Introduction
Chapter - 1

INTRODUCTION

Majority of Indian population are dependent on agriculture and allied activities. Dairying and animal husbandry are very closely connected with agriculture. They constitute over 26 per cent of agricultural output. Dairy sector alone accounts for about two-third of animal husbandry. India ranks second in the world after the United States of America in the milk production.

India is predominantly an agricultural country and dairying is recognized as an instrument for social and economic development. Animal husbandry and dairying are mainly rural based, generating employment among the rural people and providing income to them. Dairy farming, an important subsidiary to agriculture has been playing a significant role in India’s rural economy. The Indian Dairy industry has made rapid progress since Independence. A large number of modern milk plants and product factories have been successfully engaged in the routine commercial production of pasteurized bottle milk and various Western and Indian products. With modern knowledge of the protection of milk during transportation, it became possible to locate dairies where land was less expensive and crops could be grown more economically. The government has been trying a number of devices for improving the efficiency of dairy management and to make dairying self-sufficient at its operational level.

In India, about 75 per cent of population are residing in rural areas. Mixed farming involving integration of crop production and animal husbandry is being practiced in this country since ages. Livestock is the second largest source of income and employment in rural India after agriculture. The contribution of livestock and fisheries sector to country’s G.D.P. was 6.8 per cent in 2001-02 at current prices and 9 per cent in 2005. The value of output of livestock and
fisheries to the total value of output of agricultural and allied sectors was 27.7 per cent. The contribution of milk alone (Rs.105.000 core) was higher than Paddy (Rs.73.965 core) wheat (Rs. 43.816 core) in 2001-02 livestock sector provides regular employment to about 11 million in principal status and 8 millions in subsidiary status. Woman contribute 69 per cent of the labour force in livestock sector as against 35 per cent in crop farming India has a large livestock population accounting for about 57 per cent of the world buffalo population and 16 per cent of the cattle population (Economic survey 2002-03). According to the all India summary reports of 17th Livestock Census (released in July 2006), India possesses the largest livestock population in the world after Brazil.

At present Indian agriculture is characterized by decreasing farm size, increasing number of operational holdings, higher degree of fragmentation and declining contribution of agriculture to gross domestic product, now standing of nearly 28 per cent. Even though the share of agriculture in GDP is declining, the value of output of the livestock is showing an increasing trend. The growth of dairy sector has been at an encouraging 5 per cent to reach the level of 84.6 million tonnes during 2001-02 and it is 113 million tonnes in 2010-11. India is expected to reach milk production of 220 to 250 million tonnes by 2020. India’s contribution to world milk production increased from 12 to 15 per cent and it is expected to go upto 30-35 per cent by 2020. The per capita availability of milk is increased from 214 gm per day in 1996-97 to 226 gm per day in 2001-02 and it will increase upto 290 gm by 2020. India contributes 35 per cent of total Asian milk production. However, per capita availability of milk in our country is one of the lowest in the world. The reason for this is investment in animal husbandry during the plan period declined considerably. In India, there are nearly 70 million households engaged in milk production of which more than 10 million are in the co-operative sector.
Animal husbandry plays a vital role in determining the performance of agrarian economy. The main occupation of more than 75 per cent of the rural population in this state is agriculture and its allied activities. Agricultural activities are predominantly dependent on drought power provided by animal husbandry sector. Production from the domesticated livestock animals and poultry, like milk meat, wool and eggs has become subsidiary occupation of the farmers in the state.

Milk is a ‘Cash crop’ for small holders converting low value agriculture byproducts and crop residues and using family labour into a value added market commodity. Around 100 million milch animals are spread over 5 lakh villages among 70 million farmers. There are about 1,00,000 villages milk co-operatives with 11 million farmers as members. Landless, small and marginal farmers own 68 per cent of milk animals and contribute nearly 62 per cent of total milk produced as on 2006. Around 63 per cent of the available animal protein in Indian diet comes from milk. Milk could definitely continue to be a major source of animal protein in India.

For a long time India has been a net importer of dairy products. However in recent years with faster growth in milk production, India has become self sufficient in milk and with unfolding process of globalization is expected to open up opportunities for export of dairy products. Milk is highly perishable commodity and requires immediate transportation to the consumption centers.

Present status of dairy development in India is primarily due to co-operative model evolved in small town Anand in Gujarat. The government of India was impressed with the good work done in the Dairy co-operative society and decided to set up the same all over the country. This led to the setting up of National Dairy Development Board (NDDB) in 1965, as a registered society with the objective of promoting dairy co-operative societies and financing dairy infrastructure through loans and grants. The NDDB was responsible for
implementing operation Flood program between 1970 and 1976. The government of India has implemented several projects, it made several works for the improvement in milk production. In operation flood areas, the country has about one lakh organized primary village dairy co-operatives with an aggregate membership of around 11 million producers. The dairy co-operative network collects about 17 million liters per day and pays an aggregate amount of about Rs. 70,000 million to the milk producers in a year.

In the post liberalization environment investments in a dairy sector especially in putting up manufacturing sector facilities have been made by private entrepreneurs as well as multinational companies. Private sector at present, utilizes most of their milk procured in the manufacturing of milk powders, dairy whiteners, infant foods, ghee and to some extent the traditional Indian Dairy products. Only few of them market liquid milk. The co-operative and public sector plants are discharging their social responsibility to meet the liquid milk requirements in the major cities and towns.

Dairying is the scientific method of maintaining cows and buffaloes, collection and preservation of their milk and the production of milk products. Scientific dairy farming has helped in ‘white revolution’ where there is a phenomenal rise in milk production. Dairying is helping in developing a symbiotic relationship between the farmer and the industry. Besides cattle rearing is the base of sustainable crop production and is eco-friendly.

Dairy development fits well into the country’s program of increasing poor production, rural employment and equitable distribution of different products. Dairying can be profitable in greater parts of arid and semi-arid regions of India where the best breeds of dairy have evolved. The best breeds of cattle and buffaloes are also from the regions where agriculture has prospered. India is
aiming at high tech dairying methods, although its base will continue to be in the hands of millions of marginal farmers as well as landless labour.

The structure of livestock production in India is significantly different from that in the rest of the world, owing to rapid increase in the demographic pressure on land and the consequent pressure on the context of pasture and other grazing lands. Therefore the relationship between human and livestock population in India has become one of symbiosis rather than competition. Thus animal husbandry is probably best considered as part of the agricultural system, using agricultural wastes to feed animals and animal wastes in turn as a source of both fuel and fertilizer.

Apart from land and irrigation, livestock has been the largest productive resources in the rural economy of India. The value of livestock held by households is estimated at Rs. 57 billion or about 7 per cent of privately held productive assets in the rural India. There are as many as 25 well defined cattle breeds and seven buffalo breeds in India. Numerically, the livestock strength of the country is highly impressive. The annual average milk yield of the Indian cow is about 157 kg and that of the buffalo 504 kg. Where as improved cows and buffaloes in Denmark, United Kingdom, Switzerland and Israel produce milk more than 20 times that of the Indian cow and over seven times that of the buffalo (Sing et al., 1970).

India is the largest producer of milk in the world. It has been estimated that approximately 12 per cent milk per day is processed into value added products like casein, whey powder and whey protein concentrates most of these products are exported. Dairy development in India has been acknowledged the world over as one of modern India's most successful development program. India is the second largest milk producing country with production of about 113 million tonnes during 2010-2011.
Dairy is a place where handling of milk and milk products is done and technology refers to the application of scientific knowledge for practical purposes. Dairy technology has been defined as, that branch of dairy science, which deals with the processing of milk and the manufacture of milk products on an industrial scale.

In developed countries such as the U.S.A the year 1850 is seen as the dividing line between farm and factory scale production. Various factors contributed to this change in these countries, where as the rural areas were indentified for milk production, the urban centers were selected for the location of milk processing plants and product manufacturing factories. These plant and factories were rapidly expanded and modernized with improved machinery and equipment to ensure the various advantages of large-scale production. Nearly all the milk in the U.S.A before 1900 was delivered as raw milk. Once pasteurization was introduced, it developed rapidly.

In India dairying has been practiced as a rural cottage industry since the remote past. Semi commercial dairying started with the establishment of military dairy-farms and co-operative milk unions throughout the country towards the end of the nineteenth century.

During the earlier years each household in these countries maintained its family cow or secured milk from its neighbour who supplied those living closely. As the urban population increased, fewer households could keep a cow for private use. The high cost of milk production, problems of sanitation etc., restricted the practice, and gradually the family cow in the city was eliminated and city cattle were all sent back to the rural areas.

Gradually farmers within easy driving distance began delivering milk over regular routes in the cities. This was the beginning of the fluid milk sheds which surrounded the large cities of today. Prior to the 1850's most milk was necessarily
produced with in a short distance of the place of consumption because of lack of suitable means of transportation and refrigeration.

The Indian Dairy Industry has made rapid progress since Independence. A large number of modern milk plants and product factories have since been established. These organized dairies have been successfully engaged in the routine commercial production of pasteurized bottled milk and various western and Indian dairy products.

In India, the market milk technology may be considered to have commenced in 1950, with the functioning of the central dairy of Aarey milk colony, and milk product technology in 1956 with the establishment of AMUL Dairy, Anand. The industry is in its infancy and barely 10 per cent of our total milk production undergoes organized handling.

Statement of Research Problem

The existing literature unfolds, interesting dimensions of the new trends and patterns of dairy development since 1980's. The new market oriented policy regimes since 1991, and concomitant process of integration of the Indian economy in to the world economy through trade, investment, technology transfer is bound to have a major influence on the dairy rector. Because of liberalization dairy cooperatives have already come in conflict with corporate business in the area of milk collection and processing. Now it is very pertinent to look into the competitiveness and efficiency of dairy industry of Indian economy. Dairy technology has been defined as that branch of dairy science, which deals with the processing of milk and manufacture of milk products on the industrial scale.

But dairy is an economic activity, which adds income to households. It provides indirect insurance against risks from crops, such as crop failure due to
drought or pests. It is pertinent to study how far dairying helps the farm families to get gainful employment.

A micro investigation in Shimoga district has been undertaken to review the existing structure, growth trend in milk production, competitiveness of dairy industry, cost of production and level of efficiency in dairying. This study also covers income generation capacity of dairying in rural areas and marketing problems of dairying in the district.

Prospects for Development

India today is the second largest producer of milk in the world. A substantial increase in per capita availability of milk and attainment of near self-sufficiency in milk and milk products has been achieved. The progress made relates not only to production of milk by small producers, but also processing and marketing of milk and milk products. India has a well-developed infrastructure to support dairying activity. Agriculture including animal husbandry and dairying is a static subject in India. The state government provides livestock related services. Over 36 thousand trained veterinaries and 70 thousand para veterinarians are engaged in delivering the services.

The share of milk in livestock sector has been raising, it increased from 68.1 per cent in 1982 to 76.3 per cent in 2010. Dairying is also an important source of employment for the rural poor. In 1983 livestock sector engaged 12 million workers. In 1999-2000 livestock engaged 4.4 per cent of the total workers in the agriculture sector. Dairy sector provides additional income and generates job opportunities for 80 million families.

In 2000-2001 dairying accounted for about 13 per cent of the refinance disbursed by the National Bank for Agriculture and Rural development. In 1999-2000 only about 79 lakh animals (dairy as well as others) were provided insurance
cover. Against approximate 285 million milk animals, the number of veterinary doctors in India is around 30,000 (1 doctor for 9500 animals) which is very less.

Although we have a well developed infrastructure and trained manpower for delivery of livestock services, problem of adequate supplies of medicines, vaccinations, semen etc., and flow of institutional credit and insurance cover to dairy sector is poor partly because of procedural complexities, inordinate delays and higher transaction costs. These issues need to be addressed and sorted out. Livestock Insurance Scheme was approved in February 2006 for its implementation during the remaining part of 2005-06 and in 2006-07 on a pilot basis in 100 selected districts across the country with a total outlay of Rs. 120 crore. The scheme aims at protecting the farmers against losses due to untimely death of animals. The central government is providing subsidy to the tune of 50 per cent of the premium under the scheme.

There is a large gap in the producer and the consumer price of milk. Apparently this indicates either inefficiency in processing, large share of intermediaries and high transaction costs in collection, processing and distribution of dairy products. The processing and marketing costs and margin need to be reduced to benefit the producers as well as consumers.

Indian dairy sector is likely to face major challenges from globalization not because of inefficiency in production, but due to unfair trade practices and protection to dairy industry. The European Union and United States of America protected their dairy industry through various kinds of subsidies and support to dairy farmers and exports. The value of subsidy for milk being given by OECD countries is nearly two and a half times the total value of milk produced in India. Given an appropriate policy environment and supporting infrastructure and services, dairying has the potential to emerge as an engine of growth of agricultural sector in India.
Dairy Development in India Retrospect and Prospect

Animal husbandry and dairying constitute an important sub-sector of the agricultural sector of India’s economy. In 1994-95, the value of output from livestock was estimated to be Rs. 79,684 crores at the current price and Rs. 20,668 crores at constant price. The value of output of livestock was estimated at rupees 1,55,330 crores in 2001-2002, but it was estimated to reach to 2,15,000 crores in 2009-2010. Among crop and livestock products milk group ranked number one farm commodity in terms of its contribution to the gross value of output from agriculture in national economy. Thus animal husbandry and dairying sub-sector occupies an important place in India’s economy and has made rapid strides in the latest two decades or so.

The central and state governments in India gave much importance to dairy development as an instrument promoting socio-economic development of rural people, particularly the poor. Milch animal rearing is encouraged through various dairy development programs and indirectly through government subsidy. It is also subsidized rate of interest for purchase of milk animals under various rural development programs such as the Integrated Rural Development Program (IRDP) the Drought Prone Area Program (D.P.A.P) and the Integrated Tribal Development Projects (I.T.D.P). The total direct expenditure on dairy development programs under the five year plans from 1951 to 1997 amounted to about Rs. 2660.30 crores (Dairy India 1997 : 154, Table 7) the proposed outlay on dairy development in the Ninth five year plan (1997-98 to 2001-02) was Rs. 485 crores, which promoted the development of dairy sector. India projected to be the world’s top milk producer Nation by the end of 1999 and given India’s very long experience with dairy development and the commitment of her government to promote dairy development. The proposed expenditure on animal husbandry and dairying in the eleventh five year plan (2007-2012) is rupees 2,100 crores (17.35 per cent). It seems worth while to analyze her experience over the last 50 years.
Since, Independence and particularly after 1970, when operation flood was launched and draw lessons that might be useful for India as well as other developing countries in improving the design and implementation of dairy development project in future.

**Pre-independence Period of Dairy Development in India**

The history of government intervention in the animal husbandry and dairying subsector can be traced to the early part of the 20th century. Since then, a large number of animal husbandry and dairy development projects have been launched in India. Operation Flood Program was the important one which was launched in July 1970 in 18 selected milk sheds in India. It had been extended to cover 170 milk sheds by the end of March 1996.

The first instance of government intervention in the dairying sub-sector was the establishment of military dairy farms and creameries towards the end of the 19th century to meet the demands of defence forces and their families. As a result modern dairy plants were established mainly for manufacturing table butter in number of cities in the early parts of this century. Later the need for meeting consumer demand of liquid milk in big cities like Bombay, Calcutta, Delhi and Madras, also was recognized and various measures were adopted for the purpose. These measures included the establishment of city milk schemes, collection of milk from rural areas through private agents and co-operatives, control of purchase and sale prices of milk, establishment of dry-stock farms, milch animals etc, standards for purity and quality of ghee and creamery butter were laid down under the Ag-mark Act in 1938. Facilities for dairy research and training were also created. In 1923, the Imperial Institute of Animal Husbandry and Dairying was established at Bangalore. Its name was changed many times and finally, in 1955, it was renamed as National Dairy Research Institute and its headquarters shifted to Karnal.
India’s dairy development policy in the pre-independence era aimed at meeting the demand of milk in big cities through improvements in milk collection, processing and distribution systems in the public, private and co-operative sectors. The policy was wholly city consumer oriented, but the production interest did not receive the status of dairy industry which continued to be traditional and stagnant. A few foreign firms also entered the dairy industry and introduced modern dairy products in India.

**The Period from 1947 to 1970**

After Independence also, the main objectives and the measures used to achieve them remained almost the same as in the pre-independence era. But the government of India realized the need to do something more to boost milk production in rural areas with a view to ensure regular and adequate urban milk supply. To achieve this object, central government launched two schemes namely, the Key Village Scheme (K.V.S) in the first plan and the Intensive Cattle Development Project (I.C.D.P) in the third plan. Later, both these schemes were transferred to the state.

In 1992, the government of India constituted a working group to study the prospects of development of dairying and animal husbandry through co-operative organizations. The working group agreed with the proposal made in the Third plan that dairy development should be attempted through co-operatives and recommended steps for implementing this policy including model bye-laws and establishment of state federations of dairy co-operatives and all India Federation to co-ordinate the work of the state federations. As a matter of fact, the working group’s recommendation was based on the success of dairy co-operatives in Kaira District of Gujarat during the fifties and sixties which had demonstrated the potential of co-operatives as an instrument of dairy development.
AMUL (Anand Milk Union Limited) which is the popular name for the Kaira District Co-operative Milk Producer’s Union Ltd, was established in 1946 with headquarter at Anand in Gujarat. Initially AMUL had only two large milk producers Co-operative Societies (VMPCS) affiliated to it in 1995-96. It had some 962 VMPCS with 5,42,050 producer members and handling on an average a collection of some 6.27 lakh liters of milk per day. In 1995-96, it had an annual sale of about Rs. 380.26 core. It is now one of the big dairy unions in India and its products are best sellers in Indian markets and now are becoming popular in foreign countries also. AMUL has become a model of dairy development well adapted to India and other similar developing countries.

The Anand Pattern Dairy Co-operatives (APDCs) provide to their members a complete package inputs and services necessary for enhancing milk production. The package includes animal health care through both regular as well as emergency visits of veterinary doctors, artificial insemination, balanced cattle feed, improved fodder seeds, and extension of education and training. But more importantly, the APDC provide a year-round and assured market for the producer’s milk at remunerative price. During this period, the Government had also established milk products factories and cattle feed compounding mills in selected areas. And government had issued licenses for manufacturing of dairy machinery and equipment mainly in the private sector. On the eve of the Fourth Plan, the total number of dairy plants in operation was 91 comprising 47 liquid milk plants, 7 milk products factories and 37 pilot milk schemes. Of these 53 plants were in the public sector and the rest in the Co-operative sector. The city milk schemes were oriented more like a welfare measure than like a commercial activities and were not professionally managed.

The various policies and Programmers followed during this period had only a marginal impact on milk production which increased from a total of 17.4 million tonnes in 1951 to 20.7 million tonnes in 1969-70. It was a very low average
growth rate of only about one per cent per annum. The average rate of growth of population of milk cows and buffaloes during this period was also about one per cent. Consequently, per capita availability of milk declined from 132 gm per day in 1951 to 107 gm per day in 1969-70. Launching of Operation Flood marked the beginning of a new era in the history of dairy development in India.

**Since 1970, The Operation Flood Program Era**

The central Government had accepted the Anand Pattern Dairy Cooperative structure as the best available organizational form for promoting dairy development in the country by 1970. The National Commission on agriculture after reviewing the role played by private agencies, co-operative institutions and government owned and run city milk schemes was of the view that “Dairy development programs” can best be organized by the co-operatives of milk producers.

**The Genesis of Operation Flood**

The Operation Flood Program was formulated by the National Dairy Development Board (NDDB) which was setup in 1965 at the suggestion of the late Shri. Lal Bahadur Shastri the former Prime Minister of India to create throughout India, the APDC similar to those which had been successfully established in Kaira district of Gujarat. The Program was launched on July 1st, 1970 by the Indian Dairy Corporation. Operation flood was originally conceived as a milk marketing project aimed at enabling the modern dairies to capture commanding shares of the liquid milk markets in India’s four metropolitan cities of Bombay, Calcutta, Delhi and Madras. This goal was to be achieved by eating a virtual flood of milk in the rural milk sheds of the four metropolitan cities. The goal of Operation Flood was broadened to include improvements in standards of dairy farming by introduction of improved methods of breeding, feeding, health care and management of dairy animals backed up by necessary training and extension services. The main
objectives of India's dairy development policy since 1970 and the investments used to achieve these objectives.

The Three Phase of Operation Flood

The operation flood was implemented in three phases with OF-I in 1970. Operation Flood-II was implemented in 1979 and operation Flood-III in 1986 under of a large dairy infrastructure (dairy plants, feed plants, rail and road milk tankers etc.) has been created.

At the request of the government of India the International Development Association (IDA) which is an affiliate of the World Bank, financed three dairy development projects in the states of Karnataka, Rajasthan and Madhya Pradesh. Like OF-I these projects also sought to replicate the AMUL model of dairy development.

The Operation Flood Program was confined to the most potential milk producing areas in the country because of conditionality that it was restricted to only those areas which had financial viability. This led to disparity in spread of growth and only about half the districts in the country could be covered under the Program and some of the poorest and most backward areas were left out. Even in the areas covered some disparity in the coverage was noticed because of several operational and strategic reasons.

After the closure of Operation Flood Program, the Government of India took a number of policy initiatives for accelerating growth of the dairy industry. The focus now is to maximize coverage in the districts where operation flood was implemented and bring the remaining areas in the country under dairy development. Broad strategy adopted for post operation flood period is genetic upgradation of livestock, control of diseases, accelerating fodder development, establishment of national production and health information system and
strengthening co-operatives, on the Anand pattern. The responsibility for carrying on development activities in the Operation Flood areas has been entrusted to National Dairy Development Board. In operation the country has about 100000 organized primary village dairy co-operatives with an aggregate membership of around 11 million producers. These primary co-operatives are federated into 170 district co-operative dairy federations. The dairy co-operative network collects about 17 million liters per day and pays an aggregate amount of about Rs. 70,000 million to the milk producers in a year.

These co-operatives form part of the National Milk Grid which today links the milk producers throughout India with consumers in over 700 towns and cities. The milk Grid has minimized variation across the seasons and regions in the availability of milk and at the same time ensuring a remunerative price to the producers and a reasonable price for quality milk and milk products to the consumers.

In the post liberalization environment, investments in dairy sector especially in putting up manufacturing facilities have been made by private entrepreneurs as well as multinational companies. The investment in the co-operative sector, however, concentrated largely in milk procurement, processing and liquid milk business. Private sector at present utilizes most of their milk procured in the manufacturing of milk powders, dairy whiteners, infant food, ghee and to some extent the traditional Indian dairy products, only few of them market liquid milk. The co-operative public sector plants are discharging their social responsibility to meet the liquid milk requirements in the major cities and towns.

**Major Achievements of Operation Flood**

By March 31, 1996 (end OF -III) the average milk procurement under OF had increased nearly two times as compared to the level of production at the end of Operation Flood- II. Altogether by the end of Operation Flood-III the dairies under Operation Flood recorded average milk processing capacity utilization
nearly 67 per cent during the peak milk procurement (month January 1996) and 55 per cent on an annual basis.

During the years 1994-95, Operation Flood project produced nearly 2,68,000 MT of milk powder, 40,000 MT of butter and 1,30,000 MT of ghee. Again milk powder manufacturing capacity in the country increased from 58.50 MT per day in 1970 to 842 MT per day in 1995-96.

The growth in total milk production in India had almost trebled to 66.3 MT between 1970 and 1995 registering an average increase of 8.47 per cent per annum. The per capita milk availability increased from 107 gm per day to 197 gm per day over the same period. In 1995 the United States of America across the world's number one milk producers with its production and 72 million MT in 1996-97. But India's annual milk output was estimated to be 68.6 million MT. India now exports small quantities of dairy products to some countries. The increase in milk production has been brought out partly by increase in milk yield per animal and partly by increase in the number of milk animal population.

There has been a rapid growth in milk production in India, the milk output that had been drastically increased to 84 million tonnes in 2001. It was increased to 91 million tonnes in 2004 and 104.8 million tonnes in 2007-2008. During 1980's the cow milk production increased at an annual rate of 5.2 per cent and that of buffalo 4.7 per cent. During 1990's while the growth in cow milk production decelerated to 4.4 per cent, but buffalo's milk production increased at an accelerated rate (5.2 per cent). The increase in milk production occurred due to both increase in the number of animals milked and their productivity. During 1980's milk yield of cow increased at an annual rate of 3 per cent and that of buffalo at 1.0 per cent. The rate of growth in cow yield during 1990's decelerated marginally, while buffalo yield increased at an increasing rate. Major share of milk is from buffaloes (52 per cent) followed by cows (45 per cent) and goats (3 per cent), higher growth in cow milk production as well as productivity during 1980's
was due to substantial increase in the population of high yielding cross breed cows. Never the less milk yield particularly of cows is low in India. In 2001, annual mean milk yield of cows was 946 kg / milked cow. This is about half of the world average and 15 per cent of that in the USA, Canada and Israel.

**Impact of Operation Flood on Milk Production**

Operation flood can be expected to increase milk production through its impact on milk yield per animal size of milk herd, and proportion of lactating animals. Very few scholars have studied the impact of Operation Flood on these three parameters using appropriate measurement techniques. However, most of the increase in milk production observed over the period.

Margo's and Alderman (1987) furnished reliable estimates of impact of Operation Flood on milk production on the basis of data collected in two World Bank sponsored and funded research studies in Madhya Pradesh and Karnataka. They estimated that in Madhya Pradesh Milk output had increased by about 20 per cent over a period of five years and, in Karnataka by about 20 per cent. This means milk production in the project areas may have increased at the rate which was 4 to10 per cent higher than the average annual rate of growth in the non-project areas, this shows significant achievement of Operation Flood.

Kumar and Singh (1993) assessed the impact of Operation Flood on the production of milk in Rajasthan state and analyzed a data set of 90 households of two districts. The authors pointed out that total production of milk per household per day in the villages covered under Operation Flood was almost one and half times that to 6.92 liters that in the Non-Operation Flood villages to 4.93 liters.

Mattigatti et al. (1993) measured the impact of operation flood on cow milk production in Dharwad district of Karnataka state and concluded that the introduction of dairy co-operatives helped farmers to boost the milk production.
Gulati et al. (1996) conducted a World Bank study on the Indian dairy policy and protection. The study revealed that the productivity of milch animals increased due to cross breeding of the non-descript Indian cows with the high yielding exogenous cattle breeds. There are indications based on the data from various livestock census statistics that the number of milch animals was increasing faster than the number of total bovine stock. This shows a substantial increase in milk production beginning with the 1970’s under Operation Flood Program.

Mergos (1997) examined the ground reality of increase in milk production and direct impact of Operation Flood on milk production. The study considered that the direct impact of Operation Flood on milk production growth had been modest and indicated that 25 per cent to 50 per cent of increase in procurement by Operation Flood was likely due to switching. He also advocated that milk production increase in the country was real and no evidence was available to show otherwise.

An autonomous institute called the Institute of Rural Management, Anand (IRMA) was setup by NDDB in 1979 under operation Flood-I to train rural managers for rural producers. IRMA conducts a regular two year post-graduate Program in Rural Management (PRM). Besides it also conducts short term Management Development Programs (MDP) in various functional areas of rural management for top and middle level managers working in Operation Flood Projects.

The dairy development policy underlying Operation Program is producer-oriented, people-centered and holistic. It emphasizes integrated development of all important facts of dairy industry namely, production, procurement, processing, pricing, marketing, training, management and advocates use of appropriate technical, economic and institutional instruments to promote dairy development. This had been established in a number of pilot projects launched in India for cross breeding policy. In particular the field trails conducted in Madupetty (Kerala),
Hessaraghatta (Karnataka), Mandi (Himachal Pradesh), Patiala (Punjab), Karnal (Haryana), Almora (Uttar Pradesh) and Harringhatta (West Bengal) had proved the high milk yield potential of cross breed cows.

New Economic Policy and Dairy Development in India and Karnataka State

In the wake of India’s New Economic policy (NEP) announced in August 1991 and characterized by Liberalization, Privatization and Globalization, the dairy sector has been de-licensed. This opened the dairy industry to private entrepreneurs including multinationals as the foreign companies were allowed to raise their equity holding to 51 per cent. The basic philosophy underlying de-licensing was encouraging the competition in procurement and marketing of milk, thus enhancing value for both producers and consumers, De-licensing did have the intended effect of attracting private sector investments into the dairy industry.

De-licensing and privatization of dairy industry is neither economically sound nor socially desirable. Economically, it is imprudent to invest scarce capital in private dairy plants and machinery when the capacity already created in the co-operative sector is under utilized. Socially privatization is likely to have adverse impact on the weaker sections of milk producing population in terms of reduced employment opportunities.

India will also need to improve its comparative advantage in milk production by improving milk yield so as to reduce the per liter cost of production and improve the quality of its products by adopting latest processing and packing technologies and better management.

Investment Pattern on Animal Husbandry and Dairying during various Plan Periods

The investment on animal husbandry and dairying program shows the emphasis given to this sector by the government for increasing the production and productivity.
Table 1.1. Investment pattern on animal husbandry and dairying during various plans  

<table>
<thead>
<tr>
<th>Plan period</th>
<th>Total plan expenditure</th>
<th>Agriculture and allied activities</th>
<th>Expenditure on animal husbandry and dairying</th>
<th>Expenditure on dairying</th>
</tr>
</thead>
<tbody>
<tr>
<td>First plan (1951-56)</td>
<td>19,600</td>
<td>2,900 (14.8)</td>
<td>160.0 (5.5)</td>
<td>77.8 (48.6)</td>
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<td>Second Plan (1956-61)</td>
<td>46,720</td>
<td>5,490 (11.7)</td>
<td>334.7 (6.0)</td>
<td>120.5 (36.0)</td>
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<tr>
<td>Third Plan (1961-66)</td>
<td>85,765</td>
<td>10,890 (12.6)</td>
<td>770.7 (7.0)</td>
<td>336.0 (43.0)</td>
</tr>
<tr>
<td>Annual Plan (1966-69)</td>
<td>66,254</td>
<td>11,071 (16.7)</td>
<td>597.0 (5.4)</td>
<td>257.0 (43.0)</td>
</tr>
<tr>
<td>Fourth plan (1969-74)</td>
<td>1,57,788</td>
<td>23,204 (14.7)</td>
<td>1,542.6 (6.6)</td>
<td>787.5 (51.0)</td>
</tr>
<tr>
<td>Fifth Plan (1974-78)</td>
<td>3,94,262</td>
<td>48,665 (12.3)</td>
<td>2,324.6 (5.0)</td>
<td>540.3 (23.2)</td>
</tr>
<tr>
<td>Annual Plan (1978-80)</td>
<td>1,21,765</td>
<td>19,997 (16.4)</td>
<td>2,087.7 (10.4)</td>
<td>1,157.9 (55.5)</td>
</tr>
<tr>
<td>Sixth Plan (1980-85)</td>
<td>1,092,917</td>
<td>136,203 (12.5)</td>
<td>8,025.1 (5.8)</td>
<td>4,362.9 (54.4)</td>
</tr>
<tr>
<td>Seventh Plan (1985-90)</td>
<td>2,202,163</td>
<td>2,79,611 (12.7)</td>
<td>12,805.6 (4.6)</td>
<td>6,034.1 (47.1)</td>
</tr>
<tr>
<td>Eighth Plan Expenditure (1992-97)</td>
<td>8,71,000</td>
<td>22,467.21 (2.57)</td>
<td>1530.81 (17.57)</td>
<td>1307.51 (15.01)</td>
</tr>
<tr>
<td>Ninth plan Expenditure (1997-2000)</td>
<td>94,1,041</td>
<td>42,462.00 (4.51)</td>
<td>115.79 (0.01)</td>
<td>4850.00 (0.52)</td>
</tr>
<tr>
<td>Tenth Plan Expenditure (2002-2007)</td>
<td>16,18,460</td>
<td>58,933 (3.64)</td>
<td>25,000.00 (1.54)</td>
<td>1,612.00 (0.0099)</td>
</tr>
<tr>
<td>Eleventh Plan Expenditure (2007-12)</td>
<td>36,44,718</td>
<td>1,97,118.33 (5.40)</td>
<td>21,000.00 (0.57)</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: Government of India, Dairy Development and Income Distribution in India (1991), pp. 11-12

Note: Figures in the parenthesis shows percentage to the total.
NA = Indicates non-availability of data
The above table gives the total plan expenditure, expenditure on agriculture and allied activities, animal husbandry and dairying and exclusively the dairy sector. The expenditure at current prices in the dairy sector increased from Rs. 77.8 million in the First Five year plan to Rs. 6,034.1 million in the Seventh Plan. The Eighth Plan expenditure has been put at Rs. 2838.32 million which is almost equal to sum of the expenditures from First to Seventh Plans. Though the expenditure increased in monetary terms, the allocation to animal husbandry and dairy sector as a percentage of allocation to agriculture varied from 7 per cent in the Third Plan to 4.6 per cent in the Seventh Plan. There was gradual increase in the percentage allocation on animal husbandry and dairying sector from the First to the Third Plan and thereafter it showed a decline except in the Sixth Plan. This could be due to the quantum jump in the plan expenditure to the agriculture sector.

The percentage expenditure on the dairy sector compared to the expenditure on animal husbandry and dairying ranged from 23.2 (Fifth Plan) to 55.5 (Annual Plans, 1978-80). The expenditure on dairying is almost 50 per cent of expenditure on animal husbandry and dairying since the sixth Plan. Although the dairy sector occupies a pivotal position and its contribution to Indian economy is indeed significant, the plan investment made so far does not appear commensurate with its output and future potential for growth and development. The expenditure on animal husbandry and dairying has been put at Rs. 2100 crores (17.35 per cent) in 2007 to 2012 (Eleventh five year plan).

**Dairy Sector Reforms**

The objective of agricultural policy is to protect interest of both producers as well as consumers of agricultural commodities. Government provides veterinary inputs like Artificial Insemination (AI), health care services and fodder seeds at subsidized rates. The dairy industry was reserved for co-operatives and protected till 1990's. The entry of big private players in the processing sector was
restricted through licensing system. The economic reforms introduced in 1991, brought major changes in the dairy industry. The industry was de-licensed and opened for private participation. The private investment, foreign capital and new technology was allowed. Further all the milk products except malted foods are covered in the category of industries for which foreign equity capital participation upto 51 per cent is automatically allowed. The dividend balancing and export obligation conditions, which applied to 22 consumer goods industries including dairy products, were withdrawn in W.T.O. 2002.

As a result of positive changes introduced in dairy sector, large number of private firms entered in the processing sector by setting up milk plants. The government again brought back to the licensing system in the form of milk and milk products order (MMPO, 1992) under the provisions of essential commodity Act (GOI, 1992). The MMPO (1992) defined the concept ‘Milk shed’ which refers to the region from which the marketable surplus of milk finds its way to a processing plant. The main objective of the order was to increase supply of milk of desired quality in the interests of consumers and maintain specified hygienic conditions in the premises where milk and milk products are handled, processed, manufactured and stored. Government of India amended MMPO 1992, from time to time to make the dairy sector more liberal and facilitate faster growth. The MMPO amendment in 2001 raised the exemption limit for compulsory registration of plants 10,000 liters per day to 20,000 liters and the limit 75,000 liters to 100,000 liters.

The number of private processing dairy plants has increased in recent times due to enabling policy environment. In fact, opening up dairy industry have created a competitive environment, which will increase efficiency and supply of quality of milk and milk products at reasonable price to the consumers.
Export- Import Policies of Dairy Product

The commercial imports of dairy products were restricted from 1975 to mid nineties. The tariff rates were kept at higher level. However, this scenario had changed during 1990s. For the first time, import of milk powder, followed by butter oil was liberalized in 1994. The exports and imports of dairy products was canalized through National Dairy Development Board (NDDB) earlier was de-canalized. Presently export quotas are maintained for whole and infant milk, pure milk and butter. Further Indian Dairy products are brought under mandatory export certification issued by Export Inspection Council (EIC) based on Food Safety Management Systems. During August to December 2009, the country exported 7000 tonnes of casein (Protein from skimmed milk).

Meanwhile, Mother Dairy is chomping through 50 lakh tonnes of milk powder per day to make milk eating into precious summer, or lean season stocks, paving the way for an inevitable price hike. The NDDB has been persistently geared toward imports in the last few years. In fact, it was mid 2009 that the NDDB last mooted imports of skimmed milk products (SMP) under the tariff rate quota (TRQ) to urgently bridge domestic shortage. About 10,000 tonnes of SMP imports are allowed at 5 per cent duty under TRQ. The buzz in the sector is that Mother Dairy has already contracted imports of 2500 tonnes of milk powder.

Objectives of the Study

The specific objectives of the study are as follows:

1. To examine the importance of dairying in the rural context in Shimoga district.
2. To analyze the growth trend in milk production and productivity.
3. To study the performance and competitive efficiency of dairy industry after the new economic policy regime since 1991.
4. To evaluate the cost of production in dairying
5. To assess the income generation capacity of dairying in rural areas.
6. To study the marketing problems of dairying industry in Shimoga district
7. To compare the quality of services, classification of income from milk rendered by private and co-operative milk producers in Shimoga district.
8. To study the growth in the dairy sector which is likely to generate income and employment opportunities for millions of small holders and help to contribute towards reduction in poverty and nutritional insecurity.
9. To study change in herd structure and input requirement due to modernization.
10. To study milk yield among different breeds in different Taluks in Shimoga district.
11. To study total Livestock population, present and future supply of and demand for milk production in different Taluks of Shimoga district.
12. To assess the role of women in dairy farming and in decision making in dairy farming in different taluks. And to assess the total milk production and working conditions of the cow’s and buffaloes in different taluks in Shimoga district.
13. To study the feed and fodder use in Five Taluks in Shimoga district.

**Need for the Study**

Creation of new generation of cross breed animals alone would not lead to desired increase in milk production unless proper arrangements for feed and fodder are made. The nutrients required in the milk production are supplied at a lower cost. The feed constitutes the major part of 60 per cent to 71 per cent of total cost in milk production. It also requires human population limitedly, but dairying gives lot of stress to the depending person. This study covered five taluks of Shimoga district covering Bhadravathi, Hosanagara, Sagar and Thirthahalli.
Also the study is taken up to analyze various relevant economic parameters of different milch animals, cattle and buffaloes animal which would indicate the relative superiority of a particular breed over the other under field conditions. Further it is necessary to provide basic information on investment and labour absorption in dairying, cost of milk production, cost and returns on different species of milk animals. The overall objectives of the study are to examine the economic performance of different species of milch animals with reference to costs, returns and input-output relationship in milk production. So for no systematic attempt has been made in the five Taluks, Bhadravathi, Hosanagara, Sagar, Thirthahalli and Shimoga in Shimoga district covering these aspects.

Scope of the Present Study

From this analysis, the researcher intends to discover the potential of economics of dairying in different Taluks in Shimoga concerning cost of production, total milk production, realization of prices, and efficiency in milk production and woman participation in dairy works in village areas. The present study may be regarded as relevant and justifiable since no such comparative study has been done so far. This would mean an investigation into the working of these dairy farming. It throws light on the actual role played by the individuals and dairy farmers in solving the family problems and their influence on the raise of family income. It also helps in correcting the gender bias and empowers women in dairy works. The dairy farming definitely increases family income as well as the national income of the Nation. Thus dairying is very essential to the growth of the nation.

The Study Area – A Brief Profile

Shimoga district of Karnataka state lies between 13° 27' to 14° 39' north latitude and 74° 37' to 75° 52' east longitude. Shimoga district has a geographical
area of 8465 square kilometers. Its surrounding districts are Northcanara, Haveri, Davanagere, Chickmagalure and Udupi. In the Shimoga District there are 7 Taluks namely Shimoga, Soraba, Sagara, Shikaripura, Bhadravathi, Hosanagara and Thirthahalli. Rivers of Shimoga district are Tunga Bhadra, Kumadvathi, Sharavathi and Varada. Govardhanagiri, Kodachadri and Devakonda are famous hills of Shimoga district.

Total population of Shimoga district stood at 16.40 lakhs as per the 2001 census and the density of population is 193 persons per square kilometers. The average rainfall is 1813 mm. The average literacy of Shimoga district is 74.86 per cent. A place called Agumbe in Shimoga District receives the highest rainfall and is therefore aptly called the chirapunji of Karnataka. Some of the important spots in the district are Kodachadri hills, Gudvi bird sanctuary, Bhadra and Tunga dams. Bhadravathi Iron and Steel Factory, Mysore Paper Mills in Bhadravathi, Kavaladurga are some of historical and architectural value.

Areca nut and coconut are the two major plantation crops, Paddy, Jowar, Ragi and Sugar cane being the other major crops of the district. Banana, Watermelon, Jack fruit, Chicku, Cashew are the major fruit crops of the district. Tomato, Beans, Cauliflower, Cucumber, Brinjal and Ladyfinger etc., are the important vegetable crops of the district besides some flower crops also famous in the district.

The rationale behind the selecting Shimoga district for taking up a research study is based on the following reasons.

1. Micro investigation of the economics of dairying industry setup in the district help us not only to access their working but also explore the possibilities of rectifying their working and short comings of the dairying.

2. The present study fulfills the gap in the field of economic aspects of dairying with reference to Shimoga district in general.
3. The study involves the milk producers and Consumer's supply of and demand for milk, dairying with animal husbandry income generation capacity of dairying in rural areas and marketing problems of dairying industry in the Shimoga district.

4. The study of economics of dairying helps to focus the problems and influence of dairying in creating employment and social life in the district.

There is a more need for such micro investigation of different regions to enable us to understand the complexities of dairying which help us in formulating national level policies and strategies for the healthy and scientific growth of dairying, so that the long awaited white revolution becomes a reality in near future.

Hypotheses

Dairying and economic development are interlinked and both sustained each other. Dairying and animal husbandry are generating employment among the rural people and providing income to them.

The following hypotheses are set for the proposed research Study.

1. Dairying helps to improve the employment level, education, and health adds extra income to house holds. It provides security to farmers in the event of crop failure due to floods and famines.

2. Dairying is very important subsidiary occupation to raise the family income along with crop production, particularly for small and medium farmers even the landless and agricultural labourers. And thereby bringing about an overall increase in farm productivity.


4. Dairy development improved the efficiency and its competitiveness.
5. Increasing participation of the number of men and women including children in the dairying industry would eventually create demand for more concentration and the issues concerning dairying industry would be brought into focus.

**Research Methodology**

The study is restricted to the district of Shimoga, which lies in the Malnad belt and has plain irrigated land.

On the basis of concentration of bovine population, Five Taluks in Shimoga district has been selected. Using the stratified sampling design samples were selected on the basis of land holdings in the Five Taluks. Multistage stratified random sampling procedure was adopted to select households in the category of marginal farmers, small farmers, medium farmers, large farmers and landless agricultural labourers.

The study used both primary and secondary data for its analysis. The required primary data has been collected directly by interviewing by adopting random sampling survey method. For this purpose questionnaire has been prepared.

The information collected from primary source was analyzed with the help of appropriate statistical tools, statements and diagrams. The secondary data has been collected from related government departments, Co-operative milk union, Banks and other Institutions of Shimoga district.

The measuring tools may be the number of dairy livestock's namely, local cows, cross breed and buffaloes. And the number of dairy enterprise possessed by house hold or dairy organizations owned by the State Government in short can be measured in quantitative terms.
Technical efficiency of milk production. Factors contributing milk output in Shimoga district, investment priorities for modernization in dairy sector in Shimoga district-data are collected from university of Agricultural Sciences, G.K.V.K Bangalore. The other literary materials were collected from Department of Dairy Economics and Business Management, Dairy Science College, Hebbal Bangalore, Veterinary Science College (KVAFSU), Shimoga, Agricultural Science College, Shimoga and AH&VS Shimoga. Each dairy farmer is interviewed directly and collected materials are processed and the various tables were prepared. The results are presented in a diagrammatic form.

The five taluks are selected exclusively for the purpose of studying Economics of Dairying, whether there is any real economic development that has been taken place in the midst of the people due to maintaining dairy milch animals. Five taluks are selected on the basis of dairy farmers and milk production. In all 150 dairy farmers were interviewed for the study. The selected taluks are

1. Bhadravathi
2. Hosanagar
3. Sagar
4. Shimoga
5. Thirthahalli

In each taluk some dairy farmers are selected and interviewed, after selecting the farmers in landless farmers, small farmers, marginal farmers and large farmers in the taluk. For this purpose the questionnaire was prepared. The questionnaire consists of two schedules namely the information related to the cost, benefit of the dairy farmers and the size of the herd possessed, milch animals, cow shed structure, cost of growth of young calves by the dairy owners. And second schedule includes milk sold by the dairy owners, marketing channels, loan received and repayment, cattle development schemes, dung using methods,
fertilizer sales and performance of the dairy industry, employment generation of livestock cultivation, infrastructure facilities, production problem and the problem of disposal of surplus milk. The milk yield of indigenous (Native), cross breed cow and Buffalo breed were also estimated.

Selection of Area

The study area is selected based on the population of cattle and buffaloes in this region and keeping in view the following criteria.,

a. The supervisory unit chosen must have sizeable number of cross breed cows and buffaloes.

b. It must have a milk collection centre in these Taluks.

c. It must have a primary co-operative society financing the farmers for purchase of milk animals.

d. It must be at the road point.

e. It must be in the vicinity of the Rural Cattle Development (RCD) and Shimoga Milk Urban Union Limited Machenahalli (SHIMUL).

Selection of House Holds

In this study area there are several household animals of cross breeds, murrah and local cows. Multistage stratified random sampling procedure is adopted and 150 house holds having different species of milch animals were selected. A list of milk animal owners as well as the number of and type of milch animals owned together with their land holding details prepared from the census study constituted the first stage stratum.

As the main objectives of the study are to maximize the economic performance of different species of milk animals, the owners are sub-stratified species-wise. They are rearing local buffaloes, Murrah buffaloes and cross breed cows. The house holds are further classified according to land holding viz.,
landless, small holders (0.01-2.00 hectare) medium holders (2.01-4.00 hectare) and large holders (4.01 and above hectare).

In view of the time and resource constraints only 150 house holds were interviewed by using the pre-tested questionnaire designed for the purpose of covering costs of and returns from milk production for cross breed cows, the Murrah and local buffaloes as well as for different periods from 1997 to 2010. The data were collected in three rounds in different Taluks in Shimoga district.

**Tools for Data Collection**

Since the study is a comprehensive one, the researcher has employed several field study tools. Adequate care has been taken for collecting both primary and secondary data. To give validity to the study and to make it exhaustive primary data is collected by using structured interview schedules.

Secondary data has been also collected from published literature on Dairying. It includes books, reviews, working papers articles and other related dairying documents. Research documents such as books, circulars, statistics of dairying and articles are collected for analysis from the Veterinary Science College, Agricultural Science College in Bangalore and Shimoga district. Secondary data collected from the news coverage in the columns of the news papers.

**Pilot Survey**

To test the validity and reliability of the questionnaire, a pilot survey was carried out by using the final version of the questionnaire prepared. It helped the researcher to find out whether the language used was simple, appropriate and was easily understood by those for whom it was prepared and to establish the
reliability. On the basis of the insight from the pilot survey necessary modifications were made in the questionnaire.

**Field Work**

The major field work has been undertaken as a continuous process till the completion of work for collecting the relevant basic materials and field data. The study has virtually covered field work and sources collected from 1997 to 2010. As mentioned earlier four categories of respondents were considered for preparing the questionnaire and conducting interviews. The researcher has adopted non-participant observation technique to supplement the data collected through the questionnaire. The collected data has been tabulated manually as well as by using computers. Analysis of information has been undertaken by using percentage and verbal description.

**Data Base**

Trends have been collected in bovine population in Five Taluks in Shimoga district. The data are collected from the report on integrated sample survey for estimation of production of milk for the year 1997 to 2010. Again reports have been gathered from government of Karnataka, Bangalore and 17th, 18th census of Animal Husbandry and Dairy Sciences, University of Agricultural Sciences GKVK, Bangalore and Animal Husbandry and Dairy Sciences of Shimoga and Milk Production details by the Shimoga Co-operative Milk Union Ltd., Machenahalli, Shimoga, some statistics from the Statistical Department Shimoga.

**Policy Implication**

The micro investigation of economics of dairying helps us to understand the problems of dairying and suggest appropriate measures to strengthen this sector so that the farmers of rural India can adopt strategies to withstand the
international competition. It is also very important source of income to the farming community particularly when the prices of crops fluctuating rapidly. To have a better insight into the dairying development the in-depth study in a specific context attracts greater attention.

Limitations

This research design faces certain constraints. Non availability of data from the dairy owners, in certain areas and inapplicability of sophisticated tools owing to the busy pre-occupation of the staff in some research centers and other practical difficulties encountered by other researcher are notable and unavoidable.

Chapterisation

Chapter-1

The First chapter covers the introduction of dairying, meaning of milk and its growth in India and Karnataka, and the setting up of the problem statement of research problem, prospects for development, Dairy development in India with retrospect and prospects. Pre-independence period of dairy development in India, the period from 1947 to 1970, the Operation Flood Program era, the genesis of operation flood, the three phases of operation flood, the major achievements of operation flood, impact of operation flood on milk production details in India till 2010. This chapter has covered the hypotheses, methodology, selection of area, selection house hold, tools for data collection, the pilot survey, field work, data based technique used in research studies, statistical tools, policy implication limitation and chapterisation.

Chapter-2

The Second chapter contains the review of literature of earlier studies on dairying in India, Karnataka. This chapter also covers the different author's views
on dairying and dairy development on related issues. This is also covered the survey of related issues and it is modified on the basis of group structure. The review of literature is grouped on the basis of importance of dairying, on employment opportunities, milk consumption, disease related to livestock population, types of breeding, costs and returns of dairying, total fertilizer production, Gobar gas energy, Operation Flood Programme in India, men and women involvement in dairy farming have been covered in this review of literature chapter.

Chapter-3

The Third chapter consists of a profile of India, Karnataka and selected taluks of Shimoga district. It covers an outline of dairy farming in India and livestock production process. Need for milk production, present availability and targets of milk production in India. This chapter has also covered the scope for milk production to small and marginal farmers and agricultural labours, income contribution from dairy farming origin of Anand milk scheme, Dairy farming in Karnataka state livestock population and dairy industry challenges, livestock population in Karnataka. This chapter has covered the housing of cows and buffaloes in different taluks of Shimoga district, physical characteristics of bovine population of all taluks in Shimoga district, selling price of livestock in five taluks in Shimoga district. This chapter has covered milk and its nutritive values, cow dung using method, its preparation system. Disbursement of loan, repayment period, security, insurance, assistance from Government, Technical assistance, mortality of livestock's, cart using method in dairying are discussed in this chapter.

Chapter-4

The Fourth chapter explains the cows and Buffaloes milk production in different taluks of Shimoga district. This chapter is covered with the milk
production and home consumption status of the dairy enterprises among the dairy farmers. Taluk-wise profiles of milk and herd’s average milk production, return profiles of milk and herds average milk production in different taluks of Shimoga district. This chapter has also covered the dairy shed structure and value of different taluks in Shimoga district, Milk prices and milk sales to M.P.C.S, Labour utilization pattern in dairying in Shimoga district and selected five taluks in Shimoga district, Milk marketing tendency, transportation of milk to selling place in different taluks, role of women in dairy farming in different taluks, Livestock census 1997, and 2009-2010 animal husbandry livestock census report, details of cattle population in Shimoga district, milk production details by Shimul’s report. This also deals the cows and buffalo’s hides, hoofs and bones of cows and buffaloes in different Taluks in Shimoga district. Tables and diagrams have supported the topics.

Chapter-5

The Fifth chapter contains the cost and returns of dairy, milk yield among different breeds total milk production, global competitiveness of dairy farming and demand for and supply of milk in different taluks in Shimoga district. This chapter covers the methods of evaluation of costs, cost and returns of dairy enterprise in Shimoga district. This chapter covers the current and future supply of and demand for milk production in all taluks of Shimoga district and total human population and present and future demand for milk in all taluks of Shimoga district. The chapter contains tables and diagrams for all the concepts of dairying for this district.

Chapter-6

The Sixth chapter explains milk production technology. This chapter also covers the milk production technology, cost of production, concentrates, Dry fodder, veterinary expenses, depreciation cost of dairy animals and buildings,
returns from dairy farming, gross revenue, net return and selection of processes, objective function, and fundamental assumptions. This chapter covers the labour, livestock, consumption, demand estimation and forecasting supply prospects of milk in selected taluks in Shimoga district and the estimation of capital requirement using the asset gap approach. It also explains the milk days and dry days of different category of dairy animals in selected five taluks of Shimoga district, age at first calving of herd’s in selected five taluks of Shimoga district.

Chapter-7

The Seventh Chapter discusses on the policy implication and conclusion, the Chapter covers some suggestions for the young calf protection. The author has stressed the summary rules for milking, findings and suggestions for economics of dairying in selected taluks of Shimoga district. This also offers some suggestions as remedial measures which overcome the shortcomings in research study in Shimoga district.
References

