6.5	25.0	**96.5**	0.0	6.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.8
	Acceptable	0.0	44.2	56.2	3.50	0.0	90.00	100.0	0.0	100	**100**	0.0	100	26.9	0.1	86.6
	Not Acceptable	8.9	42.6	18.8	0.00	0.0	4.00	4.4	0.0	100	0.0	0.0	0.0	**61.9**	0.1	5.7
5 Advance payment for milk (Soc./ vendors)	Available	0.0	49.3	50.2	100	0.0	17.20	4.4	0.0	0.0	0.0	0.0	0.0	38.4	0.0	16.9
	Not Available	9.5	44.1	49.8	0.00	0.0	82.80	95.6	0.0	100	100	0.0	100	59.9	1.7	83.2

In case of output delivery, DCS households mentioned that the milk price received by them was low and they used to get the payment on fortnightly/monthly basis. Around two third of the households mentioned that incentives or bonus for supplying milk were adequate, while three fifth of selected households mentioned that cross bred cow milk was not acceptable in family. Some of the DCS households had benefitted from the system of advance payment for milk while some of the agent or private agency had provided this facility in selected area. NDCS families also felt that the milk price received by them was low. The payment was immediate for about ten percent of the families. As can be

expected, most of the NDCS households felt that the incentives or bonus for supplying milk was low.

5.5 Chapter Summary:

The performance of the dairy sector depends on many factors including input supply (particularly feed) and service provision (veterinary service and Artificial Insemination (AI) or breeding) or output services. DCS households recorded adequate supply of cattle feed and emergency veterinary services while NDCS households did not have facility to get any support from the dairy cooperatives in their area. Accordingly, they were fully dependent on the agent or private agency to get support for input and output service systems. Half of the of respondents have mentioned that lack of finance to invest in dairy business for quality milk prod/Inadequate finance, low average milk yield of animals and high feed cost were major constraints in milk production. Other major constraints reported by respondents were low milk rate, and poor knowledge about feeding and health care of animals. Besides, the constraints mentioned above, NDCS households also experienced problems of high cost of veterinary medicines. DCS households faced the constraints in the form of high cost & low return on fodder production; lack of necessary space for tying the milking animals, scarce land holdings and its competitive uses such that they cannot afford to put more land under fodder seed/crop production and high cost of cattle feed and mineral mixture. Noticeably high cost of cattle feed and mineral mixture was the biggest constraint faced by NDCS households. In addition to the constraints highlighted by DCS households, no provision of quality seed on credit was an additional big constraint faced by the NDCS household.

The DCS households recorded adequate supply of cattle feed while most of the households mentioned that cost of cattle feed and mineral mixtures was high. Around half of the DCS respondent mentioned that cattle feed and mixtures were available on credit from the cooperative society and loan was also made available for purchase of cattle. Technical guidance was also provided by the society. NDCS households did not have any access in the form of any support from the dairy cooperatives existing in their area, they were fully dependent on the agent or private agency to get support for input and output service systems. The supply of cattle feed and fodder was inadequate. Feed and fodder was not available on credit for majority of the households. Most of the

households mentioned about non-availability of emergency veterinary services and lack of technical guidance. Available emergency veterinary services were expensive. In case of output delivery, DCS households mentioned that the milk price received by them was low and they used to get the payment on fortnightly/monthly basis. Around two-third of the households mentioned that incentives or bonus for supplying milk were adequate, while three-fifth of selected households mentioned that cross bred cow milk was not acceptable in family. Some of the DCS households had benefitted from the system of advance payment for milk while some of the agent or private agency had provided this facility in selected area. NDCS families also felt that the milk price received by them was low. The payment was immediate for about ten percent of the families. As can be expected, most of the NDCS households felt that the incentives or bonus for supplying milk was low.

The next chapter presents the Summary and Conclusions.

Chapter VI

Summary and Conclusions

6.1 Introduction:

Cost plays an important role in portraying economic viability of a dairy enterprise. It is a critical economic indicator for milk producers, consumers and policy makers in order to provide an effective linkage between the milk producers and consumers for fixing the price of milk rationally. Cost of milk production often becomes a policy issue, when milk producers complain that the price of milk they are receiving does not cover the cost of milk production. One of the main problems identified is the lack of awareness among dairy producers, especially small operators, regarding their costs of production and financial breakeven point. It is important for producers to identify how they can reduce costs without reducing milk production. Break-even point is often used to estimate the minimum quantity of milk to be produced to cover the total cost of milk production. A comparison across all size of household groups for both the cow and buffaloes can be resourceful in various decision making. Breakeven point is a point where 'no-profit-no-loss' status is reached. The costs that have to be covered by the milk price determine the break-even point. With these considerations, it was felt necessary to study the comparative analysis of per litre cost of milk production as well as break even analysis for two groups-members and non-members of dairy cooperative society for two categories (small and medium) for milch cows and buffaloes. In view of above, the present study was undertaken to know the break-even point to estimate the minimum quantity of milk to be produced to cover the total cost of milk production for both the cows and buffaloes by dairy members and non-member households during lactation and cycle period considering both paid-out cost and imputed costs. The study is based on primary level data pertaining to all the costs that are incurred in production of milk, using the data collected from 6000 sample dairy households across four states each from North, South, East and West region of India.

6.2 Main Findings:

- The profile of selected sample dairy households indicates that the average family size of selected DCS (Dairy Cooperative Society) Households was around 5.4 members which was little higher than the NDCS households (5.0 members). The family composition from both the groups (DCS & NDCS) indicates that adult males and females accounted for around 37-40 per cent of total members in each family while remaining were children.

- Majority of the respondents were male while few female DCS respondents had provided the information. In fact, female respondents accounted for almost one-fourth of total respondents of DCS group while same was hardly 6 per cent in case of NDCS group, which indicates the empowerment of women through development of organised dairy sector under three tier cooperative structure, especially considering that the data collection was done on random basis. The average age of respondents was between 41-47 years.

- The data related to level of education indicates that around three fourth of both DCS and NDCS household heads were educated up to secondary level of education. The NDCS households had relatively more number of illiterate persons than the DCS households, which is significant in number (i.e. one-fifth of total respondents in both the groups). Around 49 per cent of members from DCS family and 53 per cent of members of NDCS family were engaged in dairy activity, wherein dominance of female members was observed. At overall level, it was observed that out of total time engagements by the family members, lion share as estimated for woman members, ranges between 60-82 percent.

- Out of the total selected samples of DCS and NDCS households (HHs), around 80-81 percent were from Hindu religion followed by around 18-19 per cent being Sikh (i.e. from Punjab state) and around 1 per cent were Muslim. Few Christian households were observed in NDCS group as well. The distribution of selected households as per social group indicates that around 78 per cent of total households collectively belonged to Open and Other Backward Class (OBC) category, in which members belonging to OBC category was found to be greater in

DCS category while members from Open category were in greater number in the NDCS households group. The share of Scheduled Caste and Scheduled Tribe category ranged between 13-20 per cent. The SC households were higher in NDCS group than DCS group while opposite picture was found in case of Scheduled Caste population.

- Around 71 per cent of selected DCS households were from Above Poverty Line (APL) as compared to 64 per cent of NDCS households, the economic threshold line which indicate relatively well-off HHs in term of income and standard of living.

- The average experience of dairy farming amongst selected households was around 18 years for both groups which indicates long association of selected households with dairy business. It was observed that around 30 per cent of total households maintained farm financial record as well as dairy business records.

- On an average, most of the dairy members had joined the dairy society about 11 years ago. More than 92 per cent households from both groups had toilets at home while DCS households had more number of biogas plants than NDCS households.

- The details regarding occupation of selected fodder grower households indicate that the main occupation for the selected DCS households was agriculture and 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 majority of NDCS household in Gujarat reported to be engaged in animal husbandry and dairying followed by agriculture. In the state of Punjab, selected households were engaged in other activities along with agriculture and dairy activities. The subsidiary occupation for both DCS and NDCS was dairy followed by agriculture labour. Thus, significant numbers of dairy producers were involved in dairy farming as a secondary and support activity.

- Around 92 per cent of DCS households possessed the agricultural land holding with average land holdings of 1.6 ha, while corresponding figure for NDCS household was about 85 per cent with 2.2 ha area of holdings. The DCS households have marginally greater experience in farming (of 19 years) than NDCS households (17 years).

- The details regarding herd strength and cattle shed shows that the DCS category 2894 HHs had up to 2 milch animals (Small) and 1106 DCS HHs had 3 to 5 milch animals (Medium). Similarly, in the NDCS category 1495 HHs had upto 2 milch animals (Small) and 505 NDCS HHs had 3 to 5 milch animals (Medium). Across all DCS households, share of buffaloes was highest followed by local cows, and then cross bred cows, while in case of NDCS households, cross bred cows were higher followed by buffaloes and the lowest was local cows.

- The DCS Households had more number of cattle shed than NDCS households, while opposite picture was recorded in case of fodder storage structures. On an average, very few had cattle shed in both group mostly of both the types (Kachcha and Pucca) with its cost around Rs. 12,000/- for kachcha cattle shed while cost of Pucca cattle shed constructed ranged between Rs.41,000-Rs.64,000/-. The NDCS households had less number of fodder storage structures than DCS households, cost of which was around Rs. 25,000/-. Few DCS and NDCS households had borrowed funds while few of them had received subsidy for the construction of cattle sheds and fodder storage.

- The holding of productive assets by selected fodder grower households suggests that DCS households had relatively more number of assets than NDCS group. Overall, as can be expected, each of the household under survey had milk can along with other assets like fodder chaffer, grass cutter, etc.. Around 173 DCS households and 90 NDCS households had purchased the animals during the period under study.

- The information collected regarding gross income of the sample households indicates that share of dairy business in total income of the household ranged between 39-45 per cent in case of DCS household while same was between 30-32 per cent for NDCS households. The correlation analysis of the income received from all sources and income received from dairy business indicated a very high positive correlation and association between these two variables in DCS dairy households as compared to NDCS dairy households. This may be due to the fact that milk pouring in dairy cooperative society has regular sale and income while NDCS households might be facing irregularity in sale of milk.

- The details on fodder crops grown by the selected households during the agriculture year 2018-19 indicates that Jowar was the main fodder crop grown in kharif while Berseem, and Maize were grown more in rabi season. The assured and timely availability of fodder at home through fodder crops grown on the field as mentioned above has effect on the milk yield of the dairy animals. On an average milk yield was recorded higher in winter season followed by yield in rainy season and the lowest milk yield was realised during summer season. The milk rate accumulated for NDCS households was higher than DCS households.

- On an average, price for local cows ranged between Rs. 32,000-Rs. 34,000;for cross bred prices were between Rs. 36,000- Rs. 39,000; while buffalo price ranged between Rs. 45,000 to Rs. 49000. With selected households the average age of milch animals with 2-3 lactation period completed was between 5-7 years.

- The average age of calving was relatively higher in case of NDCS as compared to DCS which was around 28-38 months. During the milk cycle, around 267-282 days lactation period was recorded while dry period ranged between 75-87 days across the breeds. The milk yield was recorded to be around 4-6 litres per dayfor local cow, 7-10 litres per day for cross breed and 6-7 litres per day for buffalo for both groups (DCS & NDCS).

- The details on feed and fodder fed by the selected households at the time of survey as well as during earlier two seasons indicate that, for both groups of animals (dry and in-milk), a mixed trend was observed in quantity of feed (dry and green fodder) given across animal type as well as type of feed and fodder. Quantity of fodder was estimated to be higher in case of NDCS households for crossbred cows, while same was higher for DCS households for local cows. DCS households had fed less to dry dairy animals than to in-milk animals as compared to NDCS households. Quantity of green fodder was fed more to in-milk animals by both groups(except for buffaloes). The selected households used fodder from both sources (self-cultivated& purchased fodder), while self-cultivated fodder was used more (more than 95 per cent). The animals were also fed with concentrates which were mostly purchased from the market. Besides feeding the animals at stall in shed, very few

selected households could send their animals for grazing out every day for few hours on their own agriculture land or common grazing land of the village.

- The season-wise comparison of the fodder fed to the milch animals indicates that more quantity of green fodder was fed during the flush season while during lean season, dry fodder was used more. The DCS members used more concentrates for milch animals than NDCS households, which may be due to the availability and support of dairy society in providing concentrates at the village level.

- As dairy activities are carried out as complementary activity to agricultural activities, the labour use pattern by the selected sample households indicatesa complete dominance of use of family labour who were engaged in both the activities. Out of total time worked in a day by family members, most of the time was spent on field and household activities while some time was also spent for dairy activities. Very few households had reported use of hired casual labour. Thus, activities of dairy were largely carried out by the household members. Significant involvement of women in dairy activity can be seen from the data which indicates that female play a pivotal role in all the operations,for both DCE and NDCS groups.

- The details on other expenditures such as veterinary and breeding expenditure; transport cost, repair and maintenance, lights and water charges incurred during the year prior to the study period by DCS and NDCS households shows that DCS households had incurred marginally more expenditure on the veterinary services than NDCS households. Besides, some of the selected households had incurred expenditure on medicine and doctor as and when some animals fell sick. On an average DCS household had incurred cost on medicine plus doctor fee.

- During field visits and discussions with the selected households, it was observed that despite various efforts made by the government; availability of veterinary doctor is one of the bottlenecks in dairy development. Thus, most of the households depended on the alternate sources such as veterinary advisory and medical support for their animals. All other expenditure was relatively same across the groups and types of animals..

- The details regarding sale of milk by selected households indicate that on an average around 25 per cent of total milk of local cow produced was preferred for consumption at home by DCS households while corresponding figure for NDCS households was about 32 per cent. While 20-21 per cent of total buffaloes' milk was kept at home for consumption in both cases, very few DCS households preferred to sell milk directly to consumers. The NDCS households sold milk to consumers along with major share was sold to agents/private dairy.

- The milk rate received by the DCS members towards sale of milk to dairy cooperatives ranged between Rs. 24– Rs. 40 per litre while same was higher in case of sale of milk by NDCS members to agents or directly to consumers (Rs. 25 to Rs. 46 per litre). The average sales rate realised by the NDCS households for all the types of animals was higher than the rate received by the DCS households. The rate of milk was the highest for the buffalo milk followed by the local cow milk and then for cross breed cows.

- The cost of production of milk and net income realised by the sample households indicate that on an average net income realised by the DCS households was higher than NDCS households. Across the species, net return realised by the DCS and NDCS households was much higher for buffaloes followed by cross bred cows. The DCS realised lower returns for local cows as compared to buffaloes and cross breeds while same was negative forNDCS. High margins for buffalo dairy producers may be due to high rate of sale price in both groups as compared to rate per litre of milk realised for the milk of local cows and cross bred cows and that may be due to fat variation. Therefore, there is a huge scope to enhance producers' income from dairy by enhancing animals' productivity, improving management practise, and ensuing remunerative prices.

- The dairy farm business has several feasible options for that can induce positive impact, all of which are very sensitive to alterations in milk prices, milk yield and variable costs. In order to suggest suitable measures for sustainable growth in dairy, Sensitivity Analysis was carried out with seven scenarios/possibilities (viz. Scenario I: Decrease in fodder cost by 5% & Increase in milk yield by 5%; Scenario II: Decrease in fodder cost by 15% (Bihar and Punjab) & 13% (Gujarat and

Karnataka) with increase in milk yield by 5%; Scenario III: Only increase in milk yield by 15%; Scenario IV: Increase in fodder cost by 5% & Increase in milk yield by 20%; Scenario V: Increase in fodder cost by 15% & Increase in milk yield by 25% ; Scenario VI: Increase in fodder cost by 15% & Increase in milk yield by 25% with increase in milk days (up to 30 days as case may be) having minimum 60 days dry period in a cycle) and Scenario VII: fixed milk rate across the area. An improvement in net income per day can be realized by the DCS dairy households by adopting different strategies of reduction in fodder cost and increase in milk yield per day through various interventions, which can be used for policy formulations. The highest increase in net income was recorded when assumed that fodder cost was increased by 5 percent along with increase in-milk yield by 20 per cent.

- The breakeven level of the DCS and NDCS milk producers during lactation period indicate that break-even output of milk was lowest for buffaloes and was the highest for cross bred cows during the lactation period. The high rate of milk from buffalo resulted in lower levels of BEP as compared to the cross bred and local cows. While in case of NDCS milk producers, mixed picture was observed. BEP level was lesser in DCS group than NDCS except in case of buffalo. While in case of paid out BEP, as it was expected the DCS households again recorded a higher net income and low level of BEP than NDCS households. During the cycle period, break even output increased while trend was observed to be the same across breeds and groups during lactation. Thus cost on labour and fodder which are important determinant of economics of milk production are actually disguised costs, not paid and are major hidden costs. Because of this reason, dairy households continue in dairy without realising the actual economics of same.

- The performance of the dairy sector depends on many factors including input supply (particularly feed) and service provision (veterinary service and Artificial Insemination (AI) or breeding) or output services. DCS households recorded adequate supply of cattle feed and availability of emergency veterinary services while NDCS households did not have facility to get any support from the dairy cooperatives in vicinity. Accordingly, NDCS were fully dependent on the agent or private agency to get support for input and output service systems.

- Half of the of DCS respondents have mentioned that lack of finance to invest in dairy business for quality milk production/inadequate finance, low average milk yield of animals and high feed cost as major constraints in milk production. Besides the other constrains reported by respondents were low milk rate, and poor knowledge about feeding and health care of animals. Similarly, NDCS households also experienced problems of high cost of veterinary medicines.

- DCS households had faced the constraints in the form of high cost & low return on fodder production; lack of necessary space for tying the milking animals, scarce land holdings and its competitive uses such that they could not afford to put more land under fodder seed/crop production and high cost of cattle feed and mineral mixture. Noticeably high cost of cattle feed and mineral mixture was the biggest constraint faced by NDCS households. In addition to the constraints highlighted by DCS households, no provision of quality seed on credit was an additional major constraint faced by the NDCS household.

- The DCS households recorded adequate supply of cattle feed while most of the households mentioned that cost of cattle feed and mineral mixtures was high. Around half of the DCS respondents mentioned that cattle feed and mixtures were available on credit from the cooperative society and loan was also made available for purchase of cattle. Technical guidance was also provided by the society. NDCS households did not have any access in the form of any support from the dairy cooperatives in their area, they were fully dependent on the agent or private agency to get support for input and output service systems.The supply of cattle feed and fodder was inadequate. Feed and fodder was not available on credit for majority of the NDCS households. Most of the households mentioned about non availability of emergency veterinary services and lack of technical guidance. Available emergency veterinary services were expensive.

- In case of output delivery, DCS households mentioned that the milk price received by them was low and they used to get the payment on fortnightly/monthly basis. Around two third of the households mentioned that incentives or bonus for supplying milk were adequate, while three fifth of selected households mentioned that cross bred cow milk was not acceptable in family. Some of the DCS households

had benefitted from the system of advance payment for milk while some of the agent or private agency had provided this facility in selected area. NDCS families also felt that the milk price received by them was low. The payment was immediate for about ten percent of the families. As can be expected, most of the NDCS households felt that the incentives or bonus for supplying milk was low.

6.3 Policy Implications and beneficial interventions

1. The field survey highlighted some very important aspects of dairy business. The rearing of local cows for milk production can be made viable by increasing the prices given to the milk producers or wherever the production environment suits, the milk yield need to be improved. The crossbred animals and buffaloes are economically viable in all the regions. But if the productivity of these animals does not increase it is likely that in the times to come, the returns will not be even sufficient to cover the rising feed and fodder costs.

2. Wherever there is better infrastructure endowment and land is available for cultivation of green fodder, yet the farm-gate prices of milk are quite low, the net economic margin resulted into negative outcome. In the transient region of Saurashtra in Gujarat and Belgaum in Karnataka, lack of remunerative prices to farmers is a serious issue. Although the cooperative network in Gujarat has been strengthened but the prices paid to the farmers is not commensurate with their cost of production. The economics of milk is viable only during lactation period but same turns out to be having lower margin when dry period is included to calculate the costs for entire cycle (inter calving period).

3. There is a need to increase milk prices as open market milk rates are higher than those offered by cooperatives. Though it is well-known that in co-operative sector 15-17 per cent profit of milk sold goes back to farmers in the form of bonuses and dividend, there is around 71 per cent producers' share in every rupee spent by the consumer.

4. Dairy industry can serve as a cushion in the form of continuous flow of income as an industry complementary to the agricultural sector. While both agriculture and dairy industry if simultaneously operate it can improve not only farmer's income but also compensate for unexpected losses faced due to agriculture especially for poor small and marginal farmers. Besides such complementarity protects against seasonal and disguised unemployment and acts as a shield to protect farmer against the negative impact of climate change on agriculture.

5. Ration Balancing Program (RBP) results in better health of animal, improves the milk composition and the yield, improves conception rate and thereby lactation cycle improves due to reduction in the dry rate. Hence it is suggested that if the local educated youth of the village are involved in the form of Local Resource Persons (LRPs) it would result in the optimum utilization of the locally available resources in the form of fodder and labor as also the rural employment rate will improve. In the process, such positive interventions would have multi-fold effect in net dairy income and reduction in the quantity of BEP through reduction in cost and improvement in income through improved quality of milk. Such benefits can be assured through proper assessment mechanism from RBP.

6. Improvement in nutritional rationed balanced diet can create a positive impact on yield thereby improving net income and reducing the BEP quantity.

7. If the numbers of lactation days in a cycle are increased, it can create a positive impact on yield thereby improving net income and reducing the BEP quantity.

8. Fodder forms a major component of the variable cost in the dairy industry. If the feed and fodder cost is reduced it can result in improvement in net income and reduce the BEP quantity.

9. Increase in yield by any means can create a positive impact on improvement in net income and reduce the BEP quantity.

10. Mostly family labor is involved in dairy industry. Women comprise of a major proportion of family labor.

11. Dairy farmers need to be educated that rather than purchasing a lactating animal it would be better to rear a calf. Rearing a calf closer to the mother improves the mental health (by reducing the stress levels of the calf since it is closer to the mother) and physical health of the calf (since it is entirely in the control of farmer, how to rear the calf carefully).

12. As observed during the primary data collection if the resources are adequate it would be beneficial for the dairy farmer to add additional livestock beyond two animals in the herd. Resource efficiency between group of farmers can also create a positive impact on net income and reduce the quantity of BEP.

13. Fodder is the major component of the variable cost. Hence fodder community farming farms should be encouraged, benefits assessed, and should be effectively communicated to the dairy farmers. Co-operative farming of fodder, particularly on the barren land of the village, can assure sufficient local availability of the fodder, thereby reduce the variable cost, create a positive impact on net income and reduce the quantity of BEP.

14. Good quality of milk should be assured by properly educating the dairy farmers regarding the hygiene in the entire shade maintenance, hygienic maintenance of the equipment and utensils used in the milk procurement and delivery, maintenance of the animal by taking proper veterinary care of the animal and assuring good quality fodder inputs. This can result in good quality milk and thereby assure good returns for the farmers, create a positive impact on net income and reduce the quantity of BEP.

15. The indigenous milch & breedable cattle and Buffalo number should be increased in Punjab and also in other hot and humid climatic regions. It is well known that these animals can tolerate higher temperature more than the cross bred. The cost of milk production is very high for cross bred rearing as compared to indigenous cattle and buffalo in the regions of the study area.

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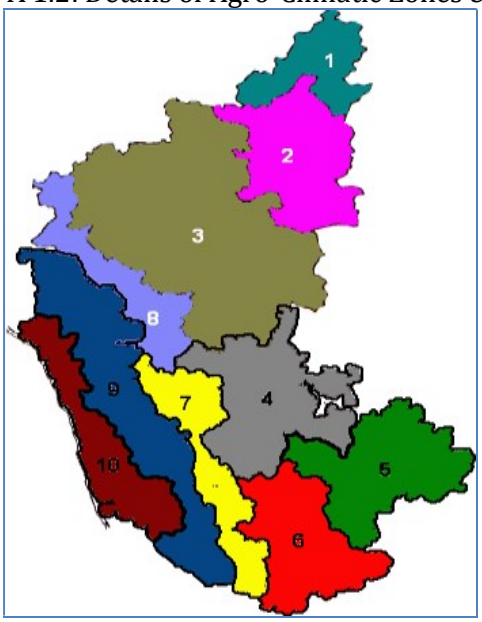
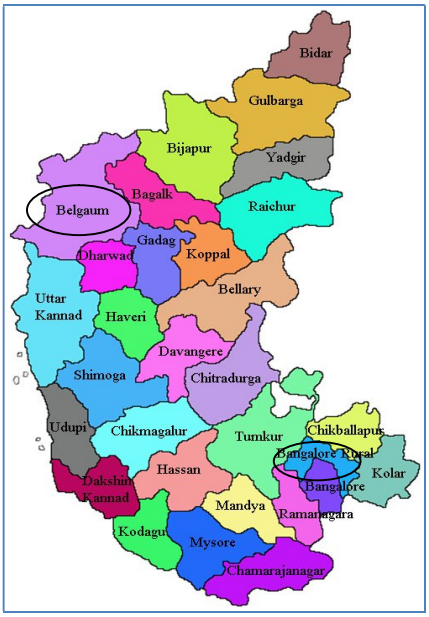
A 1: Details on Selected Milk Unions in Selected States of India & ACZs

A 1.1: Details of Agro-Climatic Zones and Location of Selected Milk Unions in Punjab

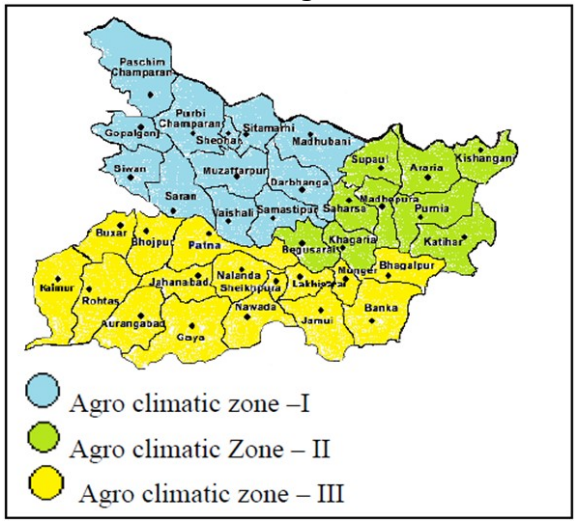
A 1.2: Details of Agro-Climatic Zones &Location of Selected Milk Unions in Karnataka

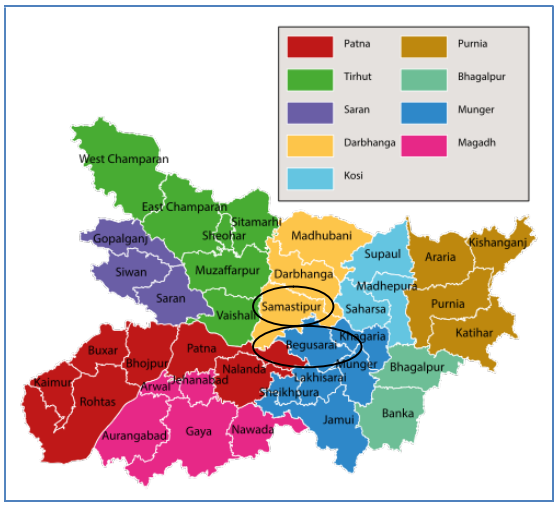




Source:https://www.uasbangalore.edu.in/index.php/seeds/91-kv-kendra

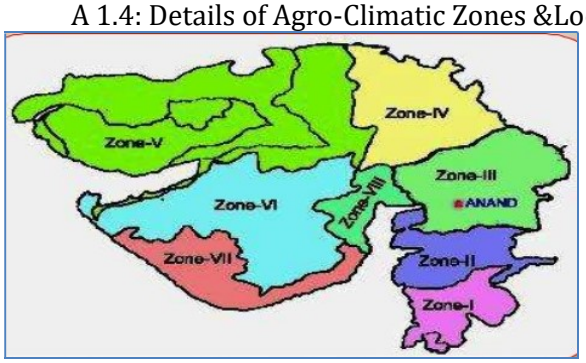
A 1.3: Details of Agro-Climatic Zones & Location of Selected Milk Unions in Bihar

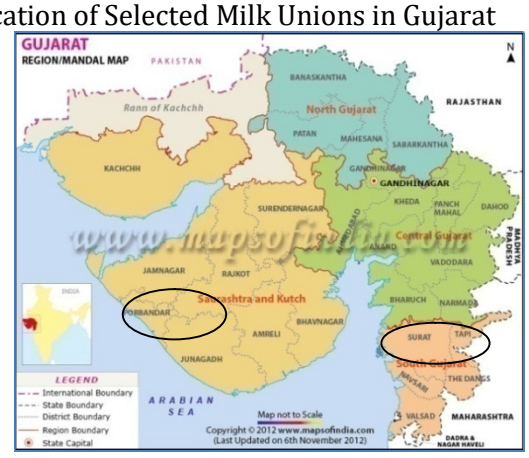




Source: Hoda, Anwarul; Pallavi Rajkhowa and Ashok Gulati (2017), "Unleashing Bihar's Agriculture Potential: Sources and Drivers of Agriculture Growth", Working Paper 336, Indian Council For Research On International Economic Relations, March 2017

A 1.4: Details of Agro-Climatic Zones &Location of Selected Milk Unions in Gujarat





A2: Details on Selected Villages

Sr.	Selected EIAs	DCS Cluster V1	DCS Cluster V2	NDCS Cluster V3
1	Karnataka			
	i) Belgaum	Morab (Raibag Taluk) Teli Thota (Morab (RaibagTaluk)	Yaraguddi (Bailahongal) Bhavihal (Bailahongal) Yaragoppa (Bailahongal)	Sanikoppa (Bailahongal) JakanayakankoppaSampagaon Gosabal (Gokak Taluk)
	ii) Bengaluru	Yeliyuru Haleyuru	Dharampura Mandibele Beediganahalli	
2	Punjab			
	i) Ropar	Abiana Madhopur Dahirpur	Thana Govindgarh Lubangarh Khijrabad	Binder nagar Gadhdollian Garbabbaga
	ii) Ludhiana	AgwarLopon BurajHari Singh GalabKhurd	AgwarGujjran RajoanaKalan KokriKalan	SawaddiKhurd Rupa Patti GalabKalan
3	Bihar			
	i) Mithila	Salkhani Babapur Utri	KeraiMahila MushairaKerai KeraiSahpur	Narayanpur
	ii) Barauni	Keshave AmrorKiradpur	Rajopur	Kari Chak
4	Gujarat			
	i) Junagadh	Chingariya Pata Gorsar	Ratia Balej RatiyaNes	Galodar Bhanduri
	ii) Surat	Vaheval (Mahuva)	Anaval (Mahuva) Lasanpor (Mahuva)	Astan, Babala, DhamdodLumbha, Haripura, Kantali, Miyavadi, Mori Uchharel, Nandida, Naugama, Ninat, Nindan and ParadiVagha

Annexure III

A3: MGNREGA and Prevailing Wages rates (Rs/day)

	MGNREGA (Unskilled labour) (Rs/person)		Selected HH (Rs/person for 8 hours)		
	Actual Paid	GOI Notified	M	F	AV
Gujarat	174	134	196	194	195
Karnataka	247	249	310	178	244
Punjab	234	240	250	200	225
Bihar	177	168	278	150	214

Notes: GOI Notification dated March 31, 2018 (F. No. J-11011/1/2009/RE/III, Department of Rural Development, Ministry of Rural Development, Govt of India
https://nrega.nic.in/netnrega/home.aspx

Annexure IV

A4: Sensitivity analysis/ Feed Strategies

1. Scenario I: Decrease in feeding cost by 5% and Increase in milk yield by 5%- based on results of ration balancing programme

Parameter	Before RBP	After RBP	Change %
Average milk production (kg/animal/day)	7.07	7.34	+ 3.8 %
Average cost of feeding (Rs./animal/ day)	135.04	119.04	-11.84 %

2. Scenario II: Increase in milk yield by 15%- balanced ration along with challenge feeding –
   "Challenge Feeding and Milk Production Performance in Crossbred Cows"
   The overall mean daily milk yield was 18.49 per cent higher in treatment group as compared to control group (20.5 vs. 17.3 kg/d).
   (Kamboj, *et al*, 2016, Indian Journal of Animal Nutrition)

3. Scenario III: Increase in feeding cost by 15% and Increase in milk yield by 25%- based on comprehensive feeding strategies with TMR in Kolhapur Milk Union

4. Scenario IV: Increase in feeding cost by 15% and Increase in milk yield by 25% with increase in milk days up to 30 days- based on comprehensive feeding strategies with TMR in Kolhapur Milk Union

Particulars	Control (n=14)	Experiment (n=24)	% Change
Average DMI (Kg/day)	12.6 (2.8%)	14.8 (3%)	
Average Milk yield (kg/day)	7.43	9.26	
Six months milk yield (kg)	1337	1669	+24.8 %
Feeding Cost (Rs/day)	185	210	
Six months feeding cost (Rs)	33,300	37,800	+13.5 %
Income from sale of milk (Rs)	58,962	73,603	
Return over feed cost (Rs)	25,662	35,803	

A 5.1: Detail on Animals with Selected Households in Gujarat

Category	Type	Particulars	Detail on Animals with Selected Households							
			DCS				NDCS			
			Local Cow	Cross Bred	Buffalo	Total	Local Cow	Cross Bred	Buffalo	Total
Small	In milk	In milk not Pregnant	12	267	190	469	28	57	154	239
		In milk and Pregnant	11	162	134	307	27	39	99	165
	Dry	Dry and pregnant	9	75	111	195	14	21	70	105
		Dry and not Pregnant	0	28	18	46	3	8	7	18
	Heifer	Not Calved even once	1	27	33	61	2	0	17	19
		Pregnant Heifer	3	5	26	34	0	3	18	21
	Calves	Male	7	59	42	108	21	13	50	84
		Female	13	273	195	481	53	71	206	330
	Adult Male		18	2	7	27	49	0	7	56
		All Animals	74	898	756	1728	197	212	628	1037
Medium	In milk	In milk not Pregnant	47	123	294	464	37	42	140	219
		In milk and Pregnant	30	104	266	400	25	33	111	169
	Dry	Dry and pregnant	24	61	280	365	27	21	96	144
		Dry and not Pregnant	2	19	53	74	4	26	55	85
	Heifer	Not Calved even once	4	7	34	45	1	1	5	7
		Pregnant Heifer	4	3	15	22	3	0	9	12
	Calves	Male	20	37	47	104	19	15	38	72
		Female	46	122	335	503	25	25	109	159
	Adult Male		41	0	5	46	47	0	2	49
		All Animals	218	476	1329	2023	188	163	565	916
All	In milk	In milk not Pregnant	59	390	484	933	65	99	294	458
		In milk and Pregnant	41	266	400	707	52	72	210	334
	Dry	Dry and pregnant	33	136	391	560	41	42	166	249
		Dry and not Pregnant	2	47	71	120	7	34	62	103
	Heifer	Not Calved even once	5	34	67	106	3	1	22	26
		Pregnant Heifer	7	8	41	56	3	3	27	33
	Calves	Male	27	96	89	212	40	28	88	156
		Female	59	395	530	984	78	96	315	489
	Adult Male		59	2	12	73	96	0	9	105
		All Animals	292	1374	2085	3751	385	375	1193	1953

A5.2: Detail on Total in Milk and Dry Animals with Selected Households in Gujarat

Particulars			in Milk and Dry Animals with Selected Households					
			Small		Medium		Total	
			In Milk	Dry	In Milk	Dry	In Milk	Dry
A	DCS	Local Cow	23	9	77	26	100	35
		Cross Bred	429	103	227	80	656	183
		Buffalo	324	129	560	333	884	462
		Total	776	241	864	439	1640	680
B	NDCS	Local Cow	55	17	62	31	117	48
		Cross Bred	96	29	75	47	171	76
		Buffalo	253	77	251	151	504	228
		Total	404	123	388	229	792	352

A5.3: Detail on Animals with Selected Households in Punjab

Sr. No.	Particulars	In milk		Dry		Heifer		Calves		Total Adult Male	All Animals	Milch Animals
		In milk not Pregnant	In milk and Pregnant	Dry and pregnant	Dry and not Pregnant	Not Calved even once	Pregnant Heifer	Male	Female			
A	DCS											
a	Small											
	Local Cattle	4	13	10	0	1	3	7	7	0	45	27
	Cross Bread	171	56	45	6	44	15	37	80	84	538	278
	Buffalo	392	130	125	27	84	39	79	224	7	1107	674
	Total	567	199	180	33	129	57	123	311	91	1690	979
b	Medium										0	0
	Local Cattle	2	0	0	0	0	0	0	1	1	4	2
	Cross Bread	222	127	72	22	22	23	16	44	45	593	443
	Buffalo	393	192	170	43	26	21	40	128	27	1040	798
	Total	617	319	242	65	48	44	56	173	73	1637	1243
c	ALL										0	0
	Local Cattle	6	13	10	0	1	3	7	8	1	49	29
	Cross Bread	393	183	117	28	66	38	53	124	129	1131	721
	Buffalo	785	322	295	70	110	60	119	352	34	2147	1472
	Total	1184	518	422	98	177	101	179	484	164	3327	2222
B	NDCS										0	0
a	Small										0	0
	Local Cattle	10	5	3	2	15	10	1	14	0	60	20
	Cross Bread	93	37	7	3	25	9	2	38	10	224	140
	Buffalo	196	70	25	7	42	22	43	49	8	462	298
	Total	299	112	35	12	82	41	46	101	18	746	458
b	Medium										0	0
	Local Cattle	9	7	0	0	4	2	2	4	1	29	16
	Cross Bread	189	103	25	0	23	9	8	33	29	419	317
	Buffalo	239	90	55	8	49	8	66	50	5	570	392
	Total	437	200	80	8	76	19	76	87	35	1018	725
c	ALL										0	0
	Local Cattle	19	12	3	2	19	12	3	18	1	89	36
	Cross Bread	282	140	32	3	48	18	10	71	39	643	457
	Buffalo	435	160	80	15	91	30	109	99	13	1032	690
	Total	736	312	115	20	158	60	122	188	53	1764	1183

A5.4: Detail on Total in Milk and Dry Animals with Selected Households in Punjab

Particulars			in Milk and Dry Animals with Selected Households					
			Small		Medium		Total	
			In Milk	Dry	In Milk	Dry	In Milk	Dry
A	DCS	Local Cow	17	10	2	0	19	10
		Cross Bred	227	51	349	94	576	145
		Buffalo	522	152	585	213	1107	365
		Total	766	213	936	307	1702	520
B	NDCS	Local Cow	15	5	16	0	31	5
		Cross Bred	130	10	292	25	422	35
		Buffalo	266	32	329	63	595	95
		Total	411	47	637	88	1048	135

A5.5: Detail on Animals with Selected Households in Karnataka

	Sr. No.		In milk		Dry		Heifer		Calves		Total Adult Male	All Animals	Milch Animals
			In milk not Pregnant	In milk and Pregnant	Dry and pregnant	Dry and not Pregnant	Not Calved even once	Pregnant Heifer	Male	Female			
	A	DCS											
a	Small	LC	16	1	3	0	1	3	1	6	1	32	20
		CB	602	143	80	1	170	38	33	148	3	1218	826
		B	204	40	47	1	16	25	32	92	1	458	292
			822	184	130	2	187	66	66	246	5	1708	1138
b	Medium	LC	2	3	1	0	0	0	1	3	0	10	6
		CB	483	175	104	4	71	11	10	39	0	897	766
		B	99	32	35	3	7	1	3	13	0	193	169
			584	210	140	7	78	12	14	55	0	1100	941
C	All	LC	18	4	4	0	1	3	2	9	1	42	26
		CB	1085	318	184	5	241	49	43	187	3	2115	1592
		B	303	72	82	4	23	26	35	105	1	651	461
			1406	394	270	9	265	78	80	301	5	2808	2079
	NDCS												
a	Small	LC	4	0	2	0	0	0	0	3	0	9	6
		CB	227	69	47	3	27	56	25	92	0	546	346
		B	203	17	44	1	12	30	24	134	0	465	265
			434	86	93	4	39	86	49	229	0	1020	617
b	Medium	LC	2	0	0	0	0	0	0	0	0	2	2
		CB	100	33	41	3	4	14	3	23	0	221	177
		B	24	4	26	2	0	1	2	3	0	62	56
			126	37	67	5	4	15	5	26	0	285	235
C	All	LC	6	0	2	0	0	0	0	3	0	11	8
		CB	327	102	88	6	31	70	28	115	0	767	523
		B	227	21	70	3	12	31	26	137	0	527	321
			560	123	160	9	43	101	54	255	0	1305	852

A5.6: Detail on Total in Milk and Dry Animals with Selected Households in Karnataka

Particulars			in Milk and Dry Animals with Selected Households					
			Small		Medium		Total	
			In Milk	Dry	In Milk	Dry	In Milk	Dry
A	DCS	Local Cow	17	3	5	1	22	4
		Cross Bred	745	81	658	108	1403	189
		Buffalo	244	48	131	38	375	86
		Total	1006	132	794	147	1800	279
B	NDCS	Local Cow	4	2	2	0	6	2
		Cross Bred	296	50	133	44	429	94
		Buffalo	220	45	28	28	248	73
		Total	520	97	163	72	683	169

A5.7: Detail on Animals with Selected Households in Bihar

Category	Type	Particulars	Detail on Animals with Selected Households							
			DCS				NDCS			
			Local Cow	Cross Bred	Buffalo	Total	Local Cow	Cross Bred	Buffalo	Total
Small	In milk	In milk not Pregnant	12	515	12	539	0	122	0	122
		In milk and Pregnant	8	454	8	470	0	12	0	12
	Dry	Dry and pregnant	8	168	14	190	0	268	0	268
		Dry and not Pregnant	6	139	7	152	0	161	0	161
	Heifer	Not Calved even once	0	0	0	0	0	0	0	0
		Pregnant Heifer	0	0	0	0	0	0	0	0
	Calves	Male	0	17	0	17	0	11	0	11
		Female	0	202	0	202	0	117	0	117
	Adult Male		0	0	0	0	0	0	0	0
		All Animals	34	1495	41	1570	0	691	0	691
Medium	In milk	In milk not Pregnant	5	183	0	188	1	50	0	51
		In milk and Pregnant	15	91	1	107	1	85	0	86
	Dry	Dry and pregnant	5	84	0	89	0	49	1	50
		Dry and not Pregnant	3	77	0	80	2	42	0	44
	Heifer	Not Calved even once	0	0	0	0	0	0	0	0
		Pregnant Heifer	0	0	0	0	0	0	0	0
	Calves	Male	0	9	0	9	0	2	0	2
		Female	0	69	0	69	0	18	0	18
	Adult Male		0	0	0	0	0	0	0	0
		All Animals	28	513	1	542	4	246	1	251
All	In milk	In milk not Pregnant	17	698	12	727	1	172	0	173
		In milk and Pregnant	23	545	9	577	1	97	0	98
	Dry	Dry and pregnant	13	252	14	279	0	317	1	318
		Dry and not Pregnant	9	216	7	232	2	203	0	205
	Heifer	Not Calved even once	0	0	0	0	0	0	0	0
		Pregnant Heifer	0	0	0	0	0	0	0	0
	Calves	Male	0	26	0	26	0	13	0	13
		Female	0	271	0	271	0	135	0	135
	Adult Male		0	0	0	0	0	0	0	0
		All Animals	62	2008	42	2112	4	937	1	942

A5.8: Detail on Total in Milk and Dry Animals with Selected Households in Bihar

Particulars			in Milk and Dry Animals with Selected Households					
			Small		Medium		Total	
			In Milk	Dry	In Milk	Dry	In Milk	Dry
A	DCS	Local Cow	20	14	20	8	40	22
		Cross Bred	969	307	274	161	1243	468
		Buffalo	20	21	1	0	21	21
		Total	1009	342	295	169	1304	511
B	NDCS	Local Cow	0	0	2	2	2	2
		Cross Bred	134	429	135	91	269	520
		Buffalo	0	0	0	1	0	1
		Total	134	429	137	94	271	523

Glimpses of Field Visits

1 Punjab

2 Karnataka

3 Bihar


केराई महिला दुग्ध उत्पादक सहयोग
होली की हार्दिक शुभ का
अध्यक्ष- रंजुला सिन्हा


होली की हार्दिक शुभ कामना

4 Gujarat


સ્થાપના : ૧/૫/૬૬
સ.ઇ.૧૦૨૧૫
ધી કુંઠેલા દૂધ ઉત્પાદક
સહકારી મંડળી લી.
મું.કુંઠેલા,તા.ડભોઇ જિ.વડો.૩૯૫
દૂધમાં

Annexure VI

Village Census

1-PDCS / 0-Non PDCS

[1] Identification of Village

1. State		2. District		3. Taluka		4. Village	
5. If PDCS exist, Name*							
5.1 Name of the Respondent							
5.2 Designation						5.3 .Mobile	
6.If PDCS not exit, how far it is?		(distance in km)……					

*PDCS- Primary Dairy Cooperative Society.

[2] Village Census

House No./ Sr. No.	Name of Head of Household/ Member	No. of Milch Animals (in Milk + Dry)						Total
		In Milk			Dry (at least calved once and not more than 7th lactation)			
		Local Cow	Cross breed cow	Buffalo	Local Cow	Cross breed cow	Buffalo	

Annexure VII

Focus Group Discussion

1.1 Name of Village_____1.2 Nearby Town Name _____Distance _____(kms)

1.3 Name of District_____ 1.4 Name of State _____1.5 No. of participants ____

2.1 Agriculture Seasons (write the period- from to months): 2018-19

Rainy	Winter	Summer

2.2 Milk Yield (lit/animal/day) along with fat %: 2018-19

Particulars	Rainy	Winter	Summer
LC			
CB			
B			

2.3Labour Rate (Rs/day for 8 hours): 2018-19

M/F	Rainy	Winter	Summer
Male			
Female			

2.4Average Life Cycle of in Milch Animals

Animal		Average Life Cycle of in Milch Animals									Av. Age of calf at Sale (months)
	Age at first heat (months)	Services per conceptions (No.)		Service period from first attempt till the success (days)	Av. Age at first calving (months)	Lactation length (days)	Dry Period (days)	Avg. No of lactations in life	Av. Productive life (years)	Life after last lactation (years)	
		AI	Natural								
LC											
CB											
B											

2.5 Cost of rearing an animal till first calving or Induction of Animal and Disposal Method

Animal	Cost of rearing calf till first calving(Rs.)	Cost of Induction of animal after 1st lactation (Rs./animal)	Salvage Value of adult animal (Rs.)	Rearing charges – unproductive animal (Rs./month)	Rate of Animal shed Land in village (Rs./sqft)
LC					
CB					
B					

2.6 Fodder Consumption for Milch Animal (Kgs / day / animal)

Sr. No.	Animal	Av. Quantity (Kgs / day / animal)							
		In milk				Dry Period			
		Green Fodder	Dry Fodder	Supplements	Concentrates	Green Fodder	Dry Fodder	Supplements	Concentrates
1	LC								
2	CB								
3	B								

Note –Take actual quantity of fodder consumed (do not include quantity of wastage)

2.7 Milk Rate (Rs. per Litre) received from different Agencies and dividend received: Please collect PDCS Rate list

Animal	Milk Rate (Rs. per Litre)----- (Milk directly sell by milk producer to)									
	Rainy and Winter Season					Summer Season				
	PDCS	Consumer	Private Dairy / Agent	Sweet Shop, Hotel, Marriage, etc.	Range of fat (%)	PDCS	Consumer	Private Dairy / Agent	Sweet Shop, Hotel, Marriage, etc.	Range of fat (%)
Rs./Litre										
LC										
CB										
B										
Bonus/ Dividend										

2.8 Prevailing Bank Interest rate (Per Cent / annum)charged by the banks/societies:

Rate of Interest charged (Per Cent / annum)						Interest on loan for Equipment (%)	Insurance premium paid (amount / animal / annum)
Purchase of Livestock			Cattle shed				
Bank	Cooperative Credit Soc.	Informal sources	Bank	Cooperative Credit Soc.	Informal sources		

Note: Informal sources- money lenders, relatives, friends, etc.

2.9 Name of Fodder Crops (By-product and Main Product) Grown in the Area:

Particulars	Fodder Crop available				
	By product/ sole crop	Crop Name1	Crop Name 2	Crop Name 3	Crop Name 4
Kharif	Cereals and Pulses				
	Oilseeds				
	Sugarcane top				
	Fodder Crop				
Rabi	Cereals and Pulses				
	Oilseeds				
	Sugarcane top				
	Fodder Crop				
Summer	Cereals and Pulses				
	Oilseeds				
	Sugarcane top				
	Fodder Crop				

2.10 Average Market Value (Rs/Unit)

Sr. No.	Assets	Purchase Value (Rs/Unit)	Sr.	Assets	Purchase Value (Rs/Unit)
1	Milk cans (aluminum / steel) – 10 lit		8	Grass Chopper	
	20 lit 40 lit		9	Fan	
2	Milking Machine		10	Fogger	
3	Grass Cutter		11	Biogas unit	
4	Fodder Chaffer-Manual		12	Tractor trolley	
5	Fodder Chaffer Power		13	Large auto(material shifting)	
6	Fodder harvester/ mowers		14	Mosquito net	
7	Feed Mixer/ TMR mixer		15	Other 1, if any (specify)	

Annexure VIII

Dairy Household Survey Schedule (for Milk Producer)(2018-19)

[1] Identification of Dairy Household

1. State		2. District		3. Taluka		4. Village	
5. Name of Household Head (HH)					6. Gender of HH	*1:Male/ 2:Female*	
7. Age (years) of HH		8. Education (code) HH			9.Mobile		

*1:illiterate, 2:literate but no formal education, 3:primary, 4:secondary, 5:graduate, 6:post-graduate,

[2] Socio-Economic Characteristics (*please write code, number or tick as applicable)*

1. Religion (code) (*1:Hindu, 2:Muslim, 3:Christian, 4:Sikh, 5:Others)*		3. Occupation- (code) *1:Cultivator, 2:Animal Husbandry and Dairying, 3:Agri. Labour, 4:Nonfarm Labour, 5:Own Non-Farm Establishment, 6:Trade, 7:Employee in Service, 8:Other*	Main/ Principal	
2. Social Group (*1:ST, 2:SC, 3:OBC, 4:Open)*			Subsidiary	
4. Income Group *(1:BPL/2:APL/3:AAY)*		5. Landless (write -0)/ Operational Holdings (ha)-Agri		
6. Experience in Dairy (years)		7. Experience in Farming (years), if possess		
8. Since how long you are a member of dairy cooperative? (years)		10. Do you maintain dairy (milk) financial record? *1:Yes/2:No*		
11.Biogas Facility at home *1:Yes/2:No*		12. Toilet facility at home *1:Yes/2:No*		
12. Details of Family:- Members : M: F: C (below 15 years): Work in Dairy: M: F: C (below 15 years):				

[3] Source-wise Farmer's Household Income (in Rs.)

Sl.	Sources of Gross Income (in Rs)Agriculture Year 2018-19	Annual Gross Income (Rs)
1	Agriculture /Cultivation	
2	Agriculture Labour /Wages	
3	Animal Farming*(Sale of milk, Dung/FYM, Urine)	
4	Animal Farming – Sale of Animal	
5	Non Farm Employment-business/Self Employment	
6	Service (Job)	
7	Any Other, specify	

Note –*Calculate animal farming income by adding income from sale of milk (calculated by reverse counting using dividend percentage and dividend amount received), income from sale of cow dung and urine(per annum–Total Quantity in kg X Rate per kg in Rs.)

[4] Cattle Shed and Fodder Storage

Building/ Shed		Cattle Shed-CS			Fodder Storage-FS		
		No.	Present Value (Rs.)	How old (years)	No.	Present Value (Rs.)	How old (years)
Pucca -Size- sq ft	1 Owned fund						
	2 Borrowed fund						
	Subsidy , if any						
Kachcha - Size- sq ft	Owned fund						

[5] Holding of Productive Assets (Dairy)

Sr No.	Assets	No.	Total Purchase Value (Rs.)	How old (years)	Subsidy received on purchase, if any with year	Sr. No.	Assets	No.	Total Purchase Value (Rs.)	How old (years)	Subsidy received on purchase, if any with year
1	Milk cans (aluminium/ steel) 10 lit/20 lit/40 lit					8	Grass Chopper				
						9	Fan				
2	Milking Machine					10	Fogger				
3	Grass Cutter					11	Biogas unit				
4	Fodder Chaffer-M					12	Tractor trolley				
5	Fodder Chaffer P					13	Auto (shifting)				
6	Fodder harvester/ mowers					14	Mosquito net				
7	Feed Mixer/ TMR mixer					15	Other 1, if any				

[6a] Herd Strength (Numbers)- On the day of Survey

Breed	Milch animals (Numbers)				Other animals (Numbers.)				
	In milk		Dry		Heifer		Calves		adult male
	In Milk Not Pregnant	In Milk And Pregnant	Dry and Pregnant	Dry and Not Pregnant	Not Calved even Once	Pregnant Heifer	Male	Female	
Local Cattle (LC)									
Cross Breed (CB)									
Buffalo (B)									

[6b] Purchase of Animal, if any,during 2018-19

Variety	No. of animals purchased	Total Amount (Rs.)	Loan taken for purchase of milk animalduring 2018-19				
			Total Loan amount (Rs.)	Subsidy AMOUNT received, if any (Rs.)	Source- (1 Bank, 2 Coop, 3- Informal	@ interest rate- %/ annum	Any other, specify
1. Local Cattle							
2. Cross Breed							
3. Buffalo							

[7a] Details on Milk Yield (Lit/day/animal), Milk Rate (Rs. Lit)

Sr. No.	Av. Milk Yield (lit / animal/ per day) 2018-19				Av. Milk Rate (Rs./lit)
	Animal	Rainy	Winter	Summer	
1	LC				
2	CB				
3	B				

[7b] Fodder Crop Production 2018-19 (crop grown as fodder crop-green fodder)

Sr. No.	Season	Crop 1…		Crop 2…		Crop 3…		Crop 4..	
		Area (ha)	Prod (tones)	Area (ha)	Prod (tones)	Area (ha)	Prod (tones)	Area (ha)	Prod (tones)
1	Kharif								
2	Rabi								
3	Summer								

Note -* 1 Green fodder production – (qty cut per day (kg) X No. of days fodder harvested during 1st cut X total cut)

[8] Details of Milch Animals(Dry + In Milk) on Survey Date ……Individual Animal wise Data

Sr. No.	Animal (breed-wise/ individual)	Estimated Present Market value (Rs.)	Age of Animal (Years)	Age at first calving (months)	Present No. of Lactation Order (e.g.1st, 2nd…7th)	Dry Period (days)	In Milk (in months)	
							(days)	Milk Drawn (lit/day) two times -Yesterday
1								
2								
3								
4								
5								

Note: Code the animals in second column for Local cattle as LC1, LC2…; Cross Breed as CB1, CB2…and Buffalo as B1, B2…

[9a] Income in Dairy (in milk animals)- Sale of milk

Sr. No	Animal	In milk						
		Milk Household Use/day (lit)	Sale of milk (Per Day) In Milk animals					
			Coop Society		Private Dairy/Agent		Consumer, Hotel, etc.	
			Sale (lit)	(Rs./Lit	Sale (lit)	(Rs./Lit	Sale (lit)	(Rs./Lit)
1	LC							
2	CB							
3	B							

Notes: 1Coop society, 2- Agents, 3- Consumers, 4. Private Companies; 5 Others.

[9b] Other Income in Dairy (Annual- All animals) & Livestock

Sr. No.	Animal	All Animals				Sale of Animal (2018-19)	
		Self Use / Sale of FYM / Cow dung (Rs/Annum)		Sale -Animal Urine (Rs/Annum)			
		Self use + Sale	Amount (Rs)	Value	Sold to	Nos.	Total Amount (Rs.)
1	LC						
2	CB						
3	B						

Notes: 1 Coop society, 2- Agents, 3- Consumers, 4. Private Companies; 5 Ayurveda doctors; 6 others.

[10] Total Cost of Feed and Fodder: AllAnimals (Previous day of interview- Summer Season)(kg/day) (ALSO TO CAPTURE OPPORTUNITY COST)

Sr. No.	Fodder Types	Feed Cost (kg/day)			Milch animals(kg/day) (As per table 8)					
		All animals (As per table 6a)			In milk period			Dry Period		
		Home (kg)	Purchased (kg)	Market Rate (Rs./kg)	LC	CB	B	LC	CB	B
A	Green-Fodder									
1										
2										
3										
B	Dry Fodder									
1										
2										
C	Concentrates									
1										
2										
D	Supplements									
1										
2										
E	Grazing hours /day									
F	Grazing cost/ month									

Note: In case if all animal are fed together the joint cost of feed will be apportioned applying standard animal units approach' and also the proportion should be told per breed

[10a] Fodder Consumption as per Seasons(kg/day)

Sr. No	Fodder Types	Rainy Season						Winter Season					
		All animals			Milch animals			All animals			Milch animals		
		Home (kg)	Purchased (kg)	Market Rate (Rs./kg)	LC	CB	B	Home (kg)	Purchased (kg)	Market Rate (Rs./kg)	LC	CB	B
A	Green-Fodder												
1													
2													
3													
B	Dry Fodder												
1													
2													
C	Concentrates												
1													
2													
D	Supplements												
1													
2													
E	Grazing hours /day												
F	Grazing cost/ month												

Note: In case if all animal are fed together the joint cost of feed will be apportioned applying standard animal units approach' and also the proportion should be told per breed

[11] Cost of Milk Production Labour &Other Expenditure): Wage Rate (Rs.) (for 8 hrs): Male_____ Female_____

Particular	Animal No.	Labour Hours (PER DAY) All works				Other Expenditures (Rs./ Annum)						
		Family Labour		Hired Labour							Insurance (Rs./ Annum)	
		Male (hours minutes)	Female (hours)	Male (hours)	Female (hours)	Veterinary Cost plus vaccination, deworming, etc	AI Cost Rs / year	Transport Cost	Repair/ Maintenance Cost of equipment/ Home	Light & Water Charges	No.	Amount
Milch (dry+ in milk)												
Other Animals												

[12] Constraints Faced in Milk Production and Feeding Management

(5:Strongly agree, 4:Agree, 3:Indifferent/Neutral, 2:disagree, 1:Strongly disagree)

Sr. No	Milk Production- Constraints	Rating 5-1	Sr. No.	Feeding Management -Constraints	Rating 5-1
1	High Feed cost		1	Unavailability of green/ dry fodder throughout the year	
2	Non Availability of Fodder		2	Majority of grazing lands are either degraded or encroached	
3	High price for milch animal		3	Irregular & inadequate supply of cattle feed by PDCS	
4	Low average milk yield of the milk animals		4	Non availability of improved fodder seed in the market / PDCS	
5	Low milk price (Rs./lit)		5	High cost of cattle feed and mineral mixture	
6	High cost of veterinary medicines		6	No provision of quality seed on credit	
7	Lack of nutritious feed for quality milk production		7	High Cost & Low return on fodder production	
8	Poor knowledge about feeding and healthcare		8	Diversion of feed and fodder ingredients for industrial use	
9	Lack of finance to invest in dairy business for quality milk prod/Inadequate finance		9	Lack of necessary space required for tying the milking animals/ Poor housing	
10	Lack of veterinary services in villages for quality milk production		10	Land is very less therefore cannot afford to put more land under fodder seed/crop production	

[13] Service Delivery(Tick -(√)

Items		Service Provider (1-PDCS/ 2-Agent)	PLEASE TICK (√)		
A	INPUT DELIVERY				
1	Supply of Cattle Feed		Adequate	Inadequate	Not Available
2.	Cost of cattle feed and mineral mixture		High	OK	Not Available
3.	Cattle feed and fodder seed on Credit		Available	-	Not Available
4	Emergency Veterinary Services		Available	-	Not Available
5	Provision of loan for purchasing cattle		Adequate	Inadequate	Not Available
6	Technical Guidance		Available	-	Not Available
B	OUTPUT DELIVERY				
1	Milk Price (Rs./lit)		Adequate	Low	
2.	Payment of Milk		Immediate	Within 15 days	Within 30 days
3.	Incentives or bonus for supplying milk		Adequate	Low	
4.	Acceptability cross-bred cow Milk in family		Poor	Acceptable	Not acceptable
5	Advance payment for milk (Soc./vendors)		Available		Not Available

Annexure VIII

Dairy Household Survey Schedule (for Milk Producer)(2018-19)

Non -Member

[1] Identification of Dairy Household

1. State		2. District		3. Taluka		4. Village	
5. Name of Household Head (HH)					6. Gender of HH	*1:Male/ 2:Female*	
7. Age (years) of HH		8. Education (code) HH			9.Mobile		

*1:illiterate, 2:literate but no formal education, 3:primary, 4:secondary, 5:graduate, 6:post-graduate,

[2] Socio-Economic Characteristics (*please write code, number or tick as applicable)*

1. Religion (code) (*1:Hindu, 2:Muslim, 3:Christian, 4:Sikh, 5:Others)*		3. Occupation- (code) *1:Cultivator, 2:Animal Husbandry and Dairying, 3:Agri. Labour, 4:Nonfarm Labour, 5:Own Non-Farm Establishment, 6:Trade, 7:Employee in Service, 8:Other*	Main/ Principal	
2. Social Group (*1:ST, 2:SC, 3:OBC, 4:Open)*			Subsidiary	
4. Income Group *(1:BPL/2:APL/3:AAY)*		5. Landless (write -0)/ Operational Holdings (ha)-Agri		
6. Experience in Dairy (number of years)		7. Experience in Farming (years), if possess		
~~8. Since how long you are a member of dairy cooperative? (years)~~		10. Do you maintain dairy (milk) financial record? *1:Yes/2:No*		
11.Biogas Facility at home *1:Yes/2:No*		12. Toilet facility at home *1:Yes/2:No*		
12. Details of Family:- Members : M: F: C (below 15 years): Work in Dairy: M: F: C (below 15 years):				

[3] Source-wise Farmer's Household Income (in Rs.)

Sl.	Sources of Gross Income (in Rs)Agriculture Year 2018-19	Annual Gross Income (Rs)
1	Agriculture /Cultivation	
2	Agriculture Labour /Wages	
3	Animal Farming*(Sale of milk, Dung/FYM, Urine)	
4	Animal Farming – Sale of Animal	
5	Non Farm Employment-business/Self Employment	
6	Service (Job)	
7	Any Other, specify	

Note –*Calculate animal farming income by adding income from sale of milk (calculated by reverse counting using dividend percentage and dividend amount received), income from sale of cow dung and urine(per annum–Total Quantity in kg X Rate per kg in Rs.)

[4] Cattle Shed and Fodder Storage

Building/ Shed		Cattle Shed-CS			Fodder Storage-FS		
		No.	Present Value (Rs.)	How old (years)	No.	Present Value (Rs.)	How old (years)
Pucca -Size- sq ft	1 Owned fund						
	2 Borrowed fund						
	Subsidy , if any						
Kachcha - Size- sq ft	Owned fund						

[5] Holding of Productive Assets (Dairy)

Sr No.	Assets	No.	Total Purchase Value (Rs.)	How old (years)	Subsidy received on purchase, if any with year	Sr. No.	Assets	No.	Total Purchase Value (Rs.)	How old (years)	Subsidy received on purchase, if any with year
1	Milk cans (aluminium/ steel) 10 lit/20 lit/40 lit					8	Grass Chopper				
						9	Fan				
2	Milking Machine					10	Fogger				
3	Grass Cutter					11	Biogas unit				
4	Fodder Chaffer-M					12	Tractor trolley				
5	Fodder Chaffer P					13	Auto (shifting)				
6	Fodder harvester/ mowers					14	Mosquito net				
7	Feed Mixer Mixer					15	Other 1, if any				

[6a] Herd Strength (Numbers)- On the day of Survey

Breed	Milch animals (Numbers)				Other animals (Numbers.)				
	In milk		Dry		Heifer		Calves		adult male
	In Milk Not Pregnant	In Milk And Pregnant	Dry and Pregnant	Dry and Not Pregnant	Not Calved even Once	Pregnant Heifer	Male	Female	
Local Cattle (LC)									
Cross Breed (CB)									
Buffalo (B)									

[6b] Purchase of Animal, if any,during 2018-19

Variety	No. of animals purchased	Total Amount (Rs.)	Loan taken for purchase of milk animalduring 2018-19				
			Total Loan amount (Rs.)	Subsidy AMOUNT received, if any (Rs.)	Source- (1 Bank, 2 Coop, 3- Informal	@ interest rate- %/ annum	Any other, specify
1. Local Cattle							
2. Cross Breed							
3. Buffalo							

[7a] Details on Milk Yield (Lit/day/animal), Milk Rate (Rs. Lit)

Sr. No.	Av. Milk Yield (lit / animal/ per day) 2018-19				Av. Milk Rate (Rs./lit)
	Animal	Rainy	Winter	Summer	
1	LC				
2	CB				
3	B				

[7b] Fodder Crop Production 2018-19 (crop grown as fodder crop-green fodder)

Sr. No.	Season	Crop 1…		Crop 2…		Crop 3…		Crop 4..	
		Area (ha)	Prod (tones)	Area (ha)	Prod (tones)	Area (ha)	Prod (tones)	Area (ha)	Prod (tones)
1	Kharif								
2	Rabi								
3	Summer								

Note -* 1 Green fodder production – (qty cut per day (kg) X No. of days fodder harvested during 1st cut X total cut)

[8] Details of Milch Animals(Dry + In Milk) on Survey Date ……Individual Animal wise Data

Sr. No.	Animal (breed-wise/ individual)	Estimated Present Market value (Rs.)	Age of Animal (Years)	Age at first calving (months)	Present No. of Lactation Order (e.g.1st, 2nd…7th)	Dry Period (days)	In Milk (in months)	
							(days)	Milk Drawn (lit/day) two times -Yesterday
1								
2								
3								
4								
5								

Note: Code the animals in second column for Local cattle as LC1, LC2…; Cross Breed as CB1, CB2…and Buffalo as B1, B2…

[9a] Income in Dairy (in milk animals)- Sale of milk

Sr. No	Animal	In milk						
		Milk Household Use/day (lit)	Sale of milk (Per Day) In Milk animals					
			Coop Society		Private Dairy/Agent		Consumer, Hotel, etc.	
			Sale (lit)	(Rs./Lit	Sale (lit)	(Rs./Lit	Sale (lit)	(Rs./Lit)
1	LC							
2	CB							
3	B							

Notes: 1Coop society, 2- Agents, 3- Consumers, 4. Private Companies; 5 Others.

[9b] Other Income in Dairy (Annual- All animals) & Livestock

Sr. No.	Animal	All Animals				Sale of Animal (2018-19)	
		Self Use / Sale of FYM / Cow dung (Rs/Annum)		Sale -Animal Urine (Rs/Annum)			
		Self use + Sale	Amount (Rs)	Value	Sold to	Nos.	Total Amount (Rs.)
1	LC						
2	CB						
3	B						

Notes: 1 Coop society, 2- Agents, 3- Consumers, 4. Private Companies; 5 Ayurveda doctors; 6 others.

[10] Total Cost of Feed and Fodder: All Animals (Previous day of interview- Summer Season)(kg/day) (ALSO TO CAPTURE OPPORTUNITY COST)

Sr. No	Fodder Types	Feed Cost (kg/day)			Milch animals(kg/day) (As per table 8)					
		All animals (As per table 6a)			In milk period			Dry Period		
		Home (kg)	Purchased (kg)	Market Rate (Rs./kg)	LC	CB	B	LC	CB	B
A	Green-Fodder									
1										
2										
3										
B	Dry Fodder									
1										
2										
C	Concentrates									
1										
2										
D	Supplements									
1										
2										
E	Grazing hours /day									
F	Grazing cost/ month									

Note: In case if all animal are fed together the joint cost of feed will be apportioned applying standard animal units approach' and also the proportion should be told per breed

[10a] Fodder Consumption as per Seasons(kg/day)

Sr. No	Fodder Types	Rainy Season						Winter Season					
		All animals			Milch animals			All animals			Milch animals		
		Home (kg)	Purchased (kg)	Market Rate (Rs./kg)	LC	CB	B	Home (kg)	Purchased (kg)	Market Rate (Rs./kg)	LC	CB	B
A	Green-Fodder												
1													
2													
3													
B	Dry Fodder												
1													
2													
C	Concentrates												
1													
2													
D	Supplements												
1													
2													
E	Grazing hours /day												
F	Grazing cost/ month												

Note: In case if all animal are fed together the joint cost of feed will be apportioned applying standard animal units approach' and also the proportion should be told per breed

[11] Cost of Milk Production Labour &Other Expenditure): Wage Rate (Rs.) (for 8 hrs): Male_____ Female_____

Particular	Animal No.	Labour Hours (PER DAY) All works				Other Expenditures (Rs./ Annum)						
		Family Labour		Hired Labour							Insurance (Rs./ Annum)	
		Male (hours minutes)	Female (hours)	Male (hours)	Female (hours)	Veterinary Cost plus vaccination, deworming, etc	AI Cost Rs / year	Transport Cost	Repair/ Maintenance Cost of equipment/ Home	Light & Water Charges	No.	Amount
Milch												
Other Animals												

[12] Constraints Faced in Milk Production and Feeding Management

(5:Strongly agree, 4:Agree, 3:Indifferent/Neutral, 2:disagree, 1:Strongly disagree)

Sr. No	Milk Production- Constraints	Rating 5-1	Sr. No.	Feeding Management -Constraints	Rating 5-1
1	High Feed cost		1	Unavailability of green/ dry fodder throughout the year	
2	Non Availability of Fodder		2	Majority of grazing lands are either degraded or encroached	
3	High price for milch animal		3	Irregular & inadequate supply of cattle feed by PDCS	
4	Low average milk yield of the milk animals		4	Non availability of improved fodder seed in the market / PDCS	
5	Low milk price (Rs./lit)		5	High cost of cattle feed and mineral mixture	
6	High cost of veterinary medicines		6	No provision of quality seed on credit	
7	Lack of nutritious feed for quality milk production		7	High Cost & Low return on fodder production	
8	Poor knowledge about feeding and healthcare		8	Diversion of feed and fodder ingredients for industrial use	
9	Lack of finance to invest in dairy business for quality milk prod/Inadequate finance		9	Lack of necessary space required for tying the milking animals/ Poor housing	
10	Lack of veterinary services in villages for quality milk production		10	Land is very less therefore cannot afford to put more land under fodder seed/crop production	

[13] Service Delivery (Tick -(√)

Items		Service Provider (1-PDCS/ 2- Agent)	PLEASE TICK (√)		
A	INPUT DELIVERY				
1	Supply of Cattle Feed		Adequate	Inadequate	Not Available
2.	Cost of cattle feed and mineral mixture		High	OK	Not Available
3.	Cattle feed and fodder seed on Credit		Available	-	Not Available
4	Emergency Veterinary Services		Available	-	Not Available
5	Provision of loan for purchasing cattle		Adequate	Inadequate	Not Available
6	Technical Guidance		Available	-	Not Available
B	OUTPUT DELIVERY				
1	Milk Price (Rs./lit)		Adequate	Low	
2.	Payment of Milk		Immediate	Within 15 days	Within 30 days
3.	Incentives or bonus for supplying milk		Adequate	Low	
4.	Acceptability cross-bred cow Milk in family		Poor	Acceptable	Not acceptable
5	Advance payment for milk (Soc./vendors)		Available		Not Available