CHAPTER 1

Introduction

India had 289 million bovines in 1997 of which cattle accounted for 69 per cent and buffaloes the rest (GOI 2002), which constituted about one-sixth of the cattle and about one-half of the buffalo population of the world. The All-India Debt and Investment Survey (1991-92) had revealed that two-thirds of the rural households in the country owned livestock and that the average value of livestock per reporting household came to Rs 3,618 as on the 30th of June 1991 (NSS, 48th round, GOI 1998a). According to this survey, bovines, cattle and buffaloes together, accounted for 90 per cent of the livestock wealth in India. The contribution of the livestock sector to total national gross domestic product (GDP) formed 5.4 percent in 2002-03 (Economic Survey: 2004-05, GOI 2003a).

Though the contribution of agriculture and allied sectors to the GDP has been declining over time, the contribution of livestock to the gross output in the agricultural sector has been steadily on the increase accounting for about 30 per cent at present. Out of the total output originating from the livestock sector, the share of milk constitutes nearly two-thirds, as against only one-half during the early 1950's. India has now become the largest producer of milk in the world (Gupta 1997). The total milk production in India is estimated at about 91 million tonnes in 2004-05 and its per capita availability is 232 grams per day (Economic Survey: 2004-05).

It is estimated that the total annual employment in the livestock sector is about 20 million persons, approximately 11 million according to principal status and 9 million according to subsidiary status (Tenth Five Year Plan: 2000-2007). Women constitute about 70 percent of the labor force in livestock farming. As the ownership of livestock is almost evenly distributed among landless labourers and marginal and small farmers, the progress of the livestock sector implies an equitable pattern of development of the rural economy. The export earnings from the livestock and the related sectors are progressively rising. Finished leather accounted for as high as 54 per cent (Rs 2,568 crore) and meat and meat products for 36 per cent (Rs 1,694 crore) of the total export earnings from the livestock sector during 2003-04 (Economic Survey: 2004-05). In sum, the importance of livestock in the Indian economy has been progressively increasing in recent decades.
The size, composition and productivity of India's livestock population have been undergoing significant changes. Right from ancient times, cattle formed an important part of the Indian agricultural system; they were kept primarily for draught purposes and as a sure source of manure. However, in recent years, consequent on the diffusion of agro-mechanical technologies in agriculture, the importance of work animals as draught power has gradually diminished. Farmers are being provided with assistance for owning agricultural machinery including tractors, and with training on their operation, maintenance and management. (Nair 1981a, 1981b, Economic Survey: 2004-05). During the past ten years (1991-92 to 2000-01), about 2.05 million tractors and 1,17,000 power tillers were sold in the country. The contribution of Draught Animal Power (DAP) to total power availability in Indian Agriculture has been declining over the years. The contribution, which was about 60 per cent in 1971-72, is estimated at 16 per cent in 2003-04. During this period, the total power availability increased from 0.3 kw/ha to 1.4 kw/ha.

It is estimated that, at present, 22.78 per cent of the cultivated area is covered by tractors for tillage operations and 21.30 per cent for sowing operations. There has been considerable progress towards mechanisation in irrigation, harvesting and threshing operations too (Economic Survey: 2004-05). However, such rapid increase in mechanisation has made agriculture more sensitive to changes in international oil prices, since for running the machines imported oil was required. The wisdom of this type of integration of Indian agriculture with the international market through substitution of renewable resources (like animal draught power) with non-renewable sources of energy has been called into question by champions of sustainable agriculture. Recently, the National Commission on Cattle (GOI 2002) has also questioned the policy of indiscriminate promotion of mechanisation of agriculture and emphasised the need to preserve India's draught animal stock by banning slaughter of cattle.

Concerted efforts to increase milk production\(^1\) in India began during the pre-independence period. During the Second World War, attempts had been made to meet the growing urban demand for milk and to ensure its regular supply for troops. Following Independence, the need for developing the livestock sector and increasing milk production received formal and official recognition. During the Five Year Plan periods, steps were taken to increase the supply of essential inputs for cattle development, to set up creameries and milk product factories and to strengthen dairy training and research programmes. Animal husbandry and dairy development programmes were also designed and implemented as part of the poverty alleviation strategies implemented in the country. The measures initiated to develop the livestock sector are reflected in the increase in the
plan outlay on animal husbandry and dairying in the successive Five Year Plans. The total plan outlay for this sector which had been a mere Rs. 22 crore in the First Five Year Plan has increased to Rs 2500 crore in the Tenth Plan (see Appendix Table 1.1). As part of the poverty alleviation strategy, the Government of India gave priority to dairy development projects such as Small Farmers Development Agency (SFDA) and the Integrated Rural Development Programme (IRDP) as instruments for providing income and employment for the rural population.

Among the several policies and programmes implemented for improving the productivity and efficiency of India's livestock sector, the Key Village Scheme (KVS), Intensive Cattle Development Programme (ICDP) and Operation Flood (OF) projects have the pride of place. The aims, scope and coverage of these programmes have undergone significant changes over time. The Key Village Scheme introduced during the First Five Year Plan had aimed at increasing the quality of bovines by controlled breeding and by taking measures for proper feeding and disease control. Initially, its focus was on increasing the supply of breeding facilities, effective disease control measures, scientific management practices and organised marketing facilities. Towards the end of the Second Plan, there were 600 Key Village Centres in the country, covering an estimated 6 million cows and she-buffaloes. Since this scheme was not able to enhance milk supply to meet the growing urban demand and its contribution to the improvement in genetic quality and the productivity of the stock remained insignificant, a new project called the Intensive Cattle Development Project (ICDP), was started in the Third Plan. Its objectives were to provide facilities for cross-breeding of milch cattle, to supply other inputs to enhance production of milk and to link up the milk-shed areas with the urban milk market by improving marketing and processing facilities. In 1960, there were 62 ICDP units in the country. In some areas in which KVS existed, it was merged with ICDP; in all other areas KVS continued in the original form. However, since ICDP did not make any significant impact on the augmentation of milk production in the country, the Government of India formulated a new project called Operation Flood (OF) by the end of the Fourth Five Year Plan. This project was based on the experience of the Kaira District Cooperative Milk Producers' Union (KDMPU), Anand. Thus, during the late 1960s, the Government of India initiated major policy changes in the dairy sector to achieve self-sufficiency in milk production.
In the Fifth Plan, the Government of India implemented the OF project through the National Dairy Development Board (NDDB) and Indian Dairy Corporation (IDC) in selected milk sheds. The basic objective of this project was to increase milk production by (a) providing an assured market for milk to rural producers by linking rural milk sheds with urban milk markets (b) simultaneously providing facilities for cross-breeding and upgrading of milch animals and (c) ensuring supply of cattle feed and facilities for veterinary care for enhancing the productivity of milch animals. The first phase of this project (OF-I) began in 1970 and ended in March 1981. The total investment of this phase (about Rs.1165 million) was generated from the sale of milk products (1,27,517 MT Skim Milk Powder and 39,696 MT of Butter Oil) donated by the European Economic Community (EEC) through the World Food Programme. About 64 per cent of the total investment of Rs 742.2 million was used for production enhancement programmes and about 10 per cent for creating supporting infrastructure facilities like storage, long distance transport and project planning. OF-I aimed at setting up dairy co-operatives in 27 milk-sheds covering 10 states of India so as to link them with the 4 metro cities of Bombay, Calcutta, Delhi and Madras. This phase of this project resulted in the formation of 12000 village dairy co-operatives with a membership of 1.5 million farmers having 2.5 million milch animals spread over 27 milk shed areas (NDDB 1978). The second phase of the Operation Flood project (OF II) launched in 1979 covered 21 states and 4 Union Territories with a total financial outlay Rs 4855 million. A major part (49 per cent) of this investment was to be financed by dairy aid provided by the EEC and the rest by a World Bank Loan (36 per cent) and by proceeds of repayment of OF I loans (15 per cent). During this second phase, about 34500 dairy co-operative societies were organised in 136 milk sheds (NDDB:2003). The third phase (OF III) was intended to rectify the imbalances remaining after OF I and OF II and to extend the programme coverage to another 15000 villages and nearly 200 medium-sized urban centres. This phase involved a financial outlay of Rs 6806 million. An indicator of the success of Operation Flood is the amount of milk procured and supplied to consumers. The average milk procurement increased from 2.56 million kg per day during Phase I to 11 million kg per day during Phase III. At present, over 60000 dairy co-operative societies function in 173 milk-sheds involving over 6 million farmer members and marketing 7.3 million kg of milk a day in over 535 cities and towns of the country. The total milk-processing capacity has reached 14 million kg. a day and powder production capacity 654 tonne a day.
As is evident from the preceding discussion, the aims and the strategy of bovine development programmes have undergone significant changes during the past four decades. The main features of these changes in strategy indicate the following: from multi-purpose bovines to single-purpose animals, from low-yielding to high-yielding milch animals, from home-based to commercialised milk production and from an indigenous model to a western model of dairy development (Nair and Jackson 1981). Such a shift in the development strategy has had significant impact on the bovine economy of the country. These policies and programmes were implemented in an overall policy environment in which the central government follows a policy of import-substitution by restricting imports and promoting domestic production. The policy was also considered a means to create livelihood for the small and marginal farming households and the landless wage earners, with milk production taking place in millions of rural households scattered across the country. Milk-processing and product manufacturing were restricted mainly to small firms and cooperatives. High import duties, non-tariff barriers, restrictions on imports and exports, and stringent licensing provisions provided incentives to Indian-owned small enterprises and cooperatives to expand production in a protected market. Competition within the organized sector was regulated through licensing provisions, which prohibited new entrants into the milk-processing sector. Milk powder and butter oil were available in the international market at lower prices, a fact which made reconstitution of milk from these products cheaper than collection and sale of fresh milk. It was therefore necessary to restrict cheap imports with a view to promoting indigenous production.

During the early 1990s, the Government of India introduced major trade policy reforms that favoured privatization and liberalization of the economy. The dairy industry was delicensed in 1991 with a view to encouraging private sector participation and investment. However, in response to sociopolitical pressure, the government introduced the Milk and Milk Products Order (MMPO) in 1992 under the Essential Commodities Act of 1955, to regulate milk and dairy product production. The government has amended the MMPO from time to time; the major amendment was made in March 2002, by which restrictions on setting up of milk-processing and milk product manufacturing plants were removed and the concept of milk-shed abolished. This amendment is expected to facilitate the entry of large companies, as a result of which competition in the domestic markets would definitely increase. A major development in the Indian dairy sector policy came when India signed the Uruguay Round Agreement on Agriculture (URAA) in 1994 and became a member of the World Trade Organization (WTO), an action which made India open
up its dairy sector to world markets (Gulati et al. 1996, Sundaresan 2001). The import and export of dairy products was delicensed and decanalized, and free trade in dairy products was allowed with only certain inspection requirements in position. The first major step was taken in 1994-95, when the import of skinned milk powder (SMP) and butter oil was decanalized; restrictions on the remaining products were removed in April 2002. Moreover, the import tariffs on dairy products were drastically reduced after trade liberalization. Further, India had bound its import tariffs for dairy products at low levels in the Uruguay Round schedules.

There exist conflicting arguments regarding the pros and cons of the liberalization process on the dairy sector. It is argued that milk prices in India are much higher than international prices (Sharma 2000, 2002, 2004, Sharma and Sharma 2002, 2002a, Sharma and Gulati 2003, Kumar 2004, Aswathi 2004, Jha 2004); with liberalization imports are likely to increase in India. At the same time, it is noted that the low prices in the major dairy exporting countries (mostly EU, USA and Canada) are due to high export subsidies and that, if the WTO negotiations could result in the withdrawal of these subsidies, these countries would not enjoy comparative advantage over India. The country would be able therefore to compete with them in the international market (Banerjee 1996, Jha and Debroy 2000, Saxena 2000, Sirohi 2002, Sharma 2001, 2004, Kumar 2004). Whatever be the merits of such arguments, it is clear that in the emerging environment of trade liberalization, the country may not be able to compete with other countries in the international market unless there happens considerable reduction in the domestic cost of production. This requires increase in productivity and efficiency of the sector.

Viewing from the vantage point of the present state of India's livestock sector, the integration of the Indian economy to the international market through increased use of imported oil and oil based products (chemical fertilizers) as substitutes to draught animal power and dung as manure in agriculture respectively, would definitely make agriculture more vulnerable to fluctuations in international oil prices. The rapid spread in mechanization would also result in the reverse tendency that has become widespread in agriculture, thereby pushing out the rural poor from agricultural production as a source of livelihood. Of course, it could be argued that the reduction in the number of work animals would release more feed for milch animals, thereby promoting dairying. However, the question that needs to be asked is the possibility for the poor resource-starved farmers to reduce their cost of production of milk and other livestock products and reap the advantages offered by the liberalization of trade. In order to provide insights into these
questions, it is necessary to look at the changes taking place in the livestock sector and the underlying factors and processes. The present study is carried out against this background. Given the large variations in the different characteristics of the livestock sector such an analysis is best be done at the regional level.

1.2 Objectives and Scope of the Study

Analysis of the recent trends in India’s livestock sector has highlighted the fact that here exists substantial differentiation in the characteristics of the livestock sector across states/regions in the country. Some of these interesting and striking differentials may be summarized as follows.

(a) The density of work animals per hectare of net sown area has shown a mildly falling trend for the country as a whole; but in several states, especially in the states of Andhra Pradesh, Gujarat, Haryana, Kerala, Rajasthan and Tamil Nadu it has shown a secular decline. On the other hand, in some other states, it has shown a mixed pattern of mildly rising trend till the 1980s, and a mild fall thereafter. A few eastern states, namely West Bengal, Bihar and Orissa, have shown an invariably upward trend in work animal density.

(b) The cattle and buffalo sex ratios (number of males per 100 females) have been shifting in favour of females at varying rates in all the states except the states in eastern India, where they have showed an upward trend till the 1980s and remained more or less stable since then.

(c) The ratio of cows to she-buffaloes has shown an increasing trend in all the regions except the eastern region. This could be a reflection of the increased demand for milch cows. She-buffaloes are more suitable for more milk production in some parts of the northern and the southern regions.

(d) The diffusion of cross-breeding technology has been uneven across the major states. The classification of states, according to the share of crossbred cattle in the total cattle population in 1997 shows that the share remained above 60 percent in Kerala and Punjab, it varied between 30 to 40 percent in Tamil Nadu, Haryana and Jammu and Kashmir, it oscillated between 10 to 25 percent in Karnataka, Maharashtra, and Uttat Pradesh and remained at less than 10 percent in Gujarat, Madhya Pradesh, Andhra Pradesh, Rajasthan and West Bengal.
Though the production of milk has shown an increasing trend in recent decades there exist considerable regional variations in the pattern of growth. The pattern of milk consumption has also shown considerable regional variations.

The trends in the pattern of bovine holdings summarised above are a reflection of the choices that farmers have made in allocating their resources in livestock-rearing to meet the changing demand conditions for milk products and services. It has been shown in some of the earlier studies that such choices are also shaped by demographic, economic, technological and institutional factors (Raj 1969 & 1972, Vaidyanathan 1978, Vaidyanathan, Nair and Harris 1982). Since, the magnitudes and interactions among such variables differ across regions, it is important to carry out disaggregated state-wise/regional analysis of the changes in the pattern of bovine holdings and the underlying factors and processes. The objective of the present study is to undertake such an analysis for the state of Tamil Nadu. Some of the reasons that motivated us to select Tamil Nadu for the study are: (i) it is one among the four states which experienced a secular decline in the stock of work animals (Nair and Dhas 1990, Sharma 2004); (ii) the production of milk has shown a steady increase over the past four decades (Dhas 1986 & 2001, Gurumurthy 1999) and (iii) the agricultural sector has been undergoing significant changes in terms of cropping pattern, degree of intensity of mechanization, etc (Madras Institute of Development Studies 1988, Rajalakshmi 2001 Naganathan 2002, GOTN 2003, GOI 2005c).

The overall objective of this study is to analyse the evolution of the bovine sector in relation to the changes taking place in the agricultural sector in particular and in the rest of the economy in general. In specific terms, the objectives of the study are outlined as follows:

(a) To examine the determinants of the size and composition of the cattle and buffalo population. An attempt will be made in this part of the analysis to bring out the influence of agro-climatic, technological and institutional factors in shaping the bovine complex;

(b) To bring out the changes in the distribution of bovine holdings and their utilization across size groups of land holdings;

(c) To analyze the factors shaping the supply of and demand for milk; and

(d) In the light of the above analysis, to highlight the prospects of development of the livestock sector.
In the past, a few state level studies attempted to unravel changes in the size and composition of the bovine population and the underlying factors (Nair 1981a, George and Nair 1990 and Yeshwanth 1990 for Kerala; Dhas 1986 for Tamil Nadu; Harold 1987 for Karnataka; Mohan 1989, Lakshmann et al. 1994 and Subramaniam, et al. 1995 for Andhra Pradesh; Shah 1997 for Maharashtra; Kurup 2003 for Orissa; Franco and Chand 1991 and Saxena 1995 for Gujarat; Fahimuddin 1963 for Bihar; Sharma, R.K. 1981 and 2001 for Haryana; Jain 1986 for Rajasthan; Kumar et al. 2004 for Himachal Pradesh; and Sastry et al. 1993 for Pondicherry). Since most of them were confined either to one or two specific aspects of the bovine sector, they do not make a comprehensive treatment of the different factors or processes at work which shape the bovine utilization patterns. An exception is the study for Kerala (Nair 1981a) that attempted to provide a comprehensive approach to the analysis of bovine holdings. One of the major limitations of the majority of these studies is that they lacked a historical approach. Research by economic historians (see for instance Thompson 1983) of Western Europe has pointed out in clear terms, how shifts from bullocks to horses as motive power in European agriculture had taken place consequent on the shift in the pattern of farming from one-crop rotation to two-crop rotation and changes in the types of ploughs and other implements used for ploughing and other agricultural operations; the link between movement of people from rural to urban areas consequent on the Industrial Revolution and the subsequent shortage of labour, which promoted labour-saving technologies in crop production and the manner in which horses emerged as a major source of farm draught power in European agriculture in the 18th and the 19th centuries. According to Thompson, it is this predominance of horses in European agriculture, and the fact that they were also very important in fighting wars, that contributed to the development of the taboo against the slaughter of horses and the eating of horsemeat in several countries in Western Europe. Though economic historians in India analyzed the influence of cattle wealth in shaping agriculture, the question how the cattle wealth in turn was shaped by changes in agriculture and in the rest of the economy has not attracted research attention. Historical insights are useful in understanding the contemporary resource utilization patterns in the livestock sector. In our approach to the study, we shall attempt to examine changes in the bovine holdings of Tamil Nadu in the light of the historical changes as have been analyzed as a background for the period 1900-1951.

Much of the quantitative analysis of the determinants of the size, composition and productivity of the bovine holdings in our study covers the period 1970-2000. For the analytical framework of the study, we have drawn from the works of Raj (1969) and Vaidyanathan (1988). One of the
distinguishing features of their analysis is the enquiry into the different roles of bovine: as a mother machine since cows reproduce calves, as a source of intermediate goods (draught power and manure to agriculture and hides and skins for leather industry), as a producer of consumer goods since cows and she-buffaloes produce milk and also serve as a consumption good, since they are slaughtered for beef. We have attempted to look at these different roles of bovines, subject to the availability of data.

1.3 Sources of Data

Much of the historical analysis has been carried out using the data available from Indian Agricultural Statistics, Livestock Censuses, Statistical Abstracts of British India, Statistical Atlas of Madras Presidency, Season and Crop Reports of Madras Presidency and historical studies on agriculture in the Madras Presidency. The analysis for more recent periods was done by using data from Livestock Censuses, Season and Crop Reports for Tamil Nadu, Agricultural Censuses and Input Surveys, Reports of Consumption Expenditure and Landholdings Surveys published by the National Sample Survey Organisation, Integrated Sample Surveys (ISS) conducted by the Tamil Nadu Animal Husbandry Department, etc., and Farm Management Studies. A note on the sources and limitations of data on the livestock sector is given in annexure -A. Because of the long delays in the publication of official data, the study could not extend the analysis to the most recent years.

1.4 Chapter Outline

Following this introduction, chapter 2 will review the major studies that analysed the patterns and variations in bovine sex ratios in India. This will be followed by an analysis of the trends in the bovine economy of Tamil Nadu till 1951. With the help of analytical models, we shall examine the determinants of bovine sex ratios in chapter 4. Chapter 5 looks at the distributional changes in bovine holdings. The trends in milk production and the factors shaping them are examined in chapter 6. The final chapter summarizes the main findings and highlights their implications.
Figure 1.1

Map showing the per capita availability of milk in India by state: 2000-01

Statewise per capita availability of milk - gms per day in 2000-01

Data source: "Basic Animal husbandry Statistics - 2002", DAHD, GOI

Source: NDDB, Annual Report
End Notes:

1 Milk production in India increased from 17 million tons in 1950-51 to 84.6 million tons in 2001-02. The trends in milk production and per capita availability of milk in India and across states between 1991-92 and 2001-02 are presented in Appendix Tables 1.2 and 1.3. The per capita details are also portrayed in a map (Figure 1.1).

2 Production of milk in rural areas, procuring of milk through producer cooperatives and moving processed milk to urban demand centres was the crucial elements of strategy of the government’s dairy development policy. This policy initiative gave a boost to dairy development and initiated the process of establishing linkages between rural producers and urban consumers.

3 The growth of village milk producers’ cooperative and procurement under Operation Flood (1970 to 1990) is depicted in Appendix Table 1.4.

4 In order to promote domestic production, India followed an import-substitution strategy and protected the dairy sector from external markets through quantitative restrictions on imports and exports and canalization (restricting imports and exports through government or government-designated agencies).

5 The order required permission from state/central registration authorities to set up units handling more than 10,000 litres of milk per day or milk solids up to 500 tons per annum, depending on the capacity of the plant. The order included sanitary and hygienic regulations to ensure product quality. The status of registrations granted under the MMPO as of March 31, 2002, is shown in Appendix Table 1.5.