India is a country of villages. Almost 70 per cent of Indians live in villages and majority of them are engaged in agriculture and allied activities. Indian agriculture today is characterised by decreasing farm size, increasing number of operational holdings, higher degree of fragmentation and declining contribution of agriculture to Gross Domestic Product (GDP). The Green Revolution in the early 70s was a milestone in the history of Indian agriculture, due to which India could produce surplus food grains. Punjab, Haryana, Uttar Pradesh and Rajasthan have greatly benefited by the Green Revolution. The fruits of the green revolution have been confined to certain regions. The crop cultivation as a whole is subjected to a high degree of risk and uncertainty providing only seasonal, irregular and uncertain income to a farmer. Highly variable income levels from agricultural enterprise place him entirely under the mercy of nature. With a view to mitigate the uncertainties of income from agricultural enterprise in the production
programme and to provide a regular and evenly distributed income throughout the year, supplementary enterprise has to be pursued.

Dairying, one of the expanding branches came out of the Green Revolution. It is an agro-based industry, expanding fastest throughout the world. A decade ago only 5 per cent of the milk produce came into the dairies, whereas today, it is 10 per cent and it is increasing. Recent reports by the Ministry of Agriculture reveal that the Dairy industry has the potential to offer about 4.2 crore jobs per year. The demand for milk products would increase as a result of increase in national GDP. In order to meet the demand, it is essential to have consistent increase in milk production, which will be possible on successful implementation of “Operation Flood” and evolution or new animal breed.¹

The National Commission on Agriculture (1971) has stressed the importance of dairy enterprise in the following words: “Dairy enterprise, next to agriculture, not only provides continuous income and improves dietary standards of family members but also supplements the income and reduces underemployment of a large number of the rural poor”.²

India has become the largest producer of milk in the world with an annual yield of 74 million tonnes. This is mainly due to successful implementation of operation 'flood project'. Milk and its products constitute about two thirds of the value of total output of the livestock sector, estimated at Rs.1,11,372 crore (at 1997-98 prices). It is also the single largest contributor in the agriculture sector to the national GDP.³

The dairy-sector generating a revenue of about 68000 crores, accounts for about 8 per cent of the Gross Domestic Product (GDP) and 25 per cent of the agricultural GDP. Interestingly, over the years, the share of animal husbandry in GDP is rising, while, that of agriculture is on the decline. This amply endorses the growing importance of dairying in Indian economy.⁴

### 1.2 IMPORTANCE OF DAIRYING


The importance of dairying lies not only in production of milk, but in its capacity to bring about significant changes in the socio-economic structure of rural economy. Its role in employment-generation is well-recognised. It has provided numerous small/marginal farmers and agricultural labourers with supplementary employment and a regular source of income. Dairying and its related activities create jobs equivalent to 25 million a year. The significant role played by co-operatives in stimulation of dairying has also proved to be an important source of progress.5

1.3 HISTORY OF DAIRY DEVELOPMENT

The history of dairy development movement in India is of recent origin. During the pre-independence period this movement was limited to a few pockets of Calcutta, Madras, Bangalore and Gujarat. The most notable of this venture was Anand Co-operative Milk Producers Union Limited (AMUL) of Kaira District, Gujarat. But after independence, Indian government took great initiative in setting up new dairy co-operatives in every corner of the country. The National Dairy Development Board (NDDB) was set up in 1965 to make the ambitious

project a success. Besides, the operation flood project was taken up in 1970 to balance the demand and supply of milk throughout the country and to help the rural people in making additional income by replicating the ‘ANAND’ pattern.\textsuperscript{6}

1.3.1 Anand Milk Union Limited (AMUL)

The Aarey Milk Colony was established in 1945 by the Bombay Government under Greater Bombay Milk Scheme. During 1946, the first farmers’ integrated dairy co-operative was established in Kaira District at Anand which later came to be known as Anand Milk Union Limited (AMUL). Thus after Independence, both Amul and Greater Bombay Milk Scheme set a faster pace of dairy development with emphasis on developing techniques of processing and marketing under Indian conditions.

The growing demand for milk in Bombay provided the stimulus for the milk products in Kaira District to increase production and the Kaira District Co-operative Milk Producers Union, popularly known as ‘AMUL’ came into being.

Starting with just two milk producer societies with a daily collection of 250 litres in 1948, Amul now has a membership of 3,60,000 farmers handling about 8,50,000 litres and disbursing about Rs.100 crores annually towards the cost of milk supplied by them.

The Anand pattern is a three-tier structure consisting of the producer societies at the village level, which collect the milk from the producers twice a day and pay them. On behalf of its member unions, the federation undertakes the collective marketing of milk and milk products, besides attending to quality control. The role of the government is to supervise, guide, encourage and wherever necessary discipline the erring co-operatives. The Anand pattern thus establishes a direct link between the producers and the consumers.\(^7\)

1.3.2 National Dairy Development Board (NDDB)

The National Dairy Development Board (NDDB) was constituted under the aegis of the Ministry of Agriculture, Government of India in September 1965 under the Societies Registration Act 1860. It was setup to replicate the Anand

Pattern dairy co-operative in other parts of India in an effort to improve rural incomes by giving the farmers a price for milk based on price in the metropolitan cities. Its Board of Directors including Chairman are nominated by the President of India. The secretary of NDDB is the Chief Executive of the organisation who is supported by professionals to carry out the Board’s activities. It promotes project of general public utility as well as international liaison with other National Dairy Board and international agencies to facilitate the exchange of information for conducting research in the field of dairying and animal husbandry. The package of services which the NDDB offers helps in the creation of viable Co-operative Farmers’ Organisations with facilities for procuring, processing and marketing of milk and milk products. The NDDB’s approach towards the modernisation of dairying has been well-accepted under India’s various five-year-plans and the World Bank-aided projects in India and abroad.\(^8\)

The Indian dairy industry is thus on the threshold of a new era of quantum jump in milk production, which would totally transform the dairy scenario to the rural masses in terms of higher income, improved amenities and better living.

The establishment of a co-operative structure, which ensures a guaranteed market for the producer, acts as an incentive for higher milk production and

eliminates intermediaries in the milk trade. Being well-organised, the milk producers are able to bargain for a higher price in line with increasing cost of production. But the State Governments in their anxiety to protect consumer interests, act as a check against steep increases in price.

1.3.3 Perspective Plan - 2010

NDDB’s perspective plan 2010, developed in consultation with the 126 identified co-operative milk unions, covering four thrust areas – strengthening the co-operative business, enhancing productivity, managing quality and building a national information network – aims to professionalise the working of dairy co-operatives in the emerging liberalised business environment. As on March 2004, under Phase I, NDDB approved the plans of co-operative milk unions with an investment outlay of Rs.883 crore. Out of this, NDDB has already released Rs.328 crore to these unions for various perspective plan activities.  

1.3.4 Kurien’s Vision

This is where the NDDB thanks the initiatives of its Chairman Dr.V. Kurien, who made the much needed interventions and successfully conceptualised, designed, organised and implemented “Operation Flood” ensuring a remunerative market outlet to milk producers round the year through the organisation of Anand Pattern Milk Producer’s Co-operative and providing regular supplies of milk to urban consumers at reasonable price. The experience of ‘Operation Flood’ reveals that technological inputs in isolation, cannot increase milk production, unless there is assurance of year-round market of milk at a remunerative price.  

1.4 OPERATION FLOOD' PROGRAMME IN INDIA

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The performance of the Indian milk sector during Operation Flood Programme covers operation flood phase I, II and III. The dairy co-operative sector during Operation Flood (OF) has played a major role in increasing the milk production as a single largest farm commodity in terms of value. The state-wise milk production is analysed by an exponential function to reveal its compound growth rate over various operation flood phases in the country. A significant positive compound growth rate was observed in major Indian States. The milk utilisation pattern had also switched, set over the period. In a nutshell, operation flood covered nearly 7.51 per cent of rural people in the country and had provided them with income-generating opportunities for their subsistence.

Next to crop husbandry, the most likely programme for extensive support has been animal husbandry, particularly dairying sector, which has got the largest employment potential in India since time immemorial. The dairying sector has passed through an exciting stage of development and is becoming increasingly important owing to the enormous growth in milk production in the past two decades. It has brought about remarkable changes in the perspective of milk production that now focuses on the integrated approach of Operation Flood (OF) and its networking of milk, from producer to consumer.

The Indian farmers (landless and marginal are around 70 per cent of total dairy farmers) carry out dairying as an agricultural enterprise primarily through small individual units having one to two milch animals. These farmers are scattered over rural areas and they lack milk marketing infra-structure at the village level. Generally, they sell their surplus milk to the private milk vendors at a low price with an irregularity in milk marketing. To provide competitive milk price and regular milk marketing arrangement, Operation Flood (OF) programme, the most significant rural development project, was drawn up by the National Dairy Development Board (NDDB), in 1970 to replicate the Anand Pattern of dairy development in other parts of the country—with institutions owned by rural milk producers, which were sensitive to their needs and responsive to their demands. The government of India also regarded the Anand pattern as a model for dairy development due to its integrated approach in the production, procurement, processing and marketing of milk along co-operative lines.
Before 1970 various pre-operation flood dairy development programmes and policies were in operation in the country. These programmes had little impact on increase in milk production, bovine population and per capita milk availability in the country.

During 1950-51 to 1969-70, milk production increased from 17 million metric tonnes to 20.7 million metric tonnes whereas the per capita milk availability decreased from 132 gm per day to 107 gm per day. The average growth in bovine population also recorded a poor increase in the country during pre 'operation flood' period. This was the state of affairs in India’s dairy development programme christened as 'operation flood', which marked that beginning of a new era in the history of dairy development in the country.

1.5 THE BIRTH OF INDIAN DAIRY CORPORATION

The Indian Dairy Corporation (IDC) was set up under Company’s Act on 13th February 1970. It is a Government of India undertaking. The immediate need to set up Indian Dairy Corporation was to handle the commercial and Financial Transaction of “India-World Food Programme (WFP) project-618”, popularly known as ‘Operation Flood’. This has become mainly a financing-cum-promotional agency of the Central Government.

The white revolution aims at massive dairy development on a co-operative basis. Impressed by the economic transformation it had brought about in the life styles of the Gujarat farmers, it was decided that the ‘Amul’ (Anand Pattern) should be replicated nationally.
1.6 OPERATION FLOOD – PHASES I, II AND III

Since the inception of Operation Flood programme in the country in 1970, it has completed three phases known as Operation Flood phase – I, Operation Flood phase – II and Operation Flood phase – III.

Operation Flood phase – I was originally designed to be implemented over a period of five years. It was launched on July 1, 1970, but it was extended till March 31, 1981 in over 10 states. Operation Flood phase – II was launched on October 2, 1979 while operation Flood phase – I was still underway and concluded on March 31, 1985. Operation Flood Phase – II covered 22 States/Union Territories. Operation Flood phase –III was started on April 1, 1985 to consolidate the extensive milk procurement, processing and marketing the infra-structure created under Operation Flood – I and Operation Flood – II in 23 States/Union Territories and finally completed in March 31, 1996.

The Operation Flood – I project had an initial outlay of Rs.95.4 crores which was later increased to Rs.116.40 crores. The Operation Flood – II programme had
an outlay of Rs.458.5 crores, whereas it was 1303.1 crores during Operation Flood – III programme.

By the end of phase – III, 72.5 thousand village level Dairy Co-operative Societies (DCSs) had been established in 170 milk sheds covering 267 districts in 23 States/Union Territories of India from where milk was collected twice a day. Nearly 92.6 lakh farmer members supply about 10.99 million kg milk per day which is processed by 370 liquid milk processing plants and product factories under the organised sector in India. The average liquid milk marketed through milk co-operative by the end of Operation flood phase – I was 27.9 lakh litres per day, which increased to the level of 100.2 lakh litres per day by the end of Operation flood phase – III.

The growth in annual milk procurement, average liquid marketed and liquid milk converted into milk products under Operation Flood programme extended the organised marketing of milk to cover 500 towns which involved the development of procurement, processing and transportation facilities in the milk sheds. The basic infra-structure of milk processing capacity had increased substantially in the country over the various Operation Flood phases. Similarly
trends were also observed for technical inputs like a number of Artificial Insemination (AI) Centres, and cattle feed capacity.

A recent world Bank audit shows that of the Rs.200 crores it invested in operation Flood II, the net return into the rural economy has been a whopping Rs.24,000 crores per year over a period of ten years, or a total of Rs.2,40,000 crores in all. No other major development programme has matched this input-output ratio. Operation Flood, launched in 1970, has been instrumental in helping the farmers mould their own development, thus helping milk reach consumers in 700 towns and cities through a Nationalo Milk Grid. It also helped eradicate the need for middlemen, thereby reducing the seasonal price variations. As a result of the cooperative structure the whole exercise of production and distribution of milk and milk products has become economically viable for farmers to undertake on their own. In this manner the farmer himself can enjoy the fruits of his own labour.\textsuperscript{11}

1.6.1 State-Wise Growth of Milk Production Under Operation Flood

State-wise growth performance in milk production during Operation Flood phase – I depicted a maximum significant growth in milk production in Himachal

\textsuperscript{11}\texttt{http://www.indiadairy.com}
Pradesh with a compound growth rate of 22.28 per cent per annum followed by Assam and Kerala, whereas a minimum non-significant growth rate of 0.21 per cent per annum was obtained in Uttar Pradesh followed by Gujarat and Maharashtra. The growth in milk production during Operation Flood Phase – II had been 10.93 per cent per annum in Tamil Nadu whereas it was 1.49 per cent per annum in Andhra Pradesh. The growth of milk production during operation flood phase – III showed that maximum significant growth was obtained in Nagaland (35.97 per cent per annum) followed by Maharashtra and Harayana and minimum significant growth was noticed in Meghalaya with a compound growth rate of 1.18 per cent per annum followed by Andhra Pradesh and Rajasthan.12

1.7 WORLD SCENARIO OF DAIRYING

There has been a long-term orientation for world milk production. This trend has been interrupted during the past years, mainly due to the decline in milk production in central Europe and the countries that made up the former Soviet Union, notably Russia. These reductions may be attributed to the disruption caused by the economic changes, which followed the political changes of 1989.

12Virendra P. Singh., “Milk Production during Operation Flood Programme in India”, Agricultural Situation in India, February, 2000, pp.669-675.
An important influence was the removal or reduction of subsidies, which had insulated consumers from the relatively high costs of production under communist systems. It is reasonable to estimate that the long-term growth trend will re-assert itself. American countries represent a bit more than one-fourth of the 455 million tonnes of cow’s milk produced in the world. This share has been slowly increasing over the last few years, showing considerable expansion in all major countries except Canada. With its long standing production quota programme, Canada’s experience parallels that of a European union. Overall, the world milk production has increased from 451 million tonnes in 1993 to 470 million tonnes in the year 2000.

In terms of share of world trade, the European Union exports have declined by 3.3 million tonnes of milk equivalent, bringing its share down from some 48 per cent in 1993 close to 30 per cent by the year 2000. This reduction is greater than that directly caused by General Agreement on Tariffs and Trade (GATT).

The product mix of world trade is likely to shift further towards cheese. This has a long-term pattern in the more developed markets. As these markets
opened, consumption trends associated with these markets will have an increasing influence on world trade.

Market shares within product group are likely to alter significantly under the influence of the Uruguay round. This is because the restraints on subsidised exports are linked to the historic base of 1989-90. Thus the European Union, in particular, will experience the greatest restraint in relation to its exports of product, which have been increasing, such as cheese and whole milk powder. Equally, it will be less subject to limitation in products like butter and to some extent skimmed milk powder. Because of these constraints, there are likely to be major shifts in the pattern of production of the other dairy exporting countries. In the cheese sector, for instance, the combination of an increase of 1,00,000 tonnes in European Union imports and a reduction of 1,50,000 tonnes in European Union exports means that exports of cheese by other producers are likely to rise for these reasons alone by at least 2,50,000 tonnes over the 6 year period to the year 2000.

The South – East Asian Region, as well as the Middle East and the more wealthy countries in Africa and South America will become more and more the
subject of competition between the countries of Europe, New Zealand, Australia and probably the United States. As the standard of living in the importing countries rises, the exporting countries will increasingly concentrate on whole milk powder and cheese at the expense of butter and skimmed milk powder. Nevertheless, a considerable export market will remain for skimmed milk powder in the recombining sector.

Besides this growth in import demand due to a probable shift in food consumption pattern, which is hard to quantify, most dairies importing countries will experience growth and population growth. This growth is calculated to be over 30 per cent in the 13 most important non-western dairy importing countries.

There is vast potential for the export of dairy products, as the cost of milk production in India is the lowest. In India, dairy industry is not getting subsidy while European dairy farmers are getting 40-60 per cent subsidy. The General Agreement on Tariffs and Trade (GATT) has further given boost to dairy industry, as India has a comparative cost advantage concerning milk production. We have to pay more and more attention to quality milk production. At present, India is exporting malted milk food, ghee, butter and cheese to countries, like
Bangladesh, U.A.E., Nepal, Sri Lanka, Oman and Bahrain, worth about Rs.81 crores.¹³

1.8 DAIRYING IN INDIA

Dairy development in India has been acclaimed world wide as one of modern India’s most accomplished developmental programmes. The States like Gujarat, Maharashtra, Uttar Pradesh, Haryana, Rajasthan, Andhra Pradesh, Karnataka and Tamil Nadu are surplus in milk production. The consumption pattern indicates that 45 per cent of milk is consumed in liquid form, while butter milk/separated milk (butter and ghee) constitutes 34 per cent. The balance is in the form of milk powder, ice creams, cheese and other products.

Indian dairying is emerging as a sunrise industry. India represents one of the world’s largest and fastest growing markets for milk and milk products, due to the increasing disposable incomes among the 250 million strong middle class.

The world dairy is zooming on India for its rapidly growing markets that promise the ‘moon’. The changing international dairy trade pattern, following General Agreement on Tariffs and Trade (GATT) and the emergence of the World Trade Organisation (WTO), offer to the Indian dairy industry an opportunity to take its bow as an exporter. India’s enthusiasm to integrate with the world economy is reflected in technological upgradation, professional excellence and cost-effective approach. The average annual growth rate has increased from 1.64 per cent in 1990-95 to 5.63 per cent in 2011-12. Table 1.1 shows the average annual growth rate.

**TABLE 1.1**

**AVERAGE ANNUAL GROWTH RATES**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Year</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1990-1995</td>
<td>1.64</td>
</tr>
<tr>
<td>2.</td>
<td>1995-2000</td>
<td>1.15</td>
</tr>
<tr>
<td>3.</td>
<td>2000-2005</td>
<td>4.51</td>
</tr>
<tr>
<td>4.</td>
<td>2005-2010</td>
<td>5.68</td>
</tr>
<tr>
<td>5.</td>
<td>2010-2011</td>
<td>4.90</td>
</tr>
<tr>
<td>6.</td>
<td>2011-2012</td>
<td>5.63</td>
</tr>
</tbody>
</table>

Source: Dairy India 2013, p.155.
Two main reasons for the world focus on India are the low-cost economy; and the liberalisation process initiated in 1991. Other important factors include low inflation rate; inexpensive labour; the presence of the world’s third largest pool of technical manpower; the world’s largest democracy; an independent judiciary well established, lack of government interference; and ease in communication due to the widespread use of English among the educated and the professional class.  

In India, dairying occupies a prominent place in rural life and provides not only a subsidiary occupation and better nutritional standards, but also a source of organic manure and draught power. Though the contribution of overall agriculture to the Gross Domestic Product (GDP) of the country has declined during the last decade, the contribution of livestock sector to the Gross domestic Product has improved from about 6 to 8.5 per cent. It is also pertinent to note that milk is the single largest contributor in the agriculture sector to the National Gross Domestic Product. The growth of dairying in India with the total milk production of 74.3 million tonnes and per capita milk availability of 214 gm/day has been a commendable achievement and well recognised. The Indian dairy sector is vibrant

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with an exciting future and the world dairy industry is also zooming on India for its rapidly growing markets. \textsuperscript{15}

The importance of dairy in the Indian economy can be gauged from the fact that milk is the single largest item, which is estimated to fetch Rs.450 billion, way ahead of rice and wheat. The estimated value of the milch animals alone is around Rs.35 billion. Dairy animals also contribute to hides/skin and dung valued at Rs.60 billion.

The dairy sector provides additional income and generates job opportunities for 20 million farmer families. More than 70 per cent of marginal farmers and landless labourers maintain dairy animals to supplement their income. Women contribute 71 per cent of the labour force to dairy as compared to their share of 33 per cent in crop farming.

1.9 TREND OF MILK PRODUCTION IN INDIA

The annual output of dairy industry is Rs.105000 crores. Production of milk rose from 20.7 million tonnes during the year 2004-05 to 74.3 million tonnes during the year 2011-12. \textsuperscript{16}

Despite the increase in population and demand for more milk in India, the co-operatives, corporate bodies and local vendors are able to achieve tremendous output, with no fluctuations in milk production. A steady growth in milk production is found during the period 2004-05 to 2011-12.

The independent variable explained about 99 per cent and 96 per cent of variations in the production of milk in India before and after liberalisation respectively. Before and after liberalization the trend model is statistically significant at five per cent level.

It is explained that before liberalisation, the production of milk increased by 2.89 million tonnes per year, whereas after liberalisation, the production of milk increased by 2.20 million tonnes per year. Since, the $\beta$ co-efficient is positive before and after liberalisation, there is a decelerating compound growth rate in the production of milk in India from 1999-2000 to 2011-12.

The following Table 1.2 shows year-wise estimated production of milk in India and percentage contribution of Tamil Nadu.

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TABLE 1.2

YEAR-WISE ESTIMATED PRODUCTION OF MILK IN INDIA AND PERCENTAGE CONTRIBUTION OF TAMIL NADU
(In Million tonnes)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Year</th>
<th>All India</th>
<th>Tamil Nadu</th>
<th>Percentage Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1999-2000</td>
<td>31.60</td>
<td>1.74</td>
<td>5.51</td>
</tr>
<tr>
<td>2.</td>
<td>2000-2001</td>
<td>44.00</td>
<td>3.12</td>
<td>7.09</td>
</tr>
<tr>
<td>3.</td>
<td>2001-2002</td>
<td>53.90</td>
<td>3.37</td>
<td>6.25</td>
</tr>
<tr>
<td>4.</td>
<td>2002-2003</td>
<td>66.20</td>
<td>3.79</td>
<td>5.73</td>
</tr>
<tr>
<td>5.</td>
<td>2003-2004</td>
<td>69.10</td>
<td>3.97</td>
<td>5.75</td>
</tr>
<tr>
<td>6.</td>
<td>2004-2005</td>
<td>72.10</td>
<td>4.06</td>
<td>5.63</td>
</tr>
<tr>
<td>7.</td>
<td>2005-2006</td>
<td>75.40</td>
<td>4.27</td>
<td>5.66</td>
</tr>
<tr>
<td>8.</td>
<td>2006-2007</td>
<td>78.30</td>
<td>4.57</td>
<td>5.84</td>
</tr>
<tr>
<td>9.</td>
<td>2007-2008</td>
<td>80.60</td>
<td>4.90</td>
<td>6.08</td>
</tr>
<tr>
<td>10.</td>
<td>2008-2009</td>
<td>84.40</td>
<td>4.99</td>
<td>5.91</td>
</tr>
<tr>
<td>11.</td>
<td>2009-2010</td>
<td>86.20</td>
<td>4.62</td>
<td>5.36</td>
</tr>
<tr>
<td>12.</td>
<td>2010-2011</td>
<td>88.10</td>
<td>4.75</td>
<td>5.39</td>
</tr>
<tr>
<td>13.</td>
<td>2011-2012</td>
<td>91.00</td>
<td>4.90</td>
<td>5.38</td>
</tr>
</tbody>
</table>
The dairy farmers are not only benefited by marketing of milk and milk products, but also through the harnessing of the increasing livestock wealth and a range of animal by-products. The dairy activity is an integral part being an adjunct to agriculture, and efforts are being made to promote dairying as an industry through co-operative and private enterprises. It has been observed that despite a decrease in the share of agriculture in GDP, the value of output from livestock has shown an increasing trend, at present contributing around 24 per cent of the GDP in the agricultural sector. The progress of the dairy sector has been impressive by any yardstick.

Though the dairy industry has been a traditional household occupation in rural areas, it could not be made a viable commercial business unit for long, the main reason being that it was unorganised. The success of the AMUL pattern of co-operative dairy set-up and its replication in many states in the country during operation flood I and II, has increased people’s participation in the collection of milk through co-operatives and it has registered over 85 per cent of the total milk collection in the organised sector of the country.

The number of milk co-operatives during 1990 was 58830 which have now increased to about 70000 societies and from 62.5 lakh members to 90 lakh
members spread across the country. The co-operative dairies enjoyed governmental patronage for a long time which prevented private enterprises from establishing dairy units in competition to the co-operatives. However, de-licensing of this sector, enforced in 1991, paved the way for private dairies to penetrate the market for milk and milk products, which was hitherto in the co-operative-fold. The free entry and exit mechanisms have resulted in the growth of large number of small dairies in major cities in the country.\textsuperscript{17}

In the face of competition from Multinational Companies (MNCs) and the private sector, India’s dairy co-operatives achieved new records in milk procurement and marketing. Milk procurement showed an increase of 5 per cent in 1998, surpassed only by a 7 per cent increase in liquid milk marketed. During the year 1999, Indian milk products like butter, ghee, ‘Shrikhand’ and ‘Gulabjamuns’ (a sweet dish) were exported to the United States, New Zealand, Singapore, Thailand and West Asia.

The National Dairy Development Board (NDDB) which made a profit of Rs.75 crores in 1998-99, has set out to raise milk procurement by co-operatives to 33 per cent of the marketable surplus that is 488 lakhs kg. per day by 2010 and the liquid milk sales to 365 lakhs kg per day, from the present level of 75 lakhs kg per

day. NDDB co-operatives cover 80 per cent of the marketable farmers in Operation Flood (OF) programme.

Mother dairy is a wholly owned subsidiary of the National Dairy Development Board (NDDB). Other cooperatives under the NDDB umbrella include brands such as

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amul</td>
<td>Gujarat</td>
</tr>
<tr>
<td>Vijaya</td>
<td>Andhra Pradesh</td>
</tr>
<tr>
<td>Aavin</td>
<td>Tamil Nadu</td>
</tr>
<tr>
<td>Verka</td>
<td>Punjab</td>
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<tr>
<td>Vita</td>
<td>Haryana</td>
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<td>Parag</td>
<td>Uttar Pradesh</td>
</tr>
<tr>
<td>Saras</td>
<td>Rajasthan</td>
</tr>
</tbody>
</table>


1.10 EXPORT OF MILK PRODUCTS

Export of milk products from India is picking up and is gradually increasing every year. For example, in 2009-10, butter and ghee worth Rs.132.5 lakhs were exported; the figures were with Rs.225.7 lakhs in 2010-11 and Rs.456 lakhs in 2011-12. The export of dairy products was worth Rs.10 crores in 2011-12.
India exports milk and milk products mainly to Bangladesh, Netherland, Philippines, the United Arab Emirates and Sri Lanka.\textsuperscript{18}

In January 2011, the Union Government reduced the export quota for bulk exports of milk powder and infant milk food for 2010-11 to 10000 tonnes from 20000 tonnes announced earlier. The reduction was made due to apprehensions of possible milk shortage in the lean season in 2011. The export ceiling for ghee and butter at 2000 tonnes, however, was not changed. In August 2011, the Government released on export quota of 5000 tonnes of milk powder for 2011-12. Of this the export of 1250 tonnes of milk powder was reserved for units set up under the Export Promotion Capital Goods (EPCG) scheme to enable them to fulfill their export commitments. In October 2012, the government placed the exports of ghee and powder milk under Open General License (OGL). Before this, the exports were subjected to quantitative restrictions and exporters had to register the export contracts with APEDA which used to issue permission letters subject to availability of export quotas on first-come-first serve basis.\textsuperscript{19}

\textsuperscript{18} K. Rajan, \textit{op.cit.}, p.97.

This was consequent to the increase of the procurement price of milk in the past few years which made Indian prices of various dairy products un-competitive in the world markets.

India has been exporting small quantities of ghee and butter. The country at present is not able to compete with European Countries (EC) and the USA for exporting of dairy products because milk in these countries is highly subsidised with 58 and 69 per cent, respectively. Now, the GATT negotiations are for the removal of the subsidies. If India wants to capture a major chunk of this market, it will have to make efforts to ensure the quality of milk and milk products. With the reduction of subsidies, milk in the European Countries and the United States of America will be more expensive and India will have a good chance to capture the markets. This implies that there is a great scope for dairying in the country.20

1.11 DAIRY DEVELOPMENT IN TAMIL NADU

Dairy farming and agriculture have been inseparable parts of men’s life in rural Tamil Nadu. Dairying therefore, as it is the practice, generates additional income to the rural people. The cow or buffalo is fed with the low grade surplus

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by-products of the farm and about 50 per cent of the income of the village is from milk.

### 1.11.1 Origin of Milk Co-operatives in Tamil Nadu

Milk co-operative societies were organised in Tamil Nadu by the State Co-operative Department in 1920. India’s first co-operative dairy with processing and marketing facilities was established at Ayyanavaram in Madras city in 1927. This was followed by the establishment of milk co-operatives in Coimbatore, Sivagangai, Trichy, Tanjore, Ooty, Cuddalore and other parts of Tamil Nadu.

The dairy development department was established in 1958. It embarked upon a large scale dairy development activity. With aid from New Zealand and under Colombo plan, a cattle colony at Madhavaram and a dairy to process 50000 liters of milk per day were established in 1963.

Later another dairy to handle 50,000 liters of milk per day was established in Sivagangai in 1967 with the assistance from the United Nations International Children’s Emergency Fund (UNICEF). Further, a large number of chilling centres was also established and organised in the marketing of milk in Chennai and Sivagangai cities.
The commercial activities of the State Dairy Development Department (SDDD) were taken over by the Tamil Nadu Dairy Development Corporation (TNDDC) in 1972. The corporation’s activities grew in volume and in variety during these years of its operation and it became a major change agent under the Operation Flood – I (OF) programme.

According to 1977 livestock census, the cattle population was about 10.5 million of which 12 per cent were lactating cows. In addition, the state had 2.9 million buffaloes of which 30 per cent were lactating. Buffaloes formed 25 per cent of the total bovines in the country of which 15 per cent was in Tamil Nadu. The buffaloes account for nearly 66 per cent of India’s total milk production.

1.11.2 Progress under Operation Flood Programme in Tamil Nadu

The Operation Flood – I programme, which was started in July 1970. A dairy with a capacity of 2 lakh liters per day was set up at Ambattur. A feeder balancing dairy was started at Erode with two chilling centres in Sankarandampalayam and Sathyamangalam and a cattle feed plant in industrial estate in Erode was set up; A chilling centre at Ambur in North Arcot district and two chilling centres at Villupuram and Chinnasalem in South Arcot district were established; a powder plant of 10 tonnes per day was commissioned at Sivagangai
dairy and a nucleus jersey farm with imported animals has been set up at Ooty in Nilgris district to supply quality semen. A total sum of Rs.15.64 crores was sent during the period of Operation Flood – I programme.

A review of the growth of milk societies in 1976-77 shows that there were 3208 societies in Tamil Nadu, which constituted 20 per cent of the societies in India. Tamil Nadu stands second to Maharashtra in organising village milk producers’ co-operatives.

During Operation Flood – II, an additional 1,462 Anand pattern societies were organised, by enrolling an additional 1,80,390 members. The milk procurement was also increased from 3,02,500 litres to 5,22,440 litres per day. The construction of a new dairy in Salem with the capacity to handle one lakh litres per day and a new chilling centre at Thiruvannamalai were completed. Under the drought prone area programme, a new dairy of one lakh litre capacity, a powder plant with the capacity of producing 10 tonnes milk powder per day and a buffalo frozen semen station at Chithode in Erode were completed.

With the operation flood programme and International Development Agencies (IDA) aided projects in operation in Tamil Nadu, Dairy co-operatives have been developed at a much faster rate. By the end of December 1986, Tamil
Nadu had 5,626 milk producers’ co-operative societies at the village level, 16 milk producers’ unions at the district level with 28 chilling centres at the state level.

It was also envisaged under Operation Flood – III programme to increase the capacity of 9 dairies from 6.98 lakh litres per day to 16.50 lakh litres per day by commissioning two more dairies in addition to the expansion of the existing dairies. The capacity of the metro-dairies would be raised to 7.75 lakh litres per day from 4.25 lakh litres per day.\(^{21}\)

Thrust on the Operation Flood – III was to initiate policies and steps, to increase milk production and procurement to match demand and to build necessary infra-structure facilities for processing and efficient distribution network.

Three new dairies at Madras, Tiruchy and Villupuram were established with a handling capacity of four lakh litres, 1.5 lakh litres and one lakh litres per day respectively. The existing dairies were expanded in Ambattur from three lakh litres to four lakh litres per day, in Sivagangai from 1.5 lakh litres to two lakh litres per day, in Coimbatore from one lakh litres to two lakh litres per day and in Krishnagiri from one lakh litres to 1.5 lakh litres per day. New chilling centres were established in Theni, Perembalur, Karur, Namakkal and Kodaikannal.

In Tamil Nadu, co-operative dairying has also paved the way for the economic emancipation of women in the villages. Dairies are operated and managed by women themselves. In Thanneerpandal village in Periyar district the concept of ‘Micro-Dairies’ has been introduced to make dairying accessible to small and marginal farmers. The impact of dairy development in the rural economy of Tamil Nadu is great and wonderful. The dairy co-operatives are the main springs for this rural development.\textsuperscript{22}

1.11.3 Milk Production in Tamil Nadu

The milk production in Tamil Nadu has increased gradually from 6.58 lakh tonnes in 2001 to 45.74 lakh tonnes in 2011-2012. It is observed that there has been a fall in the production of milk from 35.00 lakh tonnes in 2008-09 to 33.57 lakh tonnes in 2009-10, and again increased gradually from 34.68 lakh tonnes in 2010-11 to 45.74 lakh tonnes in 2011-2012.

From the trend model, it is inferred that the independent variable explained about 77 per cent and 97 per cent of variations before and after liberalization in the production of milk in Tamil Nadu respectively. The trend model in both the cases is statistically significant at five per cent level.

It is explained that before liberalization, the production of milk in Tamil Nadu increased by 1.69 lakh tonnes per year whereas after liberalisation, the production of milk registered an upward trend of 1.44 lakh tonnes per year. The β co-efficient is positive and indicates that there is a decelerating compound growth rate in the production of milk in Tamil Nadu from 2005-06 to 2009-10.

Despite increase in milk production, state’s (Tamil Nadu's) share during 2003-04 at All India level covered around 5.9 per cent. The per capita availability of milk per day was 204 gms in 2009-10, 209 gms in 2010-11 and 210 gms in 2011-12, the increase being 2.9 per cent.\(^\text{23}\)

### 1.12 LIVESTOCK

India has a vast resource of livestock which plays a vital role in improving the socio-economic conditions of the rural masses. India ranks first in respect of cattle and buffalo, second in goats and third in sheep. India has 57 per cent of the world’s buffalo population. Animal Husbandry Sector provides large self-employment opportunities. According to National Sample Survey Organisation’s (NSSO) survey (1999-2000), the estimate of employment in animal husbandry

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\(^{23}\text{Tamil Nadu – An Economic Appraisal, 2011-12, Government of Tamil Nadu, pp.51-52.}\)
sector was 11 million in principal status and 8 million in subsidiary status, which is 5 per cent of the total working population. The contribution of livestock and fisheries sector in the total GDP during 2000-01 was 7.25 per cent.\footnote{Annual Report 2003-04, Department of Animal Husbandry & Dairying, Ministry of Agriculture, Government of India, New Delhi, p. 10.}

The concept of sacred cow is part of India’s cultural ethos since time immemorial. It stems from the many-splendoured benefits rendered by the cow to ease the burden of the poorest of the poor by providing subsistence – not just milk alone. Even when not providing milk or draught power, cattle fulfills the function of mobile, ‘thermal and chemical factories’ in the form of dung, which serves both as fuel and manure.

The available energy from animal power is estimated at around 60,000 million kilowatt hours, valued at between Rs.60,000 to Rs.1,00,000 million drawn from 70 million bullocks, 8 million buffaloes, one million horses and another million camels. To generate this amount of energy by modern industrial processes would cost three times as much. It is estimated that animal power accounts for 66 per cent of the total energy utilized in India as against only 14 per cent from other conventional sources such as coal.
The contribution of the Indian cow to the survival of the rural poor is indeed significant. No wonder, she is regarded as ‘Sacred’ and ‘Holy’.\textsuperscript{25}

Cattle rearing is believed to be among the first steps of primitive man towards civilization. Livestock has played a crucial role in the development and progress of mankind. It has provided human beings with food, energy, clothing and nutrition besides helping in transport and agricultural activities. It has also been a mute companion to humans.

Cattle-rearing has become a subsidiary vocation for many households, generating additional income. Being a pre-dominantly agricultural economy, India has the largest cattle population in the world. Their contribution to the Indian economy is quite significant. Presently, the livestock sector accounts for about 21 per cent of the value of output of the combined crops and livestock sectors which constitute agriculture. This, in turn, is about 29 per cent of the total Gross Domestic Product (GDP) of the economy.\textsuperscript{26}

Moreover, the Indian livestock sector has recorded an impressive growth in recent years. Its share in agricultural Gross Domestic Product (GDP) has risen from about 17 per cent in 1980-81 to 26 per cent in 1996-97. Economic

\textsuperscript{25}\textit{K. Rajan, op.cit.}, p.12.
liberalization is opening up opportunities for the expansion of livestock sector. Demand for livestock products is on the ascent in response to rising per capita income and changing tastes and preferences. On the supply side, outputs of different livestock have been growing at an annual rate ranging 4 to 7 per cent.27

In India, 52 per cent of the milk is produced by buffaloes, 45 per cent by cows and only 3 per cent of the milk is contributed by other species namely goat, sheep and the like. India has the largest bovine population in the world (that is 202 per cent). Operation Flood has played a wonderful role in the development of dairying. There are more than 97,000 milk co-operative societies in 264 districts as per Anand Milk Union Limited (AMUL) pattern and at present this sector grows at the rate of 6.5 per cent per annum. India’s dairying has no match in the world. The figures are simply amazing. For example 70 million farmers maintain a herd of 100 million milch animals, 57 million cows and 37 million buffaloes, fed largely on crop residues. Starting as a trickle of one or two litres per family in 5,00,000 remote villages, a unique collection system transforms this feeble flow into a stable food of 100 million litres for urban consumers every day.28


The livestock sector has an important place in the overall economy of the country. Though, during the last several decades the contribution of the overall agriculture and allied sector to the GDP of the country had declined, in view of the growth of the secondary and tertiary sectors, it is interesting to note that the contribution of livestock sector to the GDP has improved from about 6 to 9 per cent. This is largely due to a sustained annual growth rate of well-over 5 per cent in the milk production in the decade of the eighties and even a higher 7 per cent growth in the poultry. By far the most significant aspect of the growth in the livestock sector is the role played in improving the economy a lot. Livestock enterprises are important features of the rural scene both in the form of a component of integrated farming system as well as an economic vocation as such.

The growth of dairying in this country with the milk production more than trebling in the last few decades has been a commendable achievement and well recognized. Nevertheless, one would accept that we have still a long way to go to achieve the true potential that the country has a generation of meaningful technologies for the small livestock owners, the transfer of technologies to the millions of these rural folk, an efficient delivery system of the inputs and services. Several management aspects do constitute challenges which one must successfully face in the years to come. Only then can one be satisfied that this country with its
traditions will seize the opportunities to have a flourishing and prosperous dairy industry.\textsuperscript{29}

1.13 LIVESTOCK IN TAMILNADU

Dairy industry has immense potentials for the generation of gainful employment. The dairy animals can be profitably maintained by all the agricultural families. The agricultural crop residue may constitute the fodder for the dairy animals which can be supplemented by concentrates. The cattle wealth in Tamil Nadu is shown in Table 1.3 given below:

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
\textbf{TABLE 1.3} & \textbf{CATTLE WEALTH OF TAMILNADU} \\
\hline
\textsuperscript{29}K. Rajan, \textit{op.cit.}, p.26. & \\
\hline
\end{tabular}
\end{table}
<table>
<thead>
<tr>
<th>Category</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Indigenous</td>
<td>1598789</td>
<td>2402310</td>
<td>4001099</td>
</tr>
<tr>
<td>ii) Exotic &amp; Hybrid</td>
<td>992590</td>
<td>4147354</td>
<td>5139944</td>
</tr>
<tr>
<td>Total</td>
<td>2591379</td>
<td>6549664</td>
<td>9141043</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffaloes</td>
<td>268216</td>
<td>1382127</td>
<td>1650343</td>
</tr>
<tr>
<td>Total (A+B)</td>
<td>2859595</td>
<td>7931791</td>
<td>10791386</td>
</tr>
</tbody>
</table>

Source: Statistical Information 2012, Animal Husbandry Department, Tamil Nadu, p.42.

The male and female cattle population in Tamil Nadu accounts for 28,59,595 and 79,31,791 respectively. The total cattle wealth of Tamil Nadu is 1,07,91,386. The cattle population seems to be more than that of the buffaloes in Tamil Nadu in the case of both male and female population.

The total cow population was 65,49,664 whereas the total buffalo population was 13,82,127 in Tamil Nadu during the year 2012.

1.14 ISSUES RELATED TO LIBERALISATION AND DAIRYING
In 1991, as part of the economic reforms, the dairy sector was de-licensed. This effectively opened the 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’. It was also expected to spur increased inflow of capital and new technologies.

De-licensing did have the intended effect of attracting private sector investments into the dairy industry. Within a year, over 100 new dairy processing plants were established in different parts of the country, most of which were designed to manufacture a range of high value added products.

1.15 STATEMENT OF THE PROBLEM

In view of the importance of agricultural sector in the national economy and especially of the role of animal husbandry in the rural economy of India, the share for increasing the production has received quite a lot of attention through operation Flood I, II and III. India depends more on cows than buffaloes for its milk production. Though India has achieved a lot in milk production its per capita consumption is not up to the world average. The milk yield per animal is also not
upto the world standard because about 67 per cent of the animals are owned only by small and marginal farmers. Besides, there is lack of sufficient fodder, high breeding animals are not plenty and there is no proper care and management of milch animals.

Dairy farming is a subsidiary occupation in the rural sector and it provides more employment to rural masses, especially women. The profit from dairy farming is very important from the employment and national income point of view. The profit from it is based on the cost and returns of milk production.

Production is based on the type of the milch animal. Buffaloes yield more than the cow and the returns on investment are also very high because of their high yield and lactation period. The returns from the buffaloes are greater than the returns from the cows.

There are several studies relating to production and marketing of milk. But no single study could make a comparative analysis of cows and buffaloes in terms of cost and production of milk. It is necessary to study the comparative
economics of milk production of cows and buffaloes so as to increase milk production.

Hence, the present study is an attempt to analyse and compare the cost, returns and resource-use efficiency of milk production of cows and buffaloes in Sivaganga district.

1.16 OBJECTIVES OF THE STUDY

1. To analyse the cost and returns of milk production and compare it with cows and buffaloes.
2. To examine the break-even output and magnitude of profitability of cows and buffaloes.
3. To study the input-output relationship in milk production in cows and buffaloes.
4. To identify the factors which determine the yield of milk of cows and buffaloes and to examine the structural difference that exists in the milk production of cows and buffaloes.
5. To determine the marginal value productivity and examine the resource-use efficiency of different inputs used in milk production of cows and buffaloes.

6. To evaluate the marketing cost, marketing margin, price-spread and marketing efficiency of different channels of distribution of milk.

1.17 HYPOTHESES

The following hypotheses have been framed to test the above said objectives by using appropriate statistical tools.

1. Structural difference exists between cows and buffaloes.

2. The resource inputs of milk production namely green fodder, dry fodder concentrates and human labour are efficiently utilized by the households own cows and buffaloes.

1.18 LIMITATIONS

The present study was conducted through personal interviews with a pre-tested questionnaire. Though the milk producers, milk vendors and private milk
agencies did not maintain adequate records, they were able to answer the questions orally from memory. The information so collected may suffer from a certain degree of recall bias. The recall bias was minimized by cross-checking the data with the milk marketing agencies and producers who maintained records of their sales and production. This study is confined to the cows and buffaloes only. The study period is one year, that is, 2011-12. The scope of the present study is limited to the blocks on the basis of Artificial Insemination Centres available in Sivagangai district in south Tamil Nadu, India.

1.19 SCHEME OF WORK

The present study “An Economic study of Dairy Farming in Sivaganga District Tamilnadu” is divided into seven chapters.

Chapter I deals with the subject and importance of milk as diet, dairy enterprise in India, livestock population, milk production in India and Tamilnadu, statement of the problem, objectives of the study, limitations and scheme of work.

Chapter II reviews the earlier studies relating to costs, returns, resource-use efficiency and the output decomposition model.
Chapter III discusses the methodology, which includes the choice of the topic, sampling procedure, period of study, method of collection of data and tools of analysis. Further, the profile of the study area and characteristics of the sample households are also given in this chapter.

Chapter IV estimates the cost and returns structure of cows and buffaloes of dairy farming. Further, this chapter examines the break-even output of dairy farming for cows and buffaloes.

Chapter V identifies the factors influencing the milk yield and examines structural difference between cows and buffaloes and the resource-use efficiency of different factor inputs used in milk production.

Chapter VI explores the different marketing channels of milk, marketed surplus, marketing cost, marketing margin, price-spread and marketing efficiency of the channels of distribution of milk.

Chapter VII summaries the findings along with conclusion and suggestions.

CHAPTER II

REVIEW OF LITERATURE AND CONCEPTS