Chapter II

SURVEY OF LITERATURE

2.1 Role of Dairy Co-operatives in Dairying
2.2 Income and Employment Generation in Dairying
2.3 Co-existance of Agriculture and Dairying
2.4 High Breed Animals and Milk Production
2.5 Cost-Benefit Approach in Dairying
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The literature on various aspects of dairying is quite extensive. It covers such aspects like production, consumption, marketing, size of farms, quality of breed, supply of feed, income generation and so on. But the researcher gives below the reviews of only those studies which deal with the impact of dairying with respect to economic development. The major studies are classified under five heads:

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2.2 Income and Employment Generation in Dairying
2.3 Co-existance of Agriculture and Dairying
2.4 High Breed Animals and Milk Production
2.5 Cost-Benefit Approach in Dairying.

2.1 ROLE OF DAIRY CO-OPERATIVES IN DAIRYING

Deepak shah,¹ in his study conducted in Bulandshahar district of Uttar Pradesh found that the impact of milk co-operative in the area is a notable one due to their education programmes and supply of various breeds of milch

animals. A significant ‘t’ test suggested that the net income derived through superior breeds of cows and buffaloes is more in the case of beneficiary households than their non-beneficiary counter-parts in control area. In the absence of organized market infrastructure, the major portion of marketed surplus of milk is cornered by middlemen. It is necessary to liberate the milk producers from the clutches of middlemen so that they get remunerative returns for milk. In this context milk co-operatives have played a crucial role in not only providing remunerative prices to producers round the year but also extending various input and health care facilities to its member producers. This, in turn, has improved the economic position of producer members. There is, therefore, a need to cover more area under milk co-operative infrastructure in view of the positive role that they have played over the years.

In their study T.N. Datta and J.B. Murlidhar² have attempted to analyse the basic characteristic of milk production in the two districts of Rajasthan viz. Bikkner and Ganganagar, in order to understand the institutional support required to sustain the milk production base. The study reveals that the environmental factors influenced the extent of marketability of milk. The availability of sufficient crop residues exhibit direct impact in reducing inter-calving period, augmenting productivity and improving health status of milch animals. The institutional support in the from of effective marketing outlet, remunerative prices, breed preservation, animals health care, insurance, soft credit schemes etc. are essential for the sustenance of this vital sector of the rural economy.

Niranjan Rout and Mrutunjaya Tripathy have attempted to identify the agencies involved and the channels through which milk is marketed in both rural and urban areas and to study the marketing costs, margins and price spread in the marketing of milk among different size-classes of milkmen in Khurda district of Orissa. The agencies involved in milk marketing are the village traders, hotel managers, Orissa Milk Producers Federation [OMFED] and mini traders. In the direct selling of milk, the milk producers received about 93% of the price paid by the consumers in the rural area. The price received by the producers cover the variable costs but it does not cover the total cost of production. In the marketing channel having one middleman also the producers received the variable costs but could not recover the total cost of production. In the marketing channel having two middlemen the producers received a marginal return of 76% of the price paid by the consumers and the marketing channel having three middlemen, the price received by the producers was to the extent of 50% of the price paid by the consumers.

In the existing marketing scenario, the milkmen got a marginal profit over the variable costs but could not recover the total cost of production. In such cases either low cost technology may be developed to minimize the cost of milk production or marketing net work may be strengthened.

Another outstanding study undertaken by Dibakar Naik and Binod Ch. Mohanty attempts to examine the structure of dairy farms, cost of

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production of milk and its market price and the factors involved and their relative contribution to the milk yield through suitable statistical tools. The data relating to the cost of production of milk were collected from a sample of 50 households grouped under three size classes according to the number of cows kept, selected from Bhuvaneswar block in Khurda district of Orissa. Class I comprising of households having less than 5 cows and Class II comprising households having 6 to 9 cows and class III comprising households having more than 10 cows. The numbers of exotic cows with high milching potentiality in the selected households varied from 21 per cent in size - class II to 32 per cent in size - class I. In such an environment it is essential to provide more number of exotic breeds to small and marginal farmers through a revolutionary process in the rural development programmes for augmenting milk yield in the state.

Since in the existing market scenario, the milkmen got a marginal profit over the variable cost but did not recover the total cost of production, an attempt should be made to provide a dependable market support through creation of milk procuring/processing centres in milk producing areas. In the areas where milkmen are concentrated an agribusiness consortium among the milkmen may be formed, which will not only play an important role in supplying feeds to the members, but will be able to procure milk at a remunerative price. If the processing facilities are taken up at the consortium level, the processed milk can even be exported by the consortium and will create more demand for the product.

To seek an answer to the question why cost of production per unit of milk of a milch stock is high in Chhattisgarh areas of Madhya Pradesh a survey
was undertaken by A.K. Koshta and M. R. Chandrakar,\(^5\) in six selected villages of two major milk producing blocks of Raipur District. The analysis of the data collected from 40 selected respondents revealed that small farmers have obtained better employment opportunities and more returns by adopting dairy as a specialized enterprise. A combination of crossbred and local she-buffaloes have produced more returns on the medium and large size farms. Local cow breeds are not economical in terms of milk production. Most of the production of milk is disposed off to hotel/motel under different locations of dairy and the dairymen near to the city supplied relatively a larger percentage of milk production directly to household consumers at better price. Dairy farms located at a long distance from the city sold milk to middlemen at minimum price to save on cost of transportation which is uneconomical. The major constraints in the production and marketing of milk are inferior breed, poor feeding practices, insufficient veterinary facilities, lack of technical know-how and inadequate financing and marketing facilities. Therefore, dairy co-operatives are a must in promoting dairying in this rural area.

George Thomas and K.P. Mani\(^6\) have attempted to make a farmer oriented evaluation of input service management of Anand pattern dairy co-operatives of Ollukkara block, Trichur District, Kerala. In addition to the data from the records of the societies 90 farmers from three dairy co-operatives


were interviewed for collecting the primary data. The reference year of the survey was 1993. The study revealed that a considerable number of respondents were unaware of the provision of two of the input services from societies namely veterinary services and supply of fodder seeds. Though all the respondents were aware of the main input service viz., the supply of concentrated feed, 26% of them did not utilize even this service from the societies. The total sale of concentrates by the societies during the study period was only as low as 23.68% of the total requirement of the farmers. Farmers’ satisfaction in enjoying the provision of the service of concentrates through the societies was also studied. The analysis with eight satisfaction determining factors shows that the farmers were satisfied to a considerable extent on three of the factors (price of feed, mode of collecting payment and attitude of societies’ officials and staff) but in all other factors (feed availability, choice of preferred brand, quality of feed, convenience of supply time and supply in convenient quantity) they were dissatisfied in varying degrees. This micro level study provides insight in the input service management in dairy co-operatives. Sincere and concerted efforts from the part of societies seem to be missing to attract farmers to such services.

Lotan Singh and C.B. Singh⁷ have made a special enquiry into the impact of dairy co-operatives on important parameters like production, consumption and marketed surplus of milk in different milkshed areas of the country and analysed various factors affecting the marketed surplus of milk. The study was conducted in Aligarh and Bulandshahar districts of Western U.P. 120 member

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households and 60 non-member households were selected for the study. The members are associated with dairy co-operatives while the non-members are not. It was noted that the contribution of the weaker sections, consisting of the landless labourers and marginal farmers, the total marketed surplus was about 54 per cent on member households as compared to 47 per cent on non-member households. Therefore efforts should be directed to provide various facilities to the weaker sections for generating higher marketed surplus. This can be achieved through transfer of new technology of improved breeding, feeding, management and health cover along with price support to the dairy farmers.

A study by U.N. Autkar, A.B. Gattewar and G.B. Pakhare examines the role of milk producers co-operative societies in the tribal area of Dharni Tahsil. Out of 237 milk producer members, 150 milk producers were selected at random. A sum of 828510 litres of milk produced from 9 milk co-operative societies, were obtained from 300 local cows, 354 buffaloes and only one crossbred cow. Marketable surplus and self-consumption of milk by members worked out to 94.27 and 5.73 per cent respectively. A wide disparity between prices by milk societies and private agencies was observed from the study.

2.2 INCOME AND EMPLOYMENT GENERATION IN DIARYING

A study on agriculture based livestock farming system is carried out by Y. Radha, Y. Eswara Prasad and B. Vijayabhinandana, with an objective to


estimate the income and employment generation among the existing farming systems and to suggest the profitable system in Northern Telangana Zone of Andra Pradesh. The study was conducted in Karimnagar District with a sample of 96 farmers consisting 44 dairy, 32 poultry and 20 sheep rearing families. Further, 15 farmers having agriculture alone were also selected for comparison. The difference between different farming systems with respect to income and employment generation was tested by ANOVA. The results revealed that all the three agriculture based livestock farming system viz., dairy, poultry and sheep rearing generated more than 200 percent additional employment over agriculture alone. The net returns were higher in agriculture +dairy, compared to agriculture + poultry and agriculture + sheep rearing.

Another noteworthy study was conducted by Deepa K. Rathi, J.K. Gupta, and P.K. Awasthi,\textsuperscript{10} to examine the role played by livestock particularly milch animals in generation of income. The study is based on a sample of 45 farmers from Panagar block of Jabalpur District, M.P., and pertains to the year 1998 - 99. The study reveals that crop - cum - livestock farming was the most suited strategy for the diversification of farms operated by risk averters. It is found that as the milch animals increased, better amenities and economies of scale could be obtained with respect to fixed assets. Major portion of income was received from the sale of milk. Income from dung manure was another source. The study concluded that crop-livestock farming system, being a

profitable enterprise must be encouraged so as to diversify the farm business and to have more and stable income.

In a study Beohar, Sarawgi and Rajbeer Sharma\textsuperscript{11} examine employment opportunities and labour engaged in dairy enterprise on different size groups of farms in Bhind district of Madhya Pradesh. Two villages were selected at random. Thirty farmers from each village and 10 from each group - small, medium and large group - were selected for the study. The data relate to 1998 - 99. Large farmers engaged comparatively more labour than other groups. The percentage of labour in grazing decreased when the farm size is increased. Female labour was utilized in arranging grass, cleaning the cattleshed and milking. Grazing, feeding, milking and cleaning were the operations, where utilization of labour requirement was more. It was also found in the study that employment provided by milch animals was throughout the year.

In a study based on the primary data pertaining to the year 1994 - 95 collected from 90 respondents selected at random from six villages from two blocks of Hisar district Haryana by R.K. Khatkar, V.K. Singh and B.S. Tomar,\textsuperscript{12} it was observed that livestock plays a vital role in diversification of agriculture. Dairy enterprise contributes about 18 per cent to the total earnings of the farm households. Share of dairying in total earnings was found highest in medium farms [24.5 per cent] followed by small farms [23.7 per cent] and


large farms [13.4 per cent]. On an average the livestock sector generated employment to the tune of 22.57 per cent of the total mandays employment provided by different enterprises. Since livestock sector provides regular income and employment and helps in the minimization of risk in farming, it should be given due emphasis through herd improvement liberal financing and development of marketing infrastructure, processing and cheaper feed and fodder.

An important study by Vijay Paul Sharma and Pritee Sharma, concentrates the impact of trade liberalization on dairy industry. The dairy industry which was reserved mainly for the co-operative sector was delicensed in 1991 and the private sector companies including multinationals were allowed to set up milk processing and product manufacturing plants. Under this emerging environment as the dairy industry moved towards less governmental intervention and regulation, doubts are raised about the efficiency and competitiveness of the Indian dairy industry. The study, therefore, is an attempt to examine the likely impacts of trade liberalization on Indian dairy industry and its competitiveness and to analyse the factors determining competitiveness of this industry.

Since the international prices of dairy products and exchange rates are highly volatile and are outside the direct influence of government, the only way to increase the competitiveness of our dairy sector is through reducing /
stabilizing the domestic market price of dairy products. The domestic price can be reduced either by raising the milk yield or reducing the cost of milk production. Since reduction in cost is not possible, the option available to reduce cost of milk production is through raising the yield level of dairy animals. The average milk yield per animal in India is one of the lowest in the world. Therefore, in order to remain competitive in the international market, there is need to enhance productivity of milch animals and to introduce measures to improve sanitary standards in the milk production and processing sectors in the global free trade regime.

V.K. Choudhary\textsuperscript{14} has attempted to study the role of crop and dairy enterprises in income generation and sustainable rural employment and labour utilization. The data for the study were generated by personal interview from two villages, namely Jora and Labhandi of Dharsiwa block of Raipur District pertained to the year 1994 - 95. On an average 15 households were selected from each village. These 30 households were divided into three categories, viz, dairy with agriculture, agriculture with dairy, and dairy with other occupation. It is found that dairy enterprise generates better economic returns in farming situations of agriculture combined with dairy enterprise specially with large dairy herd size due to minimum cost of milk production, using surplus farm family labour and by-product. The result suggests that such mixed enterprise offer a promising scope for development of marginal and small households.

Under the milch animals scheme of IRDP, milch animals are provided to the poor agriculture labour families to create subsidiary employment opportunities. During the seventh plan period more than 73 per cent of the agricultural labour families received benefits under this scheme in Kamarajar District of Tamil Nadu. The study by M. Soundarapandian\textsuperscript{15} attempted to analyse the impact of the milch animals scheme on the income and employment level of the agricultural labour families in Kamarajar District. The study revealed that in the year following the implementation of the scheme, both the beneficiary and non-beneficiary farms increased their income which was due to the general economic development (may be due to higher wages or general inflationary effect) Non-beneficiaries gained an annual income on a small scale, ranging from Rs. 218 to Rs. 416, while the beneficiaries gained an annual income on a higher scale ranging from Rs. 1838 to Rs. 2560. Therefore the scheme should be continued and intensified.

Another important study by H.N. Atibudhi\textsuperscript{16} examines the economic rationale of adopting dairy farming as a tool for income generation and employment creation in Pipili block of Puri District in Orissa. For the purpose of the study, data were collected from a sample of 40 beneficiary households and an equal number of non-beneficiary households which were selected by


using multi-stage random sampling technique. The sample consisted of 15 small farmer (1-2 hectares of land) 15 marginal farmers (less than one hectare of land) and 10 landless labourers from the two categories of households. The data pertained to the year 1990 - 91. The result of the study provided micro level evidences in support of using dairy enterprise as a measure for anti-poverty programmes. The additional productive employment generated through the activity of dairying among the beneficiaries was 166, 169 and 171 man-days for small, marginal farmers and landless labourers respectively accounting for 43.45 to 53.27 per cent more labour employment compared to the non-beneficiaries. The study further revealed that the adoption of dairy enterprise raised the income levels of the beneficiaries by Rs. 2527, Rs. 2606, and Rs. 2210 for small and marginal farmers and the landless labourers respectively which was higher by 35 to 40 per cent than the non-beneficiary households.

Sharma and Sharma\textsuperscript{17} have attempted to examine the existing cropping pattern and the impact of supplementary enterprises like dairy, poultry and rabbitry in increasing and stabilizing farm income on vegetable farms in Himachal Pradesh. A two stage sampling technique was used to select a sample of 150 vegetable farms with holding size less than one hectare each from two blocks of Kangra District. The data were collected through survey method and pertained to the years 1986-87 to 1991-92. The vegetable farmers grew cereals too on their farms for household consumption. The study revealed that there

is a need to re-allocate the existing farm resources. By optimizing the existing resources and introducing supplementary enterprises under existing technology, the returns of vegetable farmers could be increased by 34 per cent. The introduction of dairy, poultry and rabbitry into the cropping system not only increased the returns but reduced the risk too by about 11 per cent.

In another outstanding study Sain and Joshi\textsuperscript{18} attempted to analyse the composition of draught versus milch cattle and the role of milch cattle in supplementing farm family income over time. The study revealed that significant structural shifts took place in the livestock wealth of the Punjab state. There was a sharp reduction in the number of draught cattle in the study area. Intensive mechanization of the state agriculture replaced draught animals to the extent of three-fourths of its size in the base period. The common availability of custom-hiring services of farm machinery in the rural areas made it feasible for them to get rid of the costly maintenance of draught cattle. Further, this replacement of draught cattle by the state peasantry encouraged them to make higher investment in milch cattle and particularly in cows which led to boost the milk production leading to the threshold of white revolution. This major shift towards milch cattle played a vital role in supplementing farm family income significantly in all the size categories of farms and particularly on smaller farms in the study area. Thus, the overall implications of the analysis indicate favourable trend towards milch cattle paving the way for white revolution in the state.

An attempt has been made by S.K. Gupta, M.C. Athavale and Ashtosh Srivastava\textsuperscript{19} to study the role of credit in promoting growth of livestock enterprise in Madhya Pradesh. The specific objective were to assess the quantum of credit availed, the extent of utilization and its impact on different size groups of farmers with respect to asset formation and income generation, to study the administration of the disbursement of credit and to suggest measures for improving it. For the purpose of the study, 50 respondents 30 beneficiaries and 20 non-beneficiaries - were selected from Ashta block of Schore District of Madhya Pradesh. The selection of the block and the district was made on the basis of largest- quantum of credit disbursed. The milch animals purchased by the beneficiaries made a net addition to the assets already owned by them. In most of the cases the milch animals were supplied by the Livestock Development Corporation of the government of Madhya Pradesh. In other cases it was the purchase committee which procured the milch animals in the open market. In very few cases the participants purchased milch animals of their choice, which have to be ultimately certified by the concerned veterinary extension officer. Thus the chances of loan amount being misutilized were very little. The financial aspect of the utilization of the loan showed that the beneficiaries earned a total net profit of Rs. 24, 530 or Rs. 818 per beneficiary participant. The income from the newly established dairy business contributed to the extent of 7.94% of the total income.

Barbah and Goswami have made a special investigation into the resource use efficiency and output performance of dairy loan beneficiary and non-beneficiary farmers under the IRDP in Jorhat district of Assam. The study is based on analysis of data obtained from 40 non-beneficiaries and 80 beneficiaries of IRDP availing dairy loan from eight rural and commercial bank branches in the area. The necessary information was collected during 1990-91 using multistage random sampling technique. The output performance of the non-beneficiary farms differed considerably from the beneficiary farms. The annual milk yield of a particular breed of milch animal varied between the same size-group of beneficiary and non-beneficiary farms. The cost of production of milk per litre of local and crossbred cow on non beneficiary farms was respectively 53 per cent and 12.45 per cent higher than on the beneficiary farms. However, different ratios on returns to capital, farm business income to capital, returns to family labour and management to capital were better on the beneficiary farms than on the non-beneficiary farms. There was considerable difference in resource utilization and income generation in different unit of milch animals between the beneficiary and non-beneficiary dairy farms. Inspite of the defects in the selection and procurement of milch animals and diversion of loan amount, considerable change in regard to additional labour days used and incremental income was evident in all the size-groups of beneficiary farmers under the IRDP.

Rajendra Singh\textsuperscript{21} has done a research to examine the production, consumption and marketed surplus of milk and to find out the generation of additional employment and income through dairy enterprise for alleviation of poverty among the landless and marginal farmers in Asamgarh district of Eastern Uttar Pradesh. A sample of 40 dairy beneficiaries of the IRDP in the district, consisting of 29 landless labourers and 11 marginal farmers were selected through random sampling method. The data pertained to the years 1988 to 1990. The result of the study revealed that the production of milk was the lowest in 1989 in both the categories due to the lengthy dry period. The consumption of milk showed an increase with the increase in the production of milk. The per capita consumption of milk per day was lower than the national average of 162 grams. It was higher in the case of marginal farmers due to the smaller size of the family, compared to the landless labourers. The marketed surplus of milk was higher for the marginal farmers (53.57 per cent) than that of the landless labourers (52.44 per cent). The generation of employment through dairy enterprise was higher for the landless labourers compared to the marginal farmers. Consequently, the family labour income per household was considerably higher for the landless labourers. On the whole, the income from dairy was higher being 52.8 per cent of the total income in the case of marginal farmers against 50 per cent for the landless labourers. Thus, positive generation of income from dairy enterprise in both the categories of beneficiaries indicates the important role the dairy enterprise plays in the alleviation of poverty among weaker sections of the society.

Khodaskar\textsuperscript{22} has made special investigation in Ranjini Village of Ambegaon Tehsil, in Pune District. For this purpose 20 marginal farmers out of 50 cultivating up to one hectare of land were selected. The selected marginal farmers possessed 34 crossbred cows, 28 crossed female calves, and 12 bullocks in the reference year 1994-95. The study examines the economics of dairy enterprise in the selected village. Thirty percent of the marginal farmers in the sample, possessed up to 0.4 hectare of land each and the remaining had between 0.4 to 1.00 hectare each, most of which was irrigated land. Dairing was reported as subsidiary occupation by 80 percent of the sample dairy farmers. The total net income earned by the dairy farmers during the reference year came to Rs. 1,63,015 or Rs. 8,151 per dairy farmer or about Rs. 679 per month. The study, thus, shows that the dairy enterprise is profitable.

A study by John Christy and M. Thirunavukkarasu\textsuperscript{23} highlights the extend of female participation in livestock farming. The study was carried out in Villupuram district of Tamil Nadu, where 92.56 per cent of total women population of the district reside in rural areas. Caring of animals is considered as an extension of domestic activities in Indian social system and most of the animal husbandry activities like bringing fodder from field, chaffing the fodder, preparing feed for animals, offering water to animals, cleaning of animals and their sheds preparation of dung cakes, milking, ghee-making and marketing of produce are performed and decided upon by women.


On an average, females spent about 294.34 minutes and 87.17 minutes daily for large and small ruminants keeping respectively in the study area. Inputed economic value of time spent on animal based tasks by farm women was calculated to be Rs. 24.53 and Rs. 7.26 per day per household in large and small ruminants keeping respectively. This measure underlines the economic importance of the functions carried out by farm women in the rural economy and in livestock farming for the overall economic development of the rural area and alleviating rural poverty through the generation of regular income.

2.3 CO-EXISTANCE OF AGRICULTURE AND DAIRYING

Income from crop cultivation in India, where size of land holdings are very small and cost of production of farm products is high, is not sufficient to meet the household and farm expenditure expenses of many of the farm families. Besides income from crop cultivation is highly uncertain and seasonal and is realized after a span of four to six months, whereas the expenditure on crop cultivation and family needs is much regular and frequent. To generate additional and regular cash income throughout the year some subsidiary occupation can be adopted by the farmers. Commercial dairying along with the crop cultivation, is one of such enterprises that could be easily adopted by many farm families.

In the research study Bant Singh, H.S. Bal and N.Kumar24 try to workout the economics of dairy farming along with crop cultivation. There are certain

major factors influencing the adoption of dairy farming by the farm families. They include education level of the head of the family, number of adult workers in the family, extent of non-farm income, distance of farmers field from their residence and availability of irrigation water to grow crops and fodders. It is found that education level of the head of the family and number of adult workers in the family had positive relation with the scale of dairy enterprise. However, extent of non-farm income, distance of the farmer’s field from his residence and availability of irrigation water to grow fodder had clear influence on the adoption of dairy farming as a commercial enterprise. More than 75 percent of the farm families selling milk in both rural and sub-urban villages did not have any non-farm source of income. Only few families with good non-farm income sold milk. As the income from non-farm sources increased, less and less number of families sold milk to supplement their farm income. Distance of the farmer’s field from his residence had negative influence on the adoption of dairy farming as a commercial enterprise. It is because of the difficulty of transportation of larger quantity of fodder from distant fields. Availability of irrigation water, which is crucial for growing fodder had the uppermost influence on adoption of commercial dairying. More than 75 per cent of the farm families adopting dairy farming enjoyed assured irrigation facilities. It is found in the study that milk production on majority of the farm household was on subsistence level. Because of higher prices and better marketing facilities available in the sub-urban villages relatively more number of farmers adopt dairy farming on regular basis than in the interior and remote village.
In a study Patel and Parmar\textsuperscript{25} try to assess the impact of dairy enterprise along with crop enterprise to explore the potentialities of increasing farm income through reallocating farm resource optimally. In the result of the study, conducted in the Surat District of Gujarat, it was observed that the income potential of farmers could be increased by incorporating the dairy enterprises. The extent of increase in net returns ranged from 83.72 percent on medium size farms to 27.65 percent on large size farms. The results also focussed on the fact that crop-dairy farming system given with adequate credit facilities showed best result as compared to other optimum plans. Thus it showed the profitability of mixed farming and also highlighted the impact of resource optimization and liberalization of credit in increasing net returns.

In the study conducted in the Patiala District of Punjab, Singh and Saini\textsuperscript{26} found that the integration of improved technology of crop and milk production has higher potential for increasing income and employment on all categories of farms viz., marginal farms, small farms, medium farms and large farms as compared to the existing technology of these enterprises or adopting the improved technology of crop production in isolation. The lower categories of farms would be benefited more as compared to their larger counterparts in the process of integrating crop and milk production together. The integrated plan generated with the dairy enterprise demanded substantially higher level of


\textsuperscript{26} Raj Vir Singh and Amrik S. Saini, “Integration of Improved Technology of Crop and Milk Production for Increasing Income and Employment,” \textit{Agricultural Situation in India}, Vol. XLIII, No.9, 1988, pp. 751-755.
medium term capital which further increased with the adoption of improved technology of milk production involving purchase of costly milch animals. This revealed that for the integration of improved technology of milk production with the crop production, sufficient medium term credit has to be made available to the farmers of different categories on easy terms. The increased income and employment position particularly on lower categories of farms would help to solve the problem of disparity and bring about a growth in the rural sector with equity.

The study by Chahal and Singh\textsuperscript{27} examines the distribution of milch animals among different categories of dairy farmers and the role of dairying as an adjunct to crop husbandry in Punjab. The study is based on data collected from a sample of 261 diary farmers selected from three districts, Ludhiana (Zone I), Faridkot (Zone II) and Hoshiapur (Zone - III) representing the three agro-climatic zones of the state. The data pertained to the year 1989-90. The finding of the investigation brought out that the consumption of milk and the level of production of milk per household are related directly to the socio economic development of the area. The density of milch animal population indicated that the stocking rate was higher per 100 hectares of cultivated area in zone I as compared to zones II and III. The cattle population was higher per 100 hectares of cultivated area in zone III than in zones I and II. The result revealed that the herd size increases with the increase in land holding due to better

economic position and availability of feed and fodder which come from the crop residue. The income from dairying was higher in the case of landless category of milk producers in zone III than in zones I and II. An inter-category analysis reveals that the contribution of dairying in the sum total of income increases with a decrease in farm size. The results indicate that dairying reduces the variability income if introduced as a supplementary enterprise to crop husbandry. Hence, dairying as supplementary to crop husbandry helps in reducing income variability and the government may encourage the farmers especially the marginal and small ones by providing incentives for taking up dairying as an enterprise.

An important study was conducted by Singh, Jaulkar and Nema, in Gwalior district of Madhya Pradesh, in 1991-92 to examine the role of dairying in the farm economy of marginal and small farmers. The sample of 50 irrigated farms each from marginal and small size- groups and an equal number of unirrigated farms each from the corresponding size- groups were randomly selected representing different farming situations in the study area. It is found that the contribution of dairying was higher on irrigated farms. The contribution of milch animals was comparatively higher in unirrigated situation in both size-group, which served as shock observer and valuable asset during unfavorable

conditions. It is concluded from the study that dairying as a non-land augmenting enterprise and as an adjunct to crop production played as important role in improving and propelling the farm economy of the marginal and small farmers of Gwalior district irrespective of their farming situation whether irrigated or unirrigated.

A similar study was undertaken by Radha, Eswara Prasad and Venkateswar Rao,\(^29\) in Karimnagar district of Andra Pradesh to analyse the economic, income and employment potential of dairy as a single enterprise and also as an adjunct to crop husbandry. Twenty landless farmers having dairy as the main enterprise and twenty each from small and marginal farmers were selected randomly in the study area for which data on cost of cultivation and maintenance cost of dairy were collected and analysed on per hectare and per milch animal basis. The results indicated that the farmers in the study area obtained a net return of Rs. 10,549 from agriculture. The analysis also revealed that by maintaining one milch animal as an adjunct to crop husbandry and incurring an additional expenditure of Rs. 4,485 for cultivating one hectare of land, the farmers would be in a position to derive an additional net return of Rs. 2,194, besides generating additional employment of 76 days or by 25 per cent of the total employment per year. Thus dairying plays a major role in augmenting the income as well as creating employment among the farming community.

To understand the contribution of livestock and crop enterprise R.P. Singh\textsuperscript{30} conducted a study in Kanke block of Ranji district, Jharkhand, during 1999. The study reveals that the average gross income from livestock was Rs. 4,366 per farmer. Among livestock, milch animals contributed about 53.27\% to gross annual income followed by sheep and goat (30.46\%) and pig (16.27\%) respectively. It was further observed that livestock created annual employment of 576 man-days per annum. But the average annual employment created by livestock and crop enterprise was 892 man-days per annum. The share of livestock and crop enterprise was 61 per cent and 39 percentage respectively. It was also found that average gross annual income from crop husbandry, livestock and farm forestry was Rs. 18,138. The contribution of these enterprises was 71,19 and 8 per cent in gross income respectively. Among livestock the most important was milch animal, contributing 53.27 per cent of gross income from livestock. The annual income from this source was maximum on large life farms, where agriculture and dairying co-exist on a greater extent, and declined as size of agricultural holdings reduced.

2.4 **HIGH BREED ANIMALS AND MILK PRODUCTION**

Vashist and Pradeep Katha\textsuperscript{31} have studied the comparative economics of different breeds of animals. The study revealed that the cross-bred cows had an edge in terms of returns over local and pure-bred cows owing to their higher


milk yields. Results of this study have amply confirmed that the cross-bred cows are more economical and efficient feed converters. The expenditure incurred and returns accruing from different milch animals would indicate that the fixed cost per kg. of milk was Rs. 1.16 for desi cow Rs. 0.93 for purebred cow, Rs. 0.94 for buffalo and Rs. 0.78 for cross-bred cow, and the variable cost per Kg. of milk was Rs. 2.14, Rs. 0.91, Rs. 1.59 and Rs. 0.97 respectively for these animals. The total cost per Kg. of milk came out to Rs. 3.30, Rs. 1.84, Rs. 2.53 and Rs. 1.75 for desi cow, pure-bred cow, buffalo and cross-bred cow respectively. Gross returns (including returns from dung) worked out to Rs. 3.87, Rs.2.33, Rs.2.93 and Rs.2.55, leaving a gross margin of Rs. 0.57, Rs.0.49, Rs.0.40 and Rs.0.80 for desi cow, pure-bred cow, buffalo, and cross-bred cow respectively. The crossbred cows have, therefore, emerged as the most profitable milch animal among other categories of milch animals. Further there is significant difference in the profits obtained from cross-bred cows and other milch animals which is a reliable indicator of the success of cattle improvement programmes in the study area.

Ajith Kumar Singh\(^\text{32}\) in a remarkable study conducted in states of Uttar Pradesh and Madhya Pradesh found that the proportion of cross-bred cows was 8.9 per cent in Uttar Pradesh (1982) and 0.3 per cent in Madhya Pradesh. Of the total livestock in the country 13.7 per cent are in Uttar Pradesh and 9.9 per cent are in Madhya Pradesh. The present number of livestock is excessive and its productivity is extremely low as it is underfed and undernourished. The

availability of fodder is not sufficient even to maintain one-fourth of the present livestock at adequate level of nutrition. The strategy of livestock development should, therefore, aim at reduction in its number and improvement in the quality of the livestock through cross breeding. And important problem to be encountered in this respect is the need of draught animal power particularly on small holdings. Establishment of an extensive network of tractor stations for hiring out would be an important step in the direction.

Another important study worth naming was the one conducted by G.M. Gaddi and L.B. Kunnal in Dharwad and Hubli Taluk of Dharaward district in Karnataka during 1994. With the introduction of new technology [New Milk Production Technology (NMPT) is defined to include cross-bred cows-Holstein, Friesian cross and Jersey cross- and milk production practices associated with them] in the dairy sector of Karnataka, productivity dominant output growth pattern has emerged. The study revealed that with the introduction of new technology there is structural break in milk production relation as the contribution of new technology variable was significant. The total growth in milk yield per cow per lactation by shifting to new milk production technology was about 145 per cent of which 47 per cent was contributed by technology. This means that 47 per cent more output could be produced with new milk production technology using old milk production technology level of inputs (non-descript local breeds of cow and milk production practices associated with them).

In Kerala Balu. P. Ramesh\textsuperscript{34} has done a research to examine the trends and patterns of diffusion of cross breeding technology, productivity of milch cattle and production of milk in the state. The acquisition as well as modification of cross breeding technology in Kerala is primarily carried out by the Kerala Livestock Development Board (KLDB), 1983. The technology was acquired through a bilateral agreement between the government of India and Switzerland. The technology has been modified by KLDB to suit the socio-economic and agro-ecological conditions prevalent in the state. Artificial insemination (A.I) using frozen semen is the technique adopted for implementing the breeding programme. The number of A.I done in early 1970s was around 0.5 million and increased to 1.5 million in the early 1990s. This slow growth is mainly due to the lack of initiative for expanding the programmes to new areas. The percentage of crossbreeds reached a level of 49.6 per cent by 1987. It is found that the productivity of the crossbred is higher than that of the non-descripts. The milch animal population also increased considerably during the period of which a larger share owes to crossbreds. The increase in the productivity coupled with the increase in the production of crossbred resulted in a notable increase in milk production in the state. The growth rate of crossbred cow milk production increased by 7.94 per cent during the period whereas non-descript cow milk production increased only 3.26 per cent during the period. Therefore in order to sustain the high milk production, steps should be taken to increase the proportion of crossbreds in the milch animal stock.

Another study by M.V. Manbhekar, M.R. Alshi and C.K. Joshi\textsuperscript{35} attempts to workout the maintenance cost of local and crossbred cow and to study the economics of milk production from local vis-a-viz crossbred cow based on analysis of data obtained from a sample of 25 dairymen keeping local cows and an equal number keeping crossbred cows in the vicinity of Akola city. The data on feed, fodder and milk yield from the selected dairymen collected in specially designed schedules by survey method. The data pertained to the year 1993-94. The total maintenance cost of a local cow was Rs.5,653 per year of which the total variable cost and fixed cost formed 84 per cent and 16 per cent respectively. Feed and fodder together accounted for 60 per cent of the total cost. For a crossbred cow, total maintenance cost was Rs.10,583 per year which was higher than that of local cow by 87 per cent. Higher maintenance cost for a crossbred cow is attributed to higher requirement of feed and fodder which accounted for 67 per cent of the total cost. Variable and fixed cost accounted for 86 per cent and 14 per cent of the total cost respectively. Total milk yield from a local cow was about 820 litres per year valued at Rs. 5,223. Adding income from manure, the gross return from a local cow was Rs.5357 per year. Thus, three was a loss of Rs. 278 per year from maintaining a local cow. Annual total milk yield from a crossbred cow was about 2,902 litres, valued at Rs.17,760. The value of manure produced was Rs. 353. Thus gross returns from a crossbred cow were Rs.18,113 per year. This shows that dairymen maintaining crossbred cows earned, on an average Rs. 7530 per animal per year as net profit.

Per litre cost of milk production for local and crossbred cow was Rs. 6.71 and Rs. 3.52 respectively while the price received by the dairymen for local and crossbred cow milk was Rs. 6.37 and Rs. 6.12 per litre respectively. The study thus indicates that it it is profitable to maintain a crossbred cow than a local cow as evidenced by the output-input ratio which worked out to as high as 1.71 for crossbred cow against 0.15 for local cow.

The shift in dairy technology conceived has a shift from buffalo to crossbred cow (case I) and from indigenous to crossbred cow (case II) is said to have raised the country’s milk output by realizing the higher location of the crossbred cattle. But the higher milk yield of the crossbred cattle is not necessarily a technological improvement over the existing dairy technology, based upon the indigenous cattle and buffalo. It may so happen that the entire gain in milk yield consequent upon the shift in dairy technology from buffalo and indigenous cattle to the crossbred cattle may occur due to increased input use. The study by Mahesh Lalwani36 aims to decompose the output gain in milk yield occurring as a result of shift in dairy technology, into its causative factors. Input-output data were collected under the aegis of the ongoing Operation Research Project (ORP) of the National Dairy Research Institute, Karnal. The project covered all the 5,805 rural households in its 30 villages, as on June 1980 of which six villages with 1,391 rural households were purposively selected as the first stage of sampling. A total of 104 rural households from

among 1391 households (7.5 per cent) selected at random, formed the core sample. 28 among 104 households belonged to the landless category and the rest 76 households were selected randomly among the cultivating households. A total of 238 milch bovines, of which 206 were found actually in lactation comprising 124 buffaloes, 48 crossbred cattle and 34 indigenous cows were reared by the 104 sample households during the reference year. From the study it is observed that the adoption of new technology, that is, crossbred cattle in the place of buffalo and indigenous cow led to higher per day milk yield. Consequently shift in dairy technology, either from buffalo (case I) or indigenous cow (case II) to crossbred cattle brought about a sizable total percentage gain in milk yield.

The economics of rearing crossbred cows was highlighted by Anjani Kumar and Gupta37 Crossbred cattle have a better feed conversion efficiency over local cows. The feed intake of crossbred cattle is also significantly higher than that of local cows. It is a moot point whether the higher milk yield of crossbred cows is due to their better genetic potential or due to higher feed intake, veterinary care and management. In the study conducted in middle-gangetic plain regions of Bihar, a sample of 100 households rearing crossbred cattle and 100 household rearing local cattle was randomly drawn, thus a sample of 200 households was selected from the three districts of the region. The data were collected by survey method in 1994-95. The milk yield and other economic

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parameters viz, maintenance cost, cost of milk production, sale price and net return from crossbred as well as local cattle are presented below:

Table 2.1: The Milk Yield and Other Economic Parameters of Crossbred and Local Cattle

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Crossbred</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk yield per day (litres)</td>
<td>5.47</td>
<td>2.68</td>
</tr>
<tr>
<td>Maintenance cost per day per cow (Rs.)</td>
<td>34.31</td>
<td>21.17</td>
</tr>
<tr>
<td>Cost of milk production per litre (Rs.)</td>
<td>6.27</td>
<td>7.90</td>
</tr>
<tr>
<td>Sale price per litre (Rs.)</td>
<td>8.00</td>
<td>8.00</td>
</tr>
<tr>
<td>Net return per litre (Rs.)</td>
<td>1.73</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Average milk yield of crossbred cow (5.47 litres) was considerably higher than that of local cow (2.68 litres). Further, the cost per litre of milk production from milch animal was markedly lower in case of crossbred cow. Consequently, the net return accruing from crossbred cow is significantly higher. Thus, it may be concluded that the performance of the crossbred cows was superior to that of local cows.

A special investigation by R.S. Gandhi and A. Singh38 highlighted that the average milk production of crossbreds is significantly higher than that of indigenous cattle (5.81 vs 1.69 Kg/animal/day) in Kerala state. In India the

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number of crossbred is highest in southern region (4.2 million) followed by northern region (2.6 million), eastern region (2.1 million) and western region (0.8 million). This may be attributed to the factors like the adoption of crossbreeding programme since the beginning of the century in southern region, more conducive climatic conditions for crossbreds in some pockets of Karnataka, Tamil Nadu and Kerala involvement of collaborative agencies and interest of farmers in promoting crossbreeding programme in these area. The average first lactation 305 days milk yield of crossbred animals of the Kerala state has been increasing at an average rate of 3 per cent per annum.

An important study by M. S. Pathania and G. D. Vashist was taken place in Himachal Pradesh during 1999, with the following main objectives:

a) to examine the impact of crossbreeding programme of cattle in the state

b) To study the awareness of artificial insemination crossbreeding programmes among farmers.

The study revealed that there was an increase in veterinary institutions in the state over the years. The number of artificial insermination centres increased by 313 per cent. The crossbred cattle population over the period under study has increased while the indigenous cattle population has decreased. The percentage of crossbred cattle in the total cattle population has increased from 8 per cent to 11 per cent. In cow milk, the share of milk from the crossbred

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cows to the total milk registered an increase from 11 per cent to 17 per cent indicating beneficial effects of crossbreeding programme. The opinion of farmers regarding the impact of artificial insemination revealed that majority of farmers liked the crossbred cattle due to their desirable characteristics over indigenous ones. The finding of the study have clearly brought about a definite and positive impact of cross-breeding programme in the study area.

Aitawada M.S., R.M. Bansode, K.R. Waykar and H.R. Shinde\textsuperscript{40} in the study conducted in Akola district of Maharastra state, during 2000, concentrate to workout the maintenance cost of crossbred cows and the gross and net income from milk production of crossbred cow. For this, the farmers having the crossbred cows were selected and classified into three groups according to the size of land holding such as small (less than 2 hectares) medium (2 to 8 hectares) and large (above 8 hectares)

Regarding maintenance cost it is observed that total maintenance cost per animal was Rs. 18020.24, Rs. 19851.69 and Rs. 20026.13 respectively in small, medium and large size group. Out of total cost, variable cost accounted for 90.35 per cent and fixed cost was only 9.65 per cent. At the overall level the cost of feeds and fodders was the major cost item which constituted 65.77 per cent of the total cost, followed by upkeep charges (12.79 per cent) interest on working capital (10.40 per cent). Thus it indicates that the total maintenance cost increased with the size of land holding increases. The gross income was worked out by adding value of milk, income from manure and value of young

\textsuperscript{40} Aitawada M.S. \textit{et al.}, “Economics of Milk Production from Crossbred Cows in Akola District of Maharastra State, Indian Dairyman, Vol. 57, No. 1 2005, pp. 48-52.
stock. It was Rs. 26008.81, Rs.32118.01 and Rs.29798.08 in small, medium and large size group respectively. The output-input ratio was worked out by dividing price per litre of milk by cost per litre of milk. It was noticed that output-input ratio was 1.49, 1.64,1.55 in small, medium and large size group respectively. It was also observed that the output-input ratio was highest in medium size group. So it is highly advisable to rear crossbred cows in our country.

2.5 COST-BENEFIT APPROACH IN DAIRYING

Gaurasha\textsuperscript{41} in his research paper examines and compares the cost structure, pattern of disposal and relative economics of milk production of the urban and rural dairies based on data collected from a sample of 18 urban dairy farms in Raipur town of the Raipur district of Madhya Pradesh and 24 rural dairy farms within a radius of 10 kilometers from Raipur town. He used primary data pertaining to the year 1993-'94. The study brought out that average daily expenditure incurred in a milch animal was higher in the urban area than in the rural area due to higher proportion of concentrates and green fodder fed to animals and higher cost of feed and fodder which accounted for nearly 68% of the total cost. The average cost of production per litre of milk for crossbred cow came to Rs.5.16 and Rs.5.44 in the urban and rural dairies respectively, while the corresponding figures for a buffalo worked out to Rs.6.32 and Rs. 6.33 respectively. The net returns were Rs. 3.84 and Rs.4.68 per litre in the

case of crossbred cow and buffalo milk respectively in the urban area. These were, however, Rs. 2.55 and Rs. 3.67 per litre for crossbred cow and buffalo milk in the rural area. A loss of Rs. 2.13 per litre was reported in the case of local cow milk in the rural dairies. The negative returns per litre of milk for local cow were due to lower milk yield. The per day per animal yield of milk was higher in crossbred cow than in buffalo in both the areas. The profitability is lower due to lower price of cow milk as a result of lack of demand in the local markets. The study suggested that efforts need to be made to reduce the cost, to improve the productivity of milch animals and to strengthen the marketing infrastructure. This can be done by introducing high-yielding varieties of grasses, legumes and fodder crops in the farmers fields replacing the local milch animals with improved breeds at a faster rate and encouraging the dairy farmers to organise through co-operatives which should be allowed to process and to distribute milk. The necessary infrastructural facilities like veterinary hospitals, transportation network etc. have to be created for the dairy enterprise. It is also necessary to educate the farmers on scientific management of superior milch breeds and supply them standardized cattle feed regularly at cheaper rates at their door-steps.

An attempt has been made in the study by D.S. Shukla, Bhagwan Das, Babu Singh and S.R. Yadav\(^\text{42}\) to examine the level of investment and resource use pattern in milk production and the impact of Operation Flood Programme.

on production, consumption and marketed surplus of milk on different
categories of milk producers in Uttar Pradesh. The study covered a sample of
160 farmers (80 from programme area and 80 form non-programme area) selected at random from four village of Malsa and Patara development blocks
of Kanpur-Dehat District in Uttar Pradesh. The average size of land holding of
farmers was 4.70 and 4.24 acres each in the programme and non-programme
areas respectively. The average number of milch animals was higher (2.41) in
the programme area than in the non-programme area (1.96). The investment
pattern in dairy enterprise revealed that the average investment per household
was Rs. 17,648 in the programme area as compared to Rs. 11,374 in the non-
programme area. The higher investment could be mainly due to the higher value
associated with the superior quality of milch animals maintained by the
households in the programme area. The overall average cost per milch animal
and per household per annum was Rs. 7,588 and Rs. 18,286 respectively in the
programme area as compared to Rs. 6,854 and Rs. 11,584 in the non-Programme
area. The average annual net income was much higher and amounted to Rs. 4872
per milch animal per annum and Rs. 11,742 per households per annum in the
programme area as compared to Rs. 2,491 per milch animal and Rs. 4,883 per
household per annum in the non-programme area. The average cost of milk
production per litre for the group as a whole was Rs. 3.59 and Rs. 3.67 in the
programme and non-programme areas respectively. The overall average milk
production per day per household was higher at 8.78 litres in the programme
area as compared to 6.04 litres in the non-programme area. The average
consumption per household per day was 2.23 litres and 1.92 litres in the
programme and non-programme areas respectively and the overall marketed
surplus of milk per household was also high at 6.55 litres in the programme area as compared to 4.12 litres in the non-programme area. It may be concluded that the Operation Flood Programme has augmented the income for the weaker sections of rural society, increased their investment capacity and enabled them to produce more milk at lower cost.

In an outstanding study conducted in Rajasthan by Khem Chand, Kulwant Singh and Raj Vir Singh\(^\text{43}\) would prove that the private sector dairies are more efficient in their operations more particularly in revising the prices as compared to URMUL dairy. In this competitive field, a special investigation has been made to ascertain the economics of milk production cost and returns per milch animal across different seasons, winter, summer and rainy - were worked out. The average cost of maintaining a cow was the highest in winter season followed by rainy and summer season. This was mainly attributed to the higher expenditure on fodder and feeds in winter and rainy season as compared to summer season. In the overall cost of maintenance feed cost alone accounted for more than 70% per animal per day. The dairy owners realized the highest price per litre of milk in summer season, followed by rainy and winter season. The price was high in summer season due to higher demand and lower supply of milk that could be due to lower productivity in summer season. Regarding the marketing of milk, in Bikaner, four agencies are engaged in the collection of milk viz the consumer, the sweet manufacturing unit, the private dairy plant and others like teashop, milk vendors etc. overall, the private dairy plant (Modi Dairy) has the

largest share in total milk procurement because of better procurement prices and timely payments. Due to procurement contract made by the private dairy plant producers got assured price for milk everyday. Consequently the number of dairy herds has increased by more than 30 per cent in a span of three years after the establishment of the dairy plant.

In Kerala the existence of small holdings of size less than 50 cents is quite common. Small livestock production units of one or two milch animals and their calves are common in such farming systems. In a study by Regeena\textsuperscript{44} data were collected from 30 small holders in Kollam district. All the animals reared were crossbred cows. The average daily milk yield per animal was 6.37 litres, which at Rs. 13 per litre fetched an annual income of Rs. 24843. The annual maintenance cost per animal inclusive of the imputed value of family labour was Rs. 30935, and the farmers incurred of loss of Rs. 5092. However, the cost excluding the imputed value of family labour, they would earn a profit of Rs. 6885.

The study undertaken by K. Natchimuthu and Ram Kumar\textsuperscript{45} intends to assess the technological impact of animal husbandry programmes on reproductive performance of dairy cattle under field conditions. The traits selected for the study include age at first calving, lactation length, dry period and calving interval. The study was conducted in the Union Territory of

\begin{itemize}
  \item \textsuperscript{44} S. Regeena, “Small Holder Livestock Production in the Home Gardens of South Kerala,” \textit{Livestock in Different Farming Systems in India}, 2002, pp. 120-131.
\end{itemize}
Pondichery. The dairy farmers who had more than 10 years of experience in dairy farming were selected for study. The study revealed that the increases in cattle population during the last ten years led to specifically lower age at first calving, shorter dry period and larger lactation length. However, the significant reduction in conception rate through artificial insemination led to increased calving interval over a period. It increases the profit margin of the dairy farmer.

NB The researcher has referred various literature, and decided to select only published research study for review of literature. Those studies conducted after 1990 were chosen for review of literature, with the idea that they are more relevant to the time.

Most of the research study reports relating to dairying are published in ‘Indian Journal of Agriculture Economics’, ‘Indian Dairyman’, ‘Agricultural Situation in India’, etc. That is why they are referred more than the other research periodicals.