SUMMARY
AND
CONCLUSION
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In this final chapter it is proposed to recapitulate all the salient features of the study and to bring out the significant conclusions emerging from the foregoing analysis.

Dairy farming is one of the backbone occupation of the rural population in India. It provides nutritive food, animal labour for farming and transports energy for fire and light manure for cultivation of crops and raw material for different industries in the urban area and particularly in rural economy.

Dairying is an important source of employment and supplementary income on a regular basis for a majority of rural population. The development of dairy sector bring many changes in milk pattern at rural producers' level in Sabarkantha district. It has become essential to have reliable data on milk yielding days, price of animals, cost of milk production, cost of feed and fodder for animals etc. at the village sample households level. Keeping this requirement in view, the present study entitled. "Economics of Dairy farming in Gujarat- A case study of Sabarkantha District" was undertaken with the following specific importance and objectives:-
IMPORTANCE OF THIS STUDY:

India has the highest population of milch animals in the world but the average yield per milch animal is less than that prevailing in most of the countries in the World (1), i.e., in 1993-94 the population of milch animals was 14966300, but the average daily milk yield per milch animal was 13 kgs.

Minimum average requirement of milk per person is 280 grams while the actual consumption of milk per person was 153 grams in India in 1979-80, which is very low (1). However, inspite of increase in human population, the per capita milk availability in India has increased by over 85 per cent between 1971-72 and 1996-97 i.e from 109 grams per day in 1971-72 to 202 grams per day in 1996-97.

In India the demand for milk is constantly increasing because of relatively higher growth rate of population. Rising per capita income is another important force which gives rise in demand for milk. On an average, milk consumption [requirement] is likely to be more than three times the present availability of Country's milk production. Hence, a dairy development will have to satisfy the milk demand.

Animal husbandry (AH) is a labour intensive occupation and the benefit-cost ratio is considered to be favourable to farmers. The AH programmes give the economic benefits within short time, and provide the opportunity of
self-employment to a large number of people at low cost. Thus, dairy development is imminent to reduce poverty and unemployment to some extend.

The majority of milk producers who are closely associated with co-operative dairying are small producers. Thus, the participation of the less privileged class seems to be much higher in dairy co-operatives. The co-operative dairying in an integrated manner provides a stable market and better price to all classes of producers in its command area and has earned remarkable benefits in terms of better income, better price, better productivity and resultant productions.

This indicates that dairy development has helped the landless population to stabilise the nutritional intake. It is also observed that consumption of milk and milk products are substantially higher in the case of households following dairy farming occupation.

The benefits of productivity and production enhancement are most likely to be available to less privileged classes. This is evident from the fact that nature of distribution of animals in India is less skewed than that of land. In the above context the present study aims at pointing out the present position of livestock economy at the macro level. While to examine its working at the micro level, a study of Sabarkantha district has been taken up in detail.
1.2 OBJECTIVES :-

The specific objectives of the study were as follows :

[1] To study the various cattle and dairy development programmes implemented / undertaken in India, Gujarat and Sabarkantha district.

[2] To assess the growth and regional variations in population of milch animals and factors responsible for that.

[3] To study the effects of various factors such as dry period, lactation length, breeding, maintenance of animals, components of maintenance cost such as green and dry fodder, grazing, concentrates etc. on milk production in the case of cows and buffaloes in Sabarkantha district.

[4] To examine the efficiency of cattle farming among the different types of rural families and to assess the role of cattle farming in the economy of weaker sections of the rural area.

[5] To assess the problems and prospects for milk production and its marketing with respect to rural development in Sabarkantha district, and

[6] To study the cost of milk production for cows and buffaloes in the study areas.
1.3 METHODOLOGY:

The required data for the present study were collected from both primary as well as secondary sources of data. For primary data a groups of households of agricultural labourers, small and marginal farmers and big farmers have been selected who were following dairy farming. The information from all these households was collected by informal interviewing techniques on basis of detailed questionnaire which contain the required information for the reference year June 91 to May 1992.

The allocation of nine villages to each of the three taluka was finalized by using the proportional allocation method and within the talukas, the villages were selected at random. Within each nine, selected villages, 10 to 13 sample household were selected by random method. Thus, the total number of sample household selected for the detailed investigations came to 100. In order to get detailed and reliable data, the fieldwork was carried out according to the recall method of investigation instead of the general survey method. Data were collected by the personal interview method from selected sample households in each villages. The regular field work was started in June-91 to 31st May 1992.
Genesis of the Sabarkantha District: -

The sabarkantha district selected for intensive study is situated in the northern-eastern part of the Gujarat State. For the purpose of revenue administration, the district having ten talukas is divided into two subdivisions like Prantij and Himatnagar. The district comprises of 1387 villages and 8 towns. In year 1991, the total population of the district was 18 lacs of which 89.54 percentage was rural population and 10.46 percentage was urban population. The sex ratio in the district was 965 women for 1000 men in 1991. In the district family size was 7 person in 1981. In total population the percentage of the main workers was 34.17 per cent in the district. In the working population, cultivators were 49.33 per cent and agricultural labourers were 22.92 per cent in 1991. Thus, about 73 per cent of total workers engaged in agriculture pursuits. In the district, literacy rate was 49.48 percentage to the total population.

The soils of the district are mostly light and sandy loam in texture, except in the southern and western parts of the district, where there are patches of the black soil. In addition, the some parts of western talukas have saline soils. The rainfall is erratic and precarious. The climate of the district is characterised by extremes of heat and cold.

The district is well served with railways, roads, and postal facilities. Though Modasa, Meghraj, Vijaynagar,
Malpur talukas do not have railway connections with the
district.

On examination of the land utilization pattern of
the district, it was found that the total reported area
accounted for 730 thousand hectares of which formed 3.88
per cent share of the district in the Gujarat. In 1990-91
sabarkantha district accounted for 6.71 per cent of area
under forest of Gujarat. The proportionate share of
district in permanent pasture and grazing land of the
Gujarat was 4.07 per cent. As a whole 1.38 per cent share
of district in the barren and uncultivable land of
Gujarat. The percentage share of GCA of the district in
GCA of Gujarat was 4.43 per cent in 1985-86. In the
district, it was found that the net area shown accounted
for 59.08 per cent of the total reporting area. The share
of the district of NSA. In NSA of Gujarat was 4.60 per
cent in 1990-91. In different talukas, the percentage of
net shown area was highest in Idar taluka. (19.20 per
cent) and lowest in Malpur and Vijaynagar taluka. (4.45 and
2.34 per cent). As regards the extent of area cropped more
than once, Himatnagar, Idar, Prantij, Bayad, Modasa, were
better off due to availability of irrigation facilities.

The study of the cropping pattern reveals that the
area under food and non-food crops accounted for 54.29 per
cent and 38.80 per cent of the gross cropped area
respectively. While the fodder crops claimed 5.81 per cent
of the gross cropped area for development of animal husbandry and dairying. An analysis of different crops in the district reveals that Maize, Bajara and Jowar were the common food crops. Among non-food crops, cotton and groundnut were important crops. Among condiments and spices, cumin, aniseed (Variali) and fleawort (Isabgul) were the important crops of the area.

The net irrigated area accounted for 33.20 per cent of the net area sown. Wells and Tubewells were the main sources of irrigation in the district. Canals was also one of the sources of irrigation. The slow progress in the western parts of the district may be due to inadequate irrigation facilities and poor soils, which restrained the farmers in adoption of, improved techniques of farming.

Livestock raising in general and animals rearing in particular is an integral part of agriculture and plays a vital role in the economy of the district. With the organization of sabar dairy rearing of milch animals has become not merely an adjunct to agriculture but also a major economic activity providing an independent as well as supplementary source of livelihood to a large section of the population. Buffaloes mostly in the units of one or two are reared as dairy milch animals by the cultivators in the area. While the cows are mainly reared in herds by Rabaris and Bharwads who are professional cattle breeders.
Livestock population per 100 hectares of NSA in sabarkantha fluctuated between 212 and 296 numbers during 1977 to 1992. The growth analysis of different livestock population indicates that the relative importance of cattle as well as buffaloes rearing were highest among all types of animals.


Dairy industry is well established in Gujarat and it serves as a model for other states in the country. The dairy farming has an important position in the occupational structure of the rural areas of Gujarat. It is taken up as a subsidiary occupation by all the rural milk society. Dairying has a vast potential to provide gainful and productive employment to the rural women folk as also small and marginal farmers and landless labourers.

The co-operative milk producer's movement started with Amul dairy in Kaira district in 1946. The success of this union as an instrument of socio-economic change inspired other districts in the state to replicate this pattern of dairy development. Dairy slowly spread over Mehsana, Sabarkantha, Banaskantha, Baroda, Surat and over all Gujarat.

Co-operative dairy was established at Anand in Kaira district in 1946 with the help of the Kaira district co-operative milk producers' union Ltd. (KDCMPUL),
popularly known as AMUL. Founder of KDCMPUL was Tribhovandas Patel and Dr. V. Kurian joined him to manage the co-operative dairy industry. The Gujarat State co-operative milk marketing federations (GCMMF) has been organized which is handling the surplus milk and sale of milk products of the affiliated milk unions outside their areas of operation. The Gujarat Dairy Development Cooperation (GDDC) was setup in 1973 to develop dairying activities on "Anand Pattern" in six districts of Saurashtra namely Amreli, Surendranagar, Bhavnagar, Rajkot, Jamnagar and Junagadh. GDDC also provides all necessary inputs and services to milk producers' to produce more milk.

In Gujarat State the total number of milk co-operative societies was 8,357 in 1985-86 which rose to 10,950 in 1992-93 and also continuously increased the membership of milk co-operative society from 12,10,910 in 1985-86 to 17,97,000 in 1992-93 in different dairies. The annualy milk collection from the societies was 11,362.69 Lacs kgs. in 1992-93. The total numbers of artificial insemination centers was 2,247 in 1992-93 regarding different dairies in Gujarat.

There are 19 milk co-operative unions working in the Gujarat State and the total number of chilling centers is 38 among different dairies. The estimated quantities of milk procured per day in the Gujarat State was 30.88
Lacs litres in 1992-93. The quantity of milk distributed per day was 13.06 Lacs litres in 1992-93. Among different dairies, the highest milk procured per day was at Amul dairy- Anand, Dudhsagar dairy-Mehsana and Sabar dairy- Sabarkantha. Among different dairies, the total veterinary institutions was 957 and 15 cattle feed factories with different brand names in 1992-93.

The National Dairy Development Board (NDDB) was setup in 1965 on the recommendation of the late Shri Lalbahadur Shastri, the then prime minister of India to formulat a massive dairy development to create a virtual "flood" of rurally produced milk in India. This programme which is known as "Operation Flood" was launched on July 1, 1970 by the Indian Dairy Corporation (IDC). Operation flood programme can rightly be called the world's largest co-operative dairy development programme. Operation flood-II was launched concurrently in October, 1979 and covered the period from 1980 to 1985. Recently Operation flood-III programme is in force and would continue up to March-1996. Operation flood programme at the village level has involved in presentation of the programme in the socio-economic environment of village life.

In July 1951 the planning commission issued draft outline of the first five-year plan April-1951 to March-1956. Gujarat state published the figures of plan period wise outlay and expenditure from Third five year plan
1961 to 1966. The 30 per cent of expenditure was exceeded of the total outlay in dairy development only during third five year plan. A very important achievement for dairying in the third plan was the setting up of the NDDB at Anand. Each Five Year Plan and Annual Plans the total outlay and expenditure continuously increased. Out of the total outlay in each five year plans and annual plans the money allocated for animal husbandry and dairying were fluctuated. The main objective of formulation of the plans was to ensure the optimum livestock production and removal of the poverty from the rural areas, particularly from amongst the scheduled cast/scheduled tribe/small, marginal farmers and agricultural labourers. The policy of the state government through various five years plan has been to develop dairying with a view to provide a gainful employment and to bring about socio-economic change in the rural areas.

The government policy regarding the development of dairy and animal husbandry achieved through some various programmes such as Intensive Cattle Development Projects (ICDP). Key Village Scheme, Gaushala Development and Gosādan Schemes and Intensive Cross-Breeding Programme (ICBP) were started from 1964-65 with the object of increasing milk production. In 1992-93 1,003 primary milk producers' co-operative societies were functioning under ICDP and 38 centers covered under KVS programme in Gujarat.
during year 1992-93.

Despite the existing facilities for the development of livestock in general and milch animals in particular there are several problems relating to the development of animal husbandry and dairying occupation at the farm level, viz., scarcity of dry fodder due to frequent famines, inadequate facilities to grow green fodder and paucity of drinking water in certain parts of the state are the major bottlenecks. Paucity of good genetic material among the animals and lack of facilities of organized milk marketing over a large part of the state.


The growth pattern of livestock population in Gujarat and Sabarkantha district with the objectives of examine the composition of different types of animals and growth of livestock during the last two decades 1966 to 1988 was studied. And also examine the regional disparities in livestock population and assess the factors responsible for regional disparities checked in livestock population. The composition of livestock and percentage of different types of animals in the total livestock population were analysed for the years 1966, 1972, 1977, 1982 and 1988 for Gujarat and Sabarkantha district.

Total livestock population in Gujarat has fluctuated from 135 lacs in 1961 to 174 Lacs in 1988. The
annual growth rate of livestock population was 1.07 per cent from 1961 to 1988 in Gujarat State. Whereas, Sabarkantha district total livestock population increased with fluctuations from 920 to 1174 thousand in 1961 to 1988. While annual growth rate of livestock population was $1(0.07)$ per cent for the period 1961 to 1988 in Sabarkantha district. The composition of different types of livestock population in Gujarat as well as in Sabarkantha district indicates that the proportion of cattle and buffalo rearing was highest than other animals.

The growth and density of livestock were examined by certain key indicators like (i) Total livestock population per 100 persons (ii) Per 100 hectares of reporting area (iii) Per 100 hectares of gross cropped area and (iv) Per 100 hectares of grazing land. In 1988, total livestock population per 100 persons was 42 in Gujarat. While in Sabarkantha district it was 67 for year 1988. In Gujarat total livestock population per 100 hectares of reporting area was 92 in 1988. Whereas, this proportion was 160.82 for same year in Sabarkantha district. But the numbers of population per 100 hectares of GCA in Gujarat and Sabarkantha district were 165 and 253.66 in 1988 respectively.

Whereas in 1988, the proportion of total livestock population per 100 hectares of grazing land in Gujarat and Sabarkantha district were 2051.42 and 3412.68.
The growth analysis of different types of livestock population in Gujarat state and Sabarkantha district indicates that the importance of cattle rearing was highest among all type of animal population for all measures key indicators. The relative importance of buffaloes rearing was second in Gujarat as well as Sabarkantha district for all measuring key indicators. So that importance of cattle and buffalo rearing was highest among all types of animal population.

District wise percentage distribution of total livestock population in Gujarat shows that the highest livestock population rearing was done in Panchmahal (11.09 per cent) and Banaskantha district (7.72 per cent) and lowest was reared in the Dangs district (0.70 per cent) followed by Gandhinagar (0.66 per cent) for the year 1988. Whereas in Sabarkantha district, the maximum percentage of livestock population, reared in Idar Takuka (14.16 per cent) and minimum was in Vijaynagar taluka (5.29 per cent) in 1988.

In Gujarat, the highest cattle rearing percentage was observed in Panchmahal district followed by Junagadh and Banaskantha district. But in Sabarkantha district, the highest and lowest percentage of cattle rearing was observed in Bhiloda (12.96 per cent) and Vijaynagar taluka (6.14 per cent) respectively for year 1988. The maximum buffaloes rearing percentage was indicated in Kheda and Mehsana districts of Gujarat and minimum percentage of
buffalo rearing in Dang and Gandhinagar districts. While in Sabarkantha district the highest buffalo rearing was in Idar taluka (19.50 per cent) and lowest in the Vijaynagar taluka (3.15 per cent) for the year 1988.

The total bovine population per 100 persons for the different district of Gujarat indicate that the lowest numbers was in Ahmedabad district (13) and highest in the Dang district (57) in 1982. In Sabarkantha district the highest number of bovine population per 100 persons was in the Malpur taluka (61) and minimum in Himatnagar taluka (33) in the year 1988.

The most influencing factor for regional variations in livestock population particularly density of cattle were gross cropped area under foodgrain crops area under permanent pasture and grazing land and human population. While for buffaloes they were gross irrigated area, human population, area under foodgrain crops, GCA. But lastly for density of other livestock population such as sheep, goats donkeys etc. the important responsible factors for regional variation were reported area, GCA, area under foodgrain and permanent pasture and grazing land.

[5] MAJOR FINDINGS:-

The major findings of the study are summarised as under:-

(A) Socio-economic Characteristics of Selected Sample Households: -

(1) Of the total 100 sample households in the
district, marginal farmers were 22, small farmers were 25, other farmers were 32 and agricultural labourers were 21 of the selected sample households from villages of three talukas of the Sabarkantha district. The size of family for all the sample households was 5.81 persons.

(2) In all the sample households the percentage of workers in family worked out to 32.01 persons, who participated in economic or productive work. The highest percentage of workers was observed in category of ALG (33.39 per cent).

(3) The total population of 100 sample households was 581 persons. Out of 581 persons the total number of workers was 186 of which 70 per cent were male (131) workers and 30 percent were female (55) workers. The share of female workers was highest for agricultural labour group (36 per cent) as compared to other groups. Among the different selected talukas, the proportion of female workers in total workers was highest in Meghraj taluka (36 per cent) and lowest in Modasa taluka (25 per cent). Thus, the female share in total workforce was higher in the economically backward taluka.

(4) Of the total 186 workers, 87 per cent of the workers were in the age group of 26 to 55 years. Talukawise analysis revealed that the working
population by age group of 26 to 55 years, was highest in Meghraj taluka (90.91 per cent).

An analysis of the educational attainment of 186 workers of the sample household revealed that 22.58 per cent were illiterate and 77.42 per cent had obtained education upto primary, secondary and graduate level. The illiteracy rate was significantly higher in case of female workers (45.46 per cent) than that in case of male workers (12.98 per cent). During the survey of sample household's illiteracy rate was normally higher in the case of workers of agricultural labourer households as compared to other remaining farms groups. The proportion of illiterate female workers was highest in Meghraj taluka. Whereas, illiterate male workers in the total male workers was highest for Modasa taluka (23.63 per cent).

Out of the 100 sample households, 58 per cent were reported as members of credit co-operatives society and 79 per cent of sample households were members of co-operative milk producers' society. In Meghraj taluka, there was a poor membership of both types of co-operative societies worked out for the agricultural labourer group and marginal farm's group.
While studying, the land ownership, operational holdings and leased in land pattern, it was found that 2.60 hectares of total owned land and 2.88 hectares of operated land for all sample households during survey period. Whereas, total owned land for agricultural labour group worked out to nil and leased in land was 0.55 hectares. For other farm group, the per household owned land was 6.17 hectares which was highest in all farm group. On an average, the per household gross cropped area was 0.77 hectares in group of agriculture labour which was found that leased in land were changed frequently. So, that they could not claim any right on the land it is to be transferred to the actual tailors.

Availability of irrigation facilities is one of the important factors for promoting dairy farming. The proportion of irrigated area in the operated area during the reference year varied from 51.52 per cent for other farms group to 75.32 per cent for marginal farms group.

Foodgrain crops varied between 81.22 per cent of GCA of small farms group to 76.76 per cent of GCA of marginal farms group. Whereas, all the sample households lucern and fodder crops were grown on 10.44 per cent of their GCA during the reference year.
The average gross income and input expenditure ratio for all the sample households together worked out to 1.88 for the reference year. This indicates that on an average the sample households had received net income of Rs. 0.88 against one rupee of expenditure on input used in crop cultivation business.

Structure of selected dairy sample households:

The total number of animal kept by 100 sample households at the beginning of the survey was 597. Of which 158, 318 and 121 were respectively taken together cow, buffaloes and bullocks. The total herd size was of 285 milch bovine animals comprising 84 cows and 201 buffaloes in sample household. Among different categories of sample households, the numbers of animals per sample household was nearly 3 in agricultural labour group, 7 each in marginal farms group and other farms group and 6 in small farms group during survey period. According to talukawise analysis, the highest number of animals per household was nearly 8 in Modasa taluka followed by 5 animals in Bayad and Meghraj taluka.

The total number of milch cows was 84, of which 57 or 67.86 per cent were in-milk cows and 32.14 per cent were dry cows. During the time of survey,
total number of milch buffaloes was 201. Out of that, 162 or 80.60 per cent were wet buffaloes and 39 or 19.40 per cent were dry buffaloes. Among different categories of sample household, the highest percentage of in-milk cow was 81.82 in the agricultural labour group and lowest percentage in-milk cow was 59.26 in small farmers group. Whereas, in the case of in-milk buffaloes the lowest percentage of buffaloes was 63.75 in other farm group and highest in the category of agricultural labourers (93.67 per cent).

(3) The average prices of in-milk cow was Rs. 5056 and price of dry cow was Rs.4074 during the survey. Whereas, the average prices of in-milk buffalo was Rs. 7108 and for dry buffalo was Rs. 6000 in the reference year. Hence, the average price of buffalo was higher than the average price of cow owned by the sample households. But in case of small farm group of Meghraj taluka, the average price per in-milk and dry buffalo as well as cow remaining same. Whereas in the case of other farms group in Bayad taluka, the average price of cow was higher than that of buffalo.

(4) The milk yielding days in lactation cycle for cow was 368 days, of which 255 days was wet period which constituted 69.44 per cent of the total days. But owning milch buffaloes household during
lactation cycle of 374 days, buffalo gave milk for 252 days or 67.43 per cent days. During lactation cycle, the highest percentage of milk days in the total days of cows was observed in marginal farm group (74.07 per cent). However, in case of buffalo the higher percentage of in-milk days was noted in the small farms group (255 days i.e. 68.55 per cent). According to talukawise, the proportion of wet days in a lactation cycle of cow indicates that the highest percentage was in Modasa taluka (73.22). While in case of buffalo, the highest in-milk days was observed in Bayad taluka (70.80 per cent).

Employment in dairy farming was measured as per day hours spent by sample households on feeding and management of milch animals. For all the sample households, total employment days per year per households were 343 days during the reference year. Among farm size groups, the average number of labour hours spent per day per household for animals were highest in case of small farms group (8.55 hours) and lowest in category of agricultural labourer group (6.88 hours). But talukawise labour hours spent per household per day for animals indicate that the maximum number of hours were in Bayad taluka (8.30 hours) followed by Modasa (7.54 hours) and Meghraj taluka (6.59 hours).
Feed and fodder given to milch animals is main factors affecting milk yield per animal. To the extent to green and dry fodder given to deshi buffalo per day worked out to 21.1 kgs. and 8.4 kgs. respectively. The co-efficient of variation (CV) for green and dry fodder worked out to 23.57 per cent and 44.68 per cent respectively. In case of improved buffaloes, average green and dry fodder given to buffaloes per day was 23.8 kgs. and 8.7 kgs. respectively and their co-efficient of variation were 17.46 per cent for green fodder and 54.62 per cent for dry fodder. In the different categories of sample animal holders, the average green fodder and dry fodder given to deshi buffalo per day was highest in other farms group. But the proportion of green fodder was lowest in small farms group (19.38 kgs.) and for dry fodder it was 7.26 kgs. in agricultural labourer group. Whereas, the average quantity of green fodder fed to improved buffalo per day varied between 27 kg. in case of small farms group to 20 kgs. in case of other farms group. Whereas, the average dry fodder feeding to per improved buffalo per day varied from 7.90 kgs. in category of small farms group to 10 kgs. in case of other farms group.

The average quantity of the green and dry fodder
given to deshi in-milk cow per day worked out to 21.1 kgs. and 7.3 kgs. respectively. The coefficient of variation for green fodder and dry fodder was 14.10 per cent and 46.49 per cent of deshi cow. This indicates that the sample deshi cow holders had given higher quantity of green fodder than the dry fodder to their deshi cows. While in improved cows, the green and dry fodder given per cow per day worked out to 20.5 kgs. and 9.7 kgs. respectively. The coefficient of variation for green fodder and dry fodder was 30.86 per cent and 32.89 per cent respectively. This shows that the sample improved cow holders had given significantly higher quantity of green fodder than the quantity of dry fodder to their in-milk improved cows. In different categories of sample cow holders, the average quantity of green fodder given to per improved cow per day varied between 16.71 kgs. in case of marginal farms group to 21.33 kgs. in category of small farms group. Whereas, the average dry fodder given per improved cow per day varied from 6.29 kgs. in case of marginal farms group to 10.71 kgs. in case of agricultural labour group.

(3) Concentrate given per day per deshi buffalo was 2.50 kgs. of which 1.20 kgs. (55.48 per cent) was
sabardan and 1.30 kgs. (60.25 per cent) was other concentrates like grain of bajra and maize cottonseed and gur. Whereas in improved buffalo, concentrate feed per day per improved buffalo was same kgs. i.e. 2.5 kgs. of which 1.40 kgs. (56 per cent) was sabardan and 1.10 kgs. (44 per cent) was other concentrates. This shows that there was not any differences in the average quantity of concentrates given to deshi and improved buffaloes. No significant variation among different size groups was observed in giving concentrates.

(4) Total quantity of concentrate given per day per deshi cow worked out to 3.80 kgs. Out of this 3.00 kgs. (89 per cent) was sabardan and 0.80 kgs. (11 per cent) was other concentrate. Whereas, in improved cow, total quantity of concentrate given per improved cow worked out to 3.90 kgs. Thus, sabardan and other concentrates given per improved cow per day was 2.60 kgs. and 1.30 kgs. respectively. The respective co-efficient of variation was 75.51 per cent and 74.99 per cent. However, the variability in quantity of concentrates given per cow per day is higher for deshi cow as compared to improved cow. In different categories of sample households, concentrates given to improved cow per day was significantly higher in agricultural labour group.
and on other farm groups concentrates given to
deshi cow per day was quite low.

The quantity of feed and fodder per day given by
the sample households to their deshi buffalo,
improved buffalo, deshi cow and improved cow
worked out to 32.0 kgs., 34.90 kgs., 32.30 kgs.
and 33.20 kgs. respectively. The share of green
fodder and dry fodder in total quantity of ration
was highest as compared to concentrates. In the
concentrates given to buffalo as well as cow, the
share of concentrates in total ration was higher
for cows as compared to that for buffaloes.

The share of home produced quantity of feed and
fodder in total ration given by all the sample
households to their in-milk animal worked out to
77.36 per cent. Among farm size groups, the
highest percentage share of home produced quantity
of feed and fodder in total feed and fodder given
to their animals was observed in the case of small
farms group (97.58 per cent) and other farm groups
(96.14 per cent). Whereas, the only agricultural
labour groups, depends upon purchased quantity of
feed and fodder in the total quantity of ration
i.e. 56.79 per cent.

(D) Milk Production and Milk Productivity:-

(1) On an average, production of milk per buffalo
realized by the sample households was 1226
litres during milking period with CV of 21.14 per cent. While the corresponding figures for deshi buffalo was 1202 litres and for improved buffalo, it was 1362 litres.

(2) In case of cow, the milk production realized by the sample household was 1406 litres per cow during in-milk period with CV of 22 percent. The corresponding estimate for deshi cow turned out to 1333 litres and for improved cow, it was 1446 litres.

(3) The average daily milk yield per buffalo (both Deshi and improved) realised by other sample households was 4.58 litres during milking period with co-efficient of variation of 18.78 per cent. While the corresponding figure for deshi buffalo was 4.50 litres with co-efficient of variation of 18.69 per cent and for improved buffalo, it was 5.29 litres with co-efficient of variation of 11.55 per cent.

(4) In case of cow, the average daily milk yield per cow (deshi and improved) realized by the sample household was 5.09 litres during in milk period with co-efficient of variation of 20.60 per cent. The figures for deshi cow was 4.10 litres with CV of 19.17 per cent and for improved cow yield was 5.60 litres with CV of 15.73 per cent.
(1) The average gross return realized by the sample households per deshi buffalo during the lactation period worked out to Rs. 11574 with CV of 95 per cent. While the average cost of milk production incurred by the sample households per deshi buffalo was Rs. 9973 with CV of 25 per cent. Thus, net income per deshi buffalo realized by the sample households for the lactation period was Rs. 1601 with CV of 136 per cent.

(2) In case of improved buffaloes, the average gross return realized by the sample household was Rs. 13217 with CV of 21 per cent. But, the cost of milk production per buffalo worked out to Rs. 9833 with CV of 21 per cent. Hence, the net income per improved buffalo realized by the sample household was Rs. 3384 with CV of 69 per cent during lactation period. This indicates that the gross returns as well as net income realized by the sample household from improved buffalo was significantly higher than that from the deshi buffaloes. The estimate value of Z statistic for difference between the average cost for deshi buffalo and improved buffalo was not significant i.e. 0.23. This indicates that the improved buffaloes are more profitable than deshi buffaloes.
(3) The average gross return realized by the breeders per deshi cow for the lactation period worked out to Rs. 7278. And the average cost of milk production per deshi cow was Rs. 6515. Thus, the net income per deshi cow was only Rs. 764 with CV of 198 per cent during the lactation time.

(4) But in case of improved cows, the average gross return realized by the sample households per cow was Rs. 8244 with CV of 20 per cent. While the average cost of milk production incurred per improved cow was Rs. 7410 with CV of 17 per cent. Thus, the net income per improved cow realized by the sample household was Rs. 834 with CV of 203 per cent. This indicates that the gross return realized by the sample household from improved cow was significantly higher than that from the deshi cow. The cost of milk production incurred by the sample households for improved cow was significantly higher than that for deshi cow. This also indicates that the net income from deshi cow was higher from the improved cow.

(F) Price and Cost of Milk per Litre:

(1) The ratio of average milk price per litre to the total cost incurred in producing litre of deshi buffalo milk during in-milk period was found to 1.28 and corresponding figures for lactation...
period was 1.12. This indicates that the animal holder earned a profit of Rs. 0.28 per one rupee cost of milk production from deshi buffalo for the in milk period and Rs. 0.12 per one rupee cost of milk production by considering the lactation period as a whole.

In the different categories of sample buffalo holders, the highest cost of milk production per litre for milk of deshi buffalo was worked out in other farm group during both in milk period i.e. Rs. 8.39 and lactation period Rs. 9.51. While the lowest cost of milk production per litre (Rs. 6.87 in milk period and Rs. 7.83 in lactation period) agricultural labourer group.

(2) In improved buffalo, the ratio of average price of milk per litre over an average cost incurred in producing milk was found to 1.48 for in milk period and 1.29 for lactation period. This revealed that the improved buffalo holders earned a profit of Rs. 0.48 per one rupee cost of milk production from improved buffalo during in milk period and Rs. 0.29 per one rupee cost of milk production by considering the lactation period. Which was higher than that for the deshi buffalo. In different categories of sample improved buffalo holders, the highest cost of milk
production per litre was observed in case of agricultural labourer group and the lowest was observed in the case of other farm groups. The average price per litre of milk as well as net profit realized from milk of improved buffalo were higher than that for deshi buffalo.

(3) For deshi cows holders, the ratio of average price of deshi cow's milk per litre of total cost incurred in producing milk was found to 1.10 for in milk period and Rs. 1.00 for lactation period. This shows that the deshi cow holders earned a profit of Rs. 0.10 per one rupee cost of milk production for the in milk period and 0.00 per one rupee cost of milk production for lactation period.

(4) However, in case of improved cow holders, they earned a profit of Rs.0.01 per one rupee cost of milk production for the in milk period and a loss of Rs. 0.07 per one rupee cost of milk production during the lactation period. This was lower than that for the deshi cow.

(5) Among different categories of sample cow holders, the highest cost of milk production per litre was indicated in the case of agricultural labourer group (Rs.6.08 during inmilk period and Rs.6.63
for lactation period). While the lowest per litre cost of milk production, per litre was observed in case of small farm group, it was Rs. 4.94 during in milk period and Rs. 5.30 per litre for lactation period. However, the benefit per rupee of input expenditure for improved cow was lower than that for the deshi cow.

(6) The percentage share of home produced input expenditure for all the sample household for their in-milk animals was 73.00 and share of total purchased items worked out to 27.00 per cent. The share of total purchased items was significantly higher in the case of agricultural labourer group than other different farm groups under study.

(7) The utilization pattern of income received from dairy farming revealed that the 38 per cent of the dairy income was spent on purchase of domestic needs, 12 per cent for purchase of animal, 10 per cent on social expenses and 8 per cent for purchase of sabardan. As much as 14 per cent income was spent on domestically goods and agricultural expenses. This shows that dairy income utilization was mainly for domestic needs, social expenses and livestock.

(G) Net Income From Different Sources :

(1) It was found that the 52.13 per cent net income
was received from crop cultivation, 19.18 from livestock and bonus (dairying) and 28.69 per cent net income was received from the remaining sources. Hence, cultivation and dairying occupied the prime position as an important source of income on the sample households.

(2) Among different groups of sample households, in agricultural labourer group, services and labour wages were the main two sources of income which accounted for 46.39 per cent of their total income and dairying occupied the second position for providing net income which accounted for 28 per cent. For other three farm groups, cultivation and livestock with bonus (dairying) were the first two main sources of income.

(H) Attitude Awareness and Motivation :-

(1) As many as 80 per cent of the respondents were growing green fodder for providing nutritional requirements for their animals.

(2) Among sample households, 76 per cent of the respondents obtained seeds from the co-operative society.

(3) About 49 per cent of the respondents of the sample households faced no difficulty in obtaining AI services.
(4) As many as 92 per cent of the respondents were satisfied with profession of cattle rearing. Only 10 per cent respondents, mainly the agricultural labourer groups rear the cows. Buffaloes were reared by the 90 per cent of the respondents in the sample households.

(5) As many as 52 per cent of the respondents received cattle treatment from animal dispensary and 41 per cent of respondents received cattle treatment from dairy co-operatives.

(6) About 92 per cent of the sample households expressed satisfaction for the quality of milk yield. As many as 40 per cent of the respondents viewed that better fodder and feed is necessary to obtained higher milk yield.

(7) As many as 83 per cent of the respondents satisfied with milk marketing system as they received remunerative price and dairy provides improved treatment for cattle, fodder seed and feed. Some of the respondents favouring co-operative society for giving remunerative milk price, profit-making society provided veterinary services, AI services and cattle feed.
CONCLUSION :-

The following are the major conclusion from the present study.

1) A comparison of education level between male workers and female workers indicates that the rate of illiteracy was significantly higher (45.46 per cent) in the case of female workers than that in the case of male workers (12.98 per cent).

2) In the herd size of bovine on an average per sample household there were one milch cow and two milch buffaloes during the time of survey. In the all sample households, on an average there were 67.86 percentage of in-milk cows and 80.60 percentage of wet buffaloes at the time of the survey.

3) The proportion of milk yielding days in lactation cycle of the study area of the sample households, the cow owner households had reported 255 days were as a wet period (69.44 per cent). Out of the lactation cycle of 368 days, whereas, the milch buffaloes owner households had reported that on an average in a lactation cycle of 374 days, 252 days (67.43 per cent) buffalo giving milk.

4) The occupation of dairying provided the total number of employment days utilized by the sample households for their animal was 343 days during the reference year.
The occupation of dairying is dominated by women means family labour hour in total labour hours spent per day per households for their animals was 88.70 per cent during the reference period.

The sample household of the area under study, on an average fed 21.10 kgs. of green fodder, 8.40 kgs. of dry fodder and 2.5 kgs. of concentrates per day per deshi buffalo. When in improved buffalo its proportion of fed were 23.8 kgs. of green fodder, 8.7 kgs. of dry fodder and 2.5 kgs. of concentrate for per day per improved buffalo which is higher than per deshi buffalo.

Whereas in the reference year, field works inquiry revealed that on an average deshi cow was given 21.1 kgs. of green fodder, 7.3 kgs. of dry fodder and 3.8 kgs. of concentrate to per day which was low than improved cow. But in improved cows its share of feed was 20.5 kgs. of green fodder, 9.7 kgs. of dry fodder, and 3.9 kgs. of concentrates per day.

In both the animals, buffaloes and cows the gross income as well as net income per in-milk animals realized by the sample households from improved buffaloes/cows was significantly higher than from the deshi buffaloes/cows.

The average milk price per litre received by
The sample milk producers earned a profit of Rs. 0.12 to the Rs. 0.48 per one rupee cost of milk production from buffaloes (deshi/improved) during the milk period. But the sample cow holders earned a profit 0.04 to 0.10 per one rupee cost of milk production (deshi/improved). Since contribution of milk per litre is a good measure of economic efficiency in milk production. We could conclude that the dairy project on the whole, had a positive effect on this parameter also.

10) The annual per buffalo milk yield worked out 1226 litres and the annual per cow milk yield worked to 1406 litres. Which was greater than the national average in 1991-92.

11) The various factors which affect milk productions are age of animals, vatore of animal, percentage of milking, days in lactation period, green fodder, dry fodder, concentrates, sabardan and other concentrates. The effect of this factors on the milk production for sample cows and buffaloes were examined by estimating the correlation co-efficient between production of milk and various factors as mention above. This analysis indicates that age of the animals, vatore of the animals, percentage of in milk days, dry fodder, green fodder, concentrates were significantly related with production of deshi buffalo. Whereas, for milk
production of improved buffalo was significantly related with farm crops, age of animals and vatore of animals. In the case of deshi cow, correlation co-efficient between milk production and dry fodder, percentage of milking day in lactation period was significance. While, in improved cow milk production significantly related with percentage of milking days and age of the cow.

(12) On an average the cost of milk production per litre for deshi buffalo was Rs. 9.10 and for improved buffalo, it was Rs. 9.25. In the case of cow the cost of milk production per litre was Rs. 5.12 and Rs. 5.05 for deshi and improved cow respectively.

SUGGESTIONS/IMPLICATIONS:

The important suggestions emerged from the present study are as follows.

(1) During the study the proportion of illiteracy was higher mostly in female workers who were engaged in cattle rearing. So that there is a need to provide the education to the female workers in respect of latest feeding, rearing, breeding and techniques of animal management.

(2) There is a necessity to establish of milk co-operative society network in entire Sabarkantha.
district to cover all the villages falling under its jurisdiction.

(3) During off seasons, Dairy must provide green and dry fodder in adequate quantity and quality with a low cost to sample animal holders.

(4) Because of erratic and low rainfall and lack of canal and other facilities for water in the fodder growing households in the Sabarkantha district, the water level had gone down and sample households were compelled to lift water from deeper level through tubewells. This increased the cost of dairy farming in the district. Hence, irrigation facilities available in the district, if the water of Narmada Project's canal scheme is made to reach for increasing area under irrigation facility.

(5) Government / Dairy co-operatives have takeup some programmes for enhancement of cattle raising at sample household level. Such as, cross-breeding programmes, veterinary services etc.

(6) All the villages of the district should be a connected with the main centre of the district by all weather roads. So, that transportation of milk is easily move round the year.

(7) With a view to provide and revise remunerative milk procurment price across the season during the year, Cost variation and seasonality in milk
production may be given importance for fixing the milk price.

(8) Efforts should be made to increase the yield of milk by adequate and timely supply of credit and critical inputs such as feed and fodder, cattle treatment, insurance, etc.

(9) There is a need to provide adequate facilities to milk producers for cooling and refrigeration to keep milk in good condition during its transportation and haulage by Dairy cooperatives/Government.

(10) For bringing quantum jump in milk production, efforts are needed for undertaking the genetic amelioration programme by Dairy cooperatives/Government.

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