

# Carrying Capacity Study of Teesta Basin in Sikkim

*Volume-IX*

**SOCIO-ECONOMIC ENVIRONMENT**



*Commissioned by :*

**Ministry of Environment & Forests, Government of India**

*Sponsored by :*

**National Hydroelectric Power Corporation Ltd., Faridabad**



**CENTRE FOR INTER-DISCIPLINARY STUDIES OF  
MOUNTAIN & HILL ENVIRONMENT  
CISMHE UNIVERSITY OF DELHI, DELHI**

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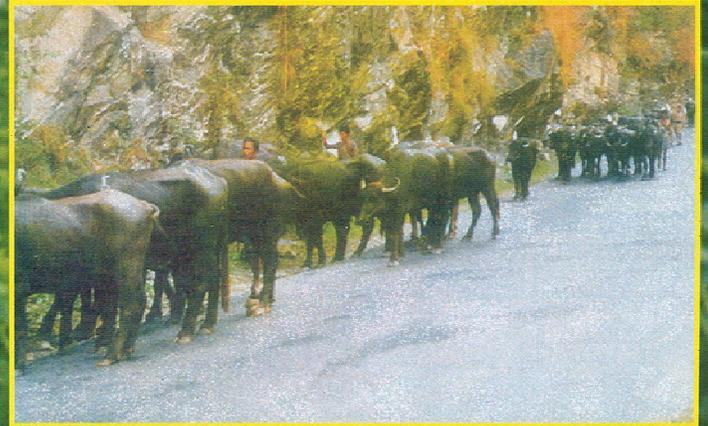
**Department of Geography and Applied Geography, University of North Bengal**

# **CARRYING CAPACITY STUDY OF TEESTA BASIN IN SIKKIM**

*Socio-economic Study in Sikkim  
with Special reference to Livestock and Allied Activities*



**Prof. M. M. Jana**  
**PRINCIPAL INVESTIGATOR**



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## **PREFACE**

Sikkim is a tiny state in Indian Territory but has abundant natural resources those are still unutilised. Vast mountains and numerous rivers are the sources of diversity and developments. There are enough potentialities in the states, which have to be tapped scientifically. So, sustainable developments are essential for the development of the state in general and the people in particular.

Agriculture and other primary activities like livestock rearing, fishing, mining etc are the main livelihood pattern of the people in the state. The study of livestock and their potentialities are most important as far as the carrying capacity study of the natural resources of the Teesta Basin is concerned. The growth rates of population during the last few decades were very high in the state compared to other hill states in India. There is a tremendous pressure of population on land and other natural resources due to this high growth of population. There are lots of changes in the life and livelihood pattern of the inhabitants of the state during the last few decades. So, it is essential to assess the existing natural resources especially livestock, which is most important subsidiary occupation of the rural inhabitants of the state. Estimation of livestock and related activities have to be need for sustainable development of the entire state.

Considering all these, the Ministry of Environment and Forest, Government of India commissioned the project entitled “Carrying Capacity Study in Teesta Basin of Sikkim” funded by National Hydroelectric Power Corporation Ltd. The project is divided in to a number of phases. In this phase, entire state has been taken into

consideration for study of livestock and related phenomena. The study is confined to socio-economic conditions of the livestock, the farmers associated of livestock rearing and nature of availability and accessibility of the fodder for the livestock in the state. Moreover, the study stressed on recent developments in the state and their impact on the socio-economic conditions of the people in general and the inhabitants of the area in particular.

The project report divided into eight chapters. In the First Chapter, Occupational Structure of the Inhabitants of Sikkim has been discussed. The Second Chapter has been dealt with the Socio-economic Conditions of the Live stock Farmers. The Third Chapter deals with distribution of livestock and fodder availability in the state. Livestock products and their marketing have been discussed in the Fourth Chapter. The Fifth Chapter is devoted to study of animal husbandry and their development. The Sixth Chapter deals with problems related to livestock rearing in the state. The Seventh Chapter deals with measures for livestock farming. The last i.e. Eighth Chapter confines itself with the conclusion and suggestions for the entire study.

Prof. M.M. Jana  
Principal Investigator

## **ACKNOWLEDGEMENT**

At first, I am deeply indebted to National Hydroelectric Power Corporation Ltd., for funding the project on “Carrying Capacity Study in Teesta Basin of Sikkim” and Ministry of Environment and Forest, Government of India, for getting the studies done. I am also indebted to the “Centre for Inter-disciplinary Studies of Mountain & Hill Environment”, University of Delhi, Delhi for coordinating the project. I am personally grateful to the project Co-ordinator and other members of the CISMHE for their constant co-operation and help to run the project.

I convey my sincere thank to the Project Assistants namely, Jahangir Alam Sarkar, Sahin Saliur Zaman, Suprotik Manta, Jayanti Biswas and Field-cum-Office Assistant, Benu Prakash Sharma, for Carrying out the fieldwork in remote areas of Sikkim in many occasions with great difficulty. They have also taken much pain for drafting and finalisation of the project report in time.

I am also grateful to our Honorable Vice-Chancellor, University of North Bengal who gave us timely advice and constant inspiration for smooth running the project. Moreover, he helped me frequently in solving many problems to run the project. I am also indebted to Head of the Department of Geography and Applied Geography, North Bengal University for his constant help and encouragement and the teachers and staffs of the Department who directly or indirectly help us to complete the project.

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Thanks are due to Officers in various Departments of Government of Sikkim, Census Office, District Hospital and other Offices located in Sikkim for furnishing data and information for preparing the project report. Many local people extended their helping hands during the fieldwork in different villages in all four districts of Sikkim.

Prof. M.M. Jana  
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Department of Geography & Applied Geography

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# **INTRODUCTION**

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# INTRODUCTION

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Study of socio-economic conditions of the inhabitants in an area or state is most important for formulation of development plans and to raise the economic conditions of the people. India is dominated by the rural population and due to backwardness, bulk of them are engaged in primary activities. Among the occupations, majority of the people are engaged in primary activities in India. Sikkim being a mountainous state, among the primary occupations, livestock rearing plays an important role in maintaining the livelihood pattern of the hill dwellers. Livestock is one of the major resources of any state and this sector is directly related to economy of the people where a large number of people are involved in livestock farming such as poultry, piggery, cattle and fisheries, thus assisting in an increase of food production and employment opportunities. So, animal husbandry sector is the main source of supplementary income for the rural households of Sikkim. Livestock production had always been an integral part of the rural livelihood in Sikkim. The livestock wealth of Sikkim still constitutes a natural resource base with immense livelihood implication (Bhasin, 1995). The state Government and Department of A.H. & V.S are responsible for all aspects of growth and development of livestock sector in the state. The cattle, piggery and poultry are considering important tools for the development of rural economy and these contribute towards socio-economic upliftment for the rural people. The livestock feeding practices in the



numerous glacial lakes, which freeze during winter. There is only one state are primarily based on crop residues and natural herbages (Paljore, S. 1995). In Sikkim, the land use pattern as existing presently provides scope mostly for a subsidiary form of livestock maintenance among settled households in the mid and lower altitudes and extensive rearing of upland livestock by grazing in higher reaches. The alpine and sub-alpine grass covers form the largest area where the migratory livestock in the high altitudes graze. The carrying capacity of these grasslands is poor and availability of forage in these grasslands is seasonal. In Sikkim, the farming system as practiced by most of the small and marginal farmers is initially aimed at fulfilling the domestic food needs (Jana, 2000). The intensive livestock production is commercially highly viable at the mid and lower hill situations of Sikkim where land use for cultivation of fodder production is highly promising. The livestock rearing in these regions cannot be expected to play a major economic role for the state as a whole though it does reflect a socio-cultural and traditional community of the tribal population of the high altitudes.

### **Purpose of the Study**

This state still is primarily an agrarian in nature needs to be seriously reviewed; only a small number of units are still functioning. With the rapid increase of population and decrease in per capita availability of cropped land, agriculture in the hills has been extended to marginal areas. Demand for fuel, fodder and grazing lands has also increased considerably. As a result, hill areas are on the verge of a major ecological crisis threading to collapse of the very life support system such as soil, water and natural vegetation. The implications of this for the phase and prosperity in the hills as well as out side hills



are obvious. The scattered pattern of settlements has its adverse effects on the provision of production and infrastructure and that social facilities, as a result of all these, the overall quality of life is poor. In addition to development programme for the state as a whole, the Government is paying special attention to the projects directed towards the upliftment of the rural people specially those belonging to the weaker section of the society.

The study deals with the livestock farming in the state of Sikkim. The region is suitable for livestock farming due to favourable climatic conditions and other natural factors. In Sikkim, most of the villagers are small and marginal farmers. The agricultural production is not sufficient to sustain their livelihood. So, people practice livestock farming for additional income and to supply protein to their diet in food of the inhabitants. Livestock rearing is a part and parcel of many people especially in rural areas in Sikkim. Restriction of livestock grazing in the forests, natural calamities and lack of area under forage production, compel the rural folks to restrict the number of livestock. Feed and fodder are creating some major problems in livestock rearing in the state. Thus, the number of livestock is decreasing in the state year by year. Moreover, there are some problems like marketing, transporting, preservation and distribution of livestock products in the state. Livestock products are not sufficient to the local people. So, a bulk of it is impetrated from outside. Though many schemes were introduced in the state for the development of livestock farming but the achievements are not up to the mark. So, a special attention has to be given for the development of the people in general and the livestock farming in particular.



The carrying capacity study in Teesta Basin in Sikkim has environmentally tempered by the adverse effects of technologically aided development and human interference into natural equilibrium of the area. The state has many advantages like heavy rainfall, numerous perennial rivers, vast open terrain, steep slopes etc for generation of hydropower. So, various parts of the state where the dams had already been constructed and some dams are under construction (Singtam, Dikchu) etc. are undergone developments. As a result, different types of problems like (a) the ground water level goes down resulting in dry condition of the subsoil, which affects the productivity of crops and drinking water supply. (b) Vast areas of agricultural land were submerged and lost for dam construction. (c) Many residential houses were damaged and crack. So, these houses are dangerous to live in.

### **Study Area**

Sikkim is a landlocked, smallest mountainous state in the eastern Himalayas of Indian Union. Sikkim lies between  $27^{\circ} 04' 46''$  and  $28^{\circ} 07' 48''$  N latitude and  $80^{\circ} 00' 58''$  and  $88^{\circ} 55' 25''$  E longitude. This state is located and bounded by three international boundaries with China, Nepal, and Bhutan (Fig.1). The state is a part of eastern Himalayas and the elevation ranges between 300 m to 8000 m above mean sea level. The present report concerns the Livestock production and their economic activities details in Sikkim. According to Census 2001, only 0.22% of total geographical area is covered by this state. The state's total area is 7096 sq km. Sikkim is sparsely populated with a population density of 76 person per  $\text{km}^2$ . In 2001 Census, about 11.10% of the total population of this state were urban. The

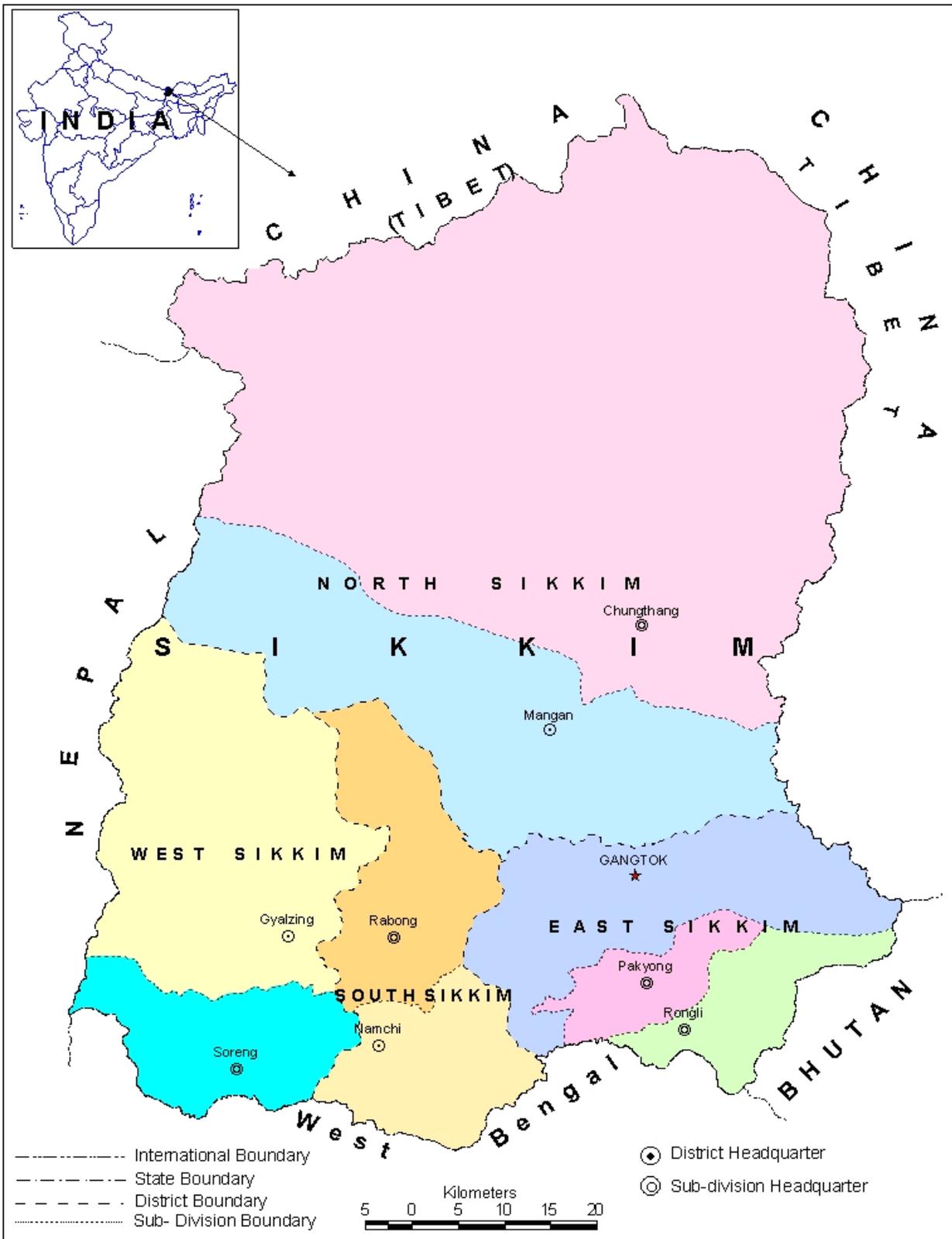


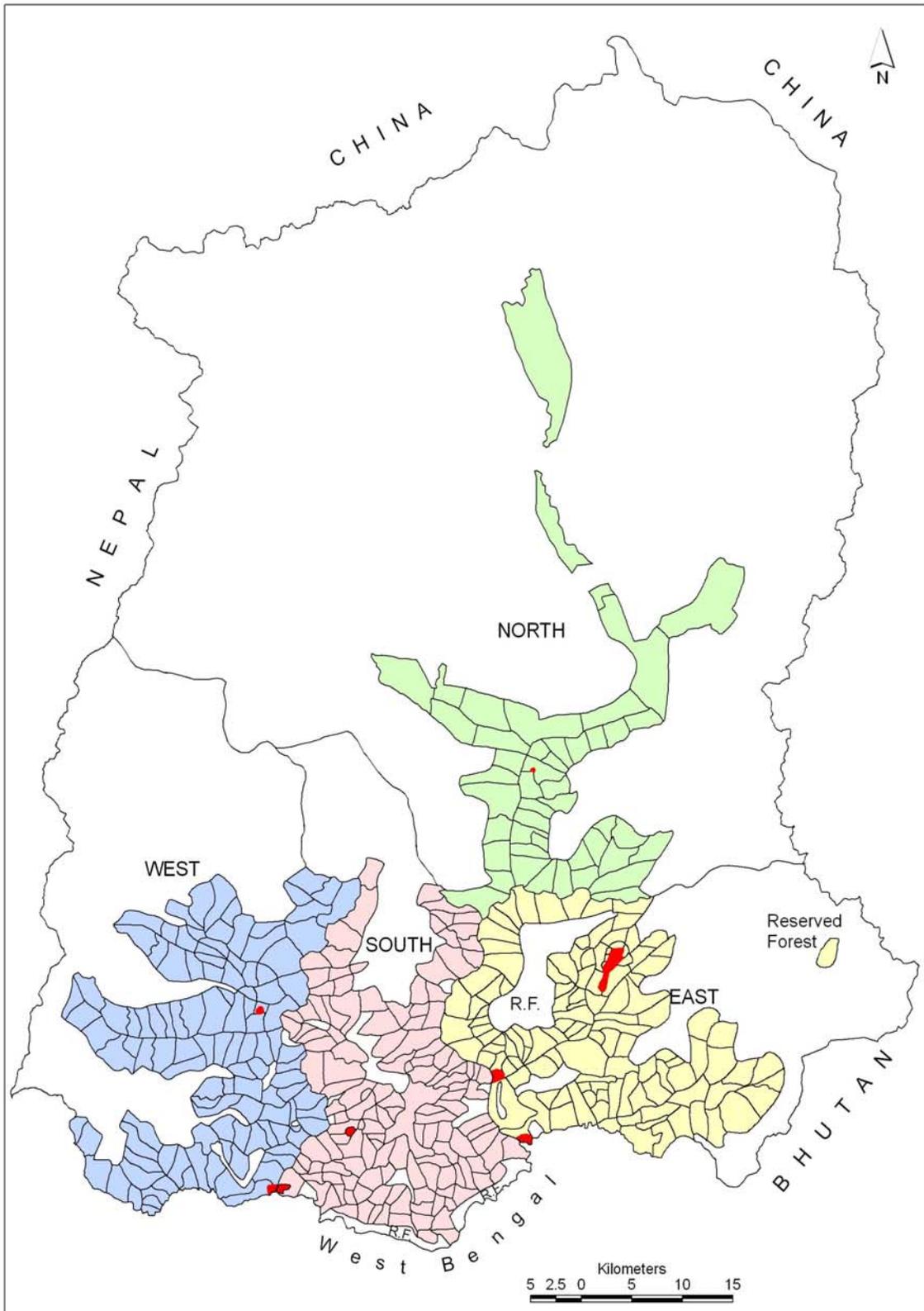
Fig 1 Location map of Teesta Basin in Sikkim



state is divided into four districts (North, South, East and west), and its headquarters, Gangtok is located in the East District. The state is again divided into nine Sub-divisions viz. Gangtok, Pakyong and Rongli in the East District, Namchi and Ravong in the South District, Gyalzing and Soreng in the West District and Mangan and Chungthang in the North District which consists of total 453 revenue blocks. Out of total, 411 revenue blocks are inhabited and 42 are forest blocks (Fig.2). Most of the inhabited revenue blocks are generally located in the southern rugged hilly tracts up to 2,100 m and the areas rejuvenated by Teesta and Rangit valleys. They are Lepcha, Bhutia, Chumbipa, Dukpa, Sherpa and Yolmo, etc. Buddhism and Hinduism are the two main predominant religions in the state. Here, the settlements patterns are scattered on the hill slopes and river valleys, depending on availability of agricultural lands and water. According to census 2001, about 89 per cent of the total population live in rural areas. In rural areas, agriculture is the main economic pursuit. About 78% of total population of the state depends on agriculture. Inhospitable climate, torrential rains (300 cms/ year), cold weather and the temperature range between 1°C and 26°C throughout the year, under developed Industrial facilities, lack of resources and economic backwardness, cause tremendous set back in the economic development of the State. But the land under cultivation is only 15.7% of the total area of this state. Since the yield is low, agriculture does not play a significant role in the economy of the state. The landscape of the state owes much to drainage network of the river Teesta. All the major rivers of the state are southerly flow. The northwestern part of the state is highly elevated and therefore remain under snow cover almost through out the year. There are numerous glacial lakes, which freeze during winter. There is only one

major river system in Sikkim that is the river Teesta. The Chola range in the east and the Singalila range in the west determine the boundary of the Teesta. Sikkim is a land of great climatic contrasts with in very short distance. Latitudinally, the basin is located within the subtropical climatic regime. Presence of high mountains plays the prime role in fashioning the climatic types of the state. The differences in the climatic types can be imagined from the fact that the altitude of Sikkim ranges from tropical alpine zone. Sikkim is the most humid place in the whole of the Himalayan range because its proximity to the Bay of Bengal and direct exposure to the effects of moisture laden South-West Monsoon. Rainfall variation along the Teesta valley is significant. The whole state is a land of mountain crests. The green cover of the state is critical for sustaining livelihoods in agriculture, animal husbandry and tourism. Forest resources have catered to the requirements of local communities and tourism. Therefore, investment in the forestry sector is quite crucial, particularly when this provides sustainability to general physical environment (Ires, J.D. 1990).

The geographical and climatic characteristics of the state have deeply influenced its economic and social development. Human settlements and economic activities have been built around ecology and terrain. Environment preservation, therefore takes a high priority for sustainable human development in Sikkim (Chandna, 1998). It also contributes to the preservation of traditional values and promotion of eco-tourism. So, the state has a tremendous potential for successful tourism industry in all the four districts of Sikkim. The State is 113 Km along from north to south and 64 km wide from west to east. Besides, there are numerous rivers and water channels in this state. They are potentially rich in generation of hydel power and



**Fig.2 Map showing revenue blocks of Teesta basin in Sikkim**

aquaculture. A few dams had already been constructed Like Rangitnagar in the South District and the West District near Legship, Singtam and Dikchu in the East District etc. Due to dam construction, the agricultural land has been encroached resulting in loss of valuable and scarce cultivated land. Forest (45%), which is one of the important resources in the State, has been degraded due to over exploitation for high pressure of population. Deforestation affects the rainfall pattern and availability of water in the rivers. Deforestation and degradation of forest affect not only the environment but also economy of the state in general and the livelihood pattern of the tribal communities those are directly or indirectly depend on forests in particular.

### **Objective**

The major objectives of the study are as follows:

- (1) To study the background of the study area.
- (2) To assess to the socio-economic condition of the state in general and the inhabitants in particular.
- (3) To study different mountain economy those are predominated in Sikkim.
- (4) To asses the situation and practices of livestock and animal husbandry.
- (5) To assess the livestock population and animal husbandry development in the state.
- (6) To assess the fodder requirement and their availability.
- (7) To assess the facilities for grazing and migration of livestock.
- (8) To assess the various forms of livestock products and marketing.

- (9) To discuss the problems related to livestock rearing and their related activities.
- (10) To study different measures for the development of the economic conditions of the people in general and livestock farmers in particular.

## **Methodology**

The following Methodology was adapted:

- (1) Data and information were collected from different Government, Semi-Government and private offices and organizations.
- (2) Primary data and information were collected through field visits at different times of the year and at various places by sampling. The data received from the secondary sources were also checked at primary level.
- (3) Specific questionnaire formats (A: village level, B: Family level) were prepared for collecting primary data.
- (4) Household data were collected by visiting individual household that formed part of stratified random sample.
- (5) Fieldwork, interview and discussions had been made from local people of the area to arrive at conclusions of the study.
- (6) Different types of maps and diagrams were prepared for presenting the data collected from different sources and analyzed these for finalization of the report (Fig.3).

## **Limitations**

To carry on the project, efforts were made to cover all the revenue blocks of four districts in Teesta river basin. There were

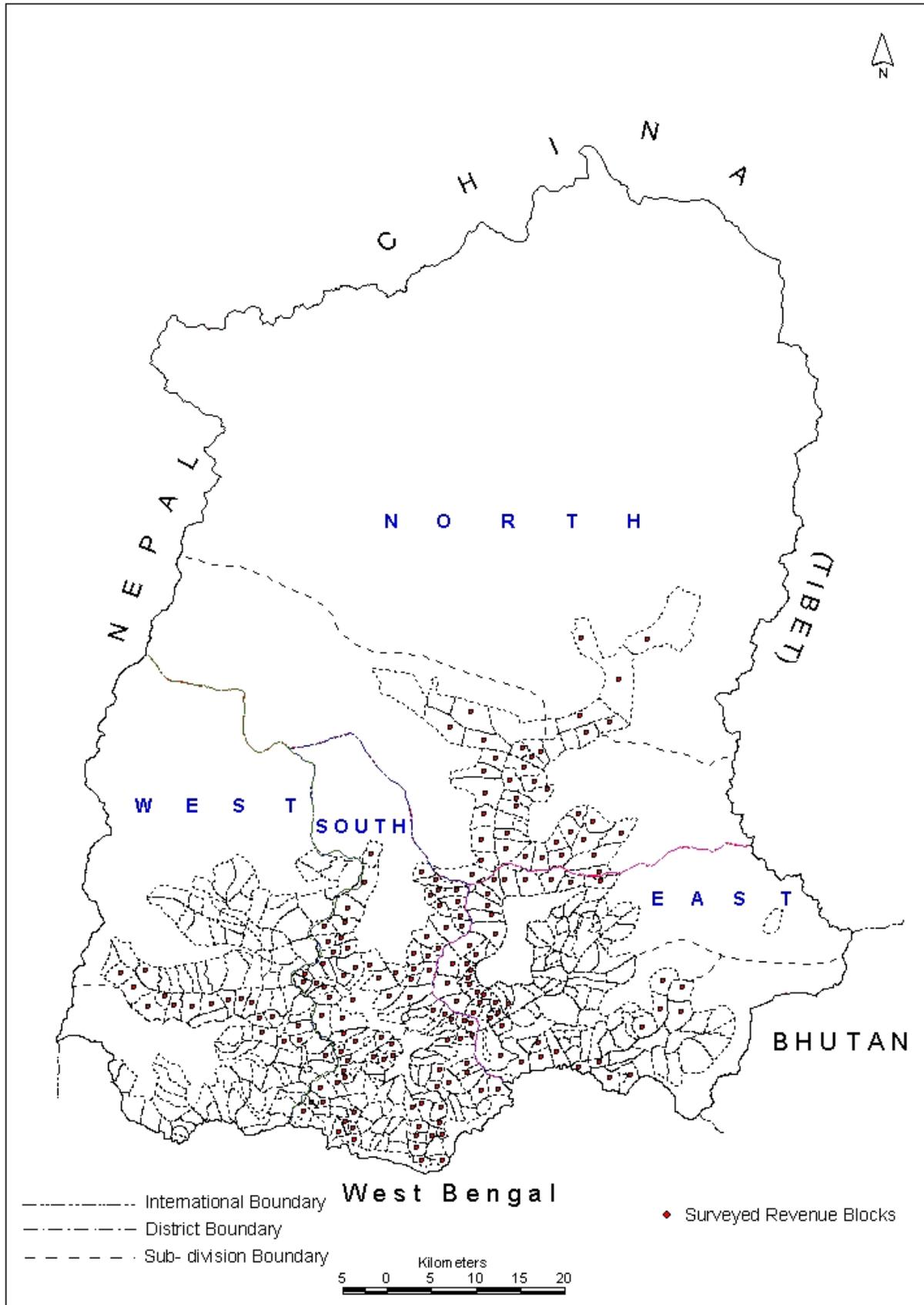


Fig.3 Map showing surveyed revenue blocks of Teesta basin in Sikkim

some transformations in these revenue blocks due to better developmental activities like dam and other developmental work etc. which are in process at the moment. But still a number of revenue blocks those are away from the river basin could not be covered due to inaccessibility and other reasons. In some areas like dam affected area and proposed dam area, ere studied in detail and more than 73% households were taken in special circumstances.

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# **CHAPTER - 1**

## **OCCUPATIONAL STRUCTURE OF THE INHABITANTS**

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# **OCCUPATIONAL STRUCTURES OF THE INHABITANTS**

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## **1.0 INTRODUCTION**

Occupational pattern in an area or a state depends on the availability of natural resources and influences the livelihood pattern of the society or community. Moreover, occupations control the socio-economic condition of the people in general and in the individual in particular. These are the main feature by which, we can take a clear idea about the condition of a people of the state or a region. Study area, Sikkim is a mountainous state and has plenty of natural resources. So, occupation of people vary from place to place or region to region. Occupation pattern in rural and urban areas differs due to various regions. According to 2001 Census, there are 540,851 populations in Sikkim. Among them, about 59,870 populations belong to urban areas and rest of the population (480,981) live in rural areas. Distribution of workers gives an understanding of the geo-economic prospects and potentiality of an area.

## **1.1 OCCUPATION PATTERN**

Most of the people of Sikkim are involved in four types of occupation i) Cultivators, ii) Agricultural labourers, iii) Households workers and iv) People involved in other services.

**Table 1.1A District wise distribution of workers in Sikkim Census 2001**

<b>Workers</b>	<b>North</b>	<b>East</b>	<b>South</b>	<b>West</b>	<b>Total</b>
Total Workers	9.00	44.35	26.48	20.17	100.00
Cultivators	7.00	28.88	36.92	27.21	100.00
Agricultural Labourers	12.38	47.70	15.78	24.13	100.00
Household workers	8.76	46.85	16.30	28.09	100.00
Other workers	10.80	61.98	16.15	11.07	100.00

Source: Sikkim Statistical Profile-2004.

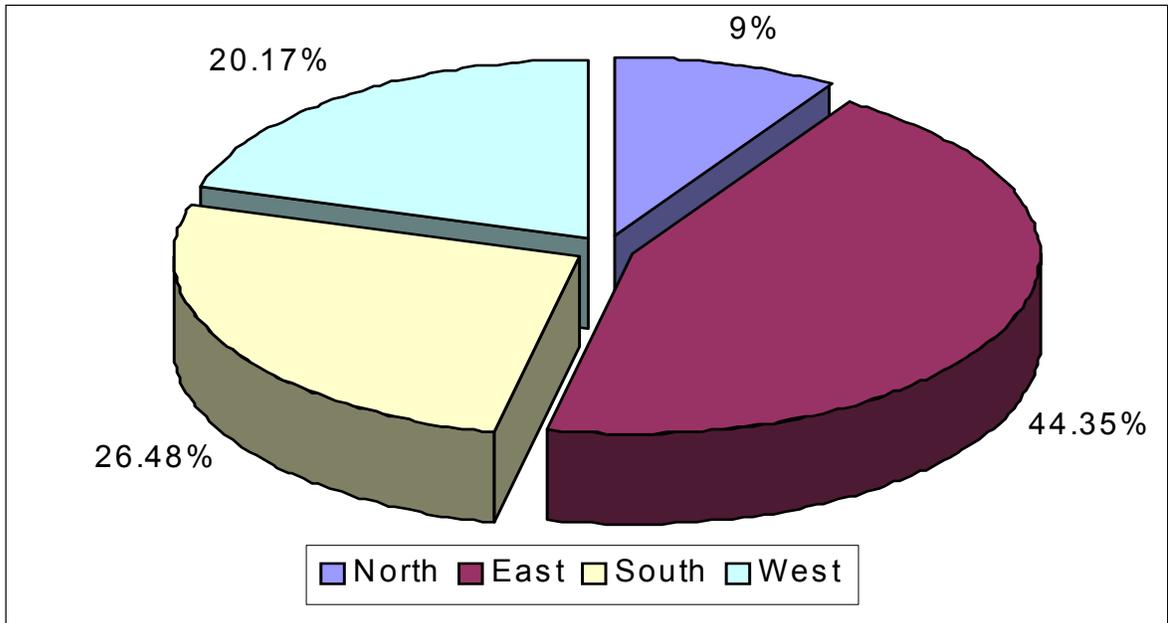
It is observed from Table 1.1A that among the districts, the East District shares the highest percentage of total workers. The East District also shares the highest percentage of other workers; because it is more advanced district and highest percentage of urban population of the state live here. The district is also shared the highest percentage of agricultural labours and workers engaged in household industries. The percentage of total workers in the district of Sikkim varies due to various socio-economic and socio-cultural factors (Fig. 1.1a).

**Table 1.1B District-wise distribution of workers in different activities (2001)**

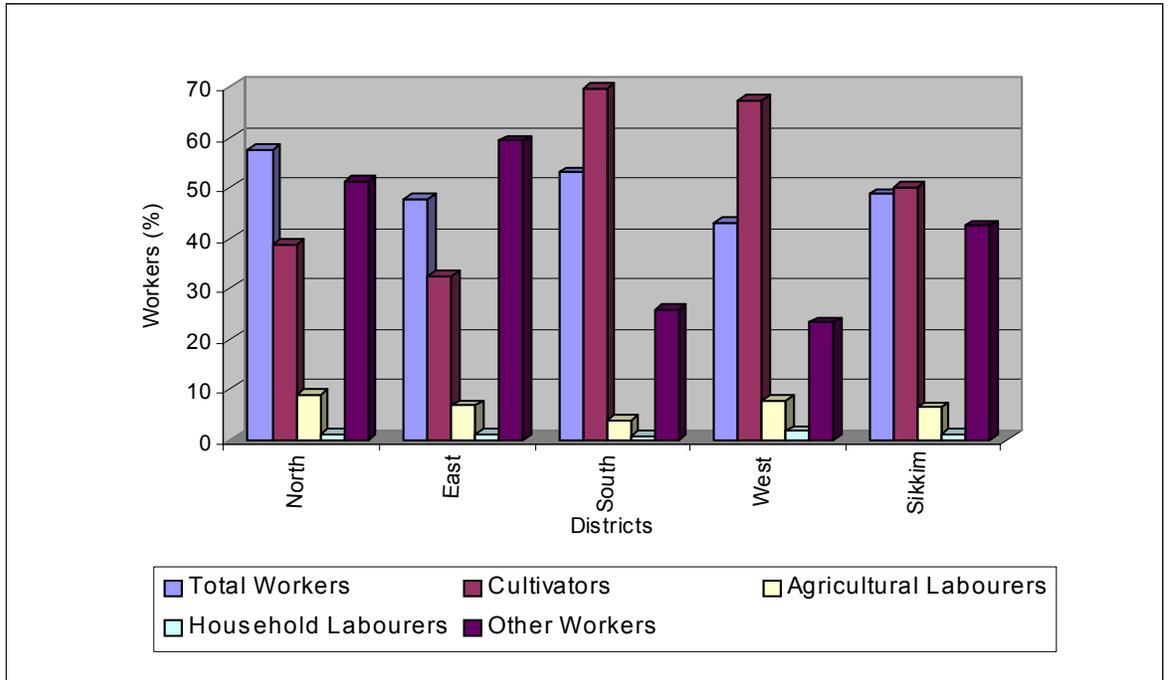
<b>Worker</b>	<b>North</b>	<b>East</b>	<b>South</b>	<b>West</b>	<b>Sikkim</b>
Total Workers	57.60	47.67	53.03	43.11	48.68
Cultivators	38.82	32.60	69.57	67.30	49.90
Agricultural Labourers	8.87	6.82	3.83	7.69	6.43
Household Workers	1.21	1.30	0.77	1.72	1.25
Other Workers	51.10	59.28	25.83	23.29	42.42
Total	100.00	100.00	100.00	100.00	100.00

Source: Sikkim, A Statistical Profile 2004-05

From Table 1.1B it can be revealed that 48.68 per cent of total workers to total population are engaged in different economic activities and the rest of population is non-workers. Out of the total workers, the highest percentage of workers (49.90%) is engaged in cultivation and the lowest percentage (1.25%) of workers is engaged in household industries in the State. About 42.42% of total workers



**Fig.1.1A District-wise distribution of workers engaged in different occupation in state widely varies (1.1.B)**



**Fig.1.1B Distribution of Workers (Percentage)**

are engaged in other economic activities i.e. they are other workers. Highest percentage of cultivators to total workers are found in the South District (69.57) followed by the West District (67.30), the North District (38.82) where as the East district shares 32.60% (Fig.1.1B). High percentage of cultivators in the South District is due to availability of agricultural land and suitable agro-climatic conditions. Very negligible percentage of household workers is found in all the districts of the State. The percentage of other workers to total worker is varied from district to district. The highest percentage of workers engaged in tertiary activities is observed in the East District (59.28%) due its location of capital city, Gangtok where many Government offices, schools, colleges and organisation are situated and the lowest percentage of workers is found in the West District (23.29%) due to its rural character and remoteness from the state capital. The distribution of farmers engaged in livestock related activities are unevenly distributed in the state (Table 1.2) (Fig.1.2).

**Table 1.2 Distribution of livestock farmers in Sikkim (2001)**

Total Livestock Workers	North	East	South	West	Total
Total Workers	454	2177	872	649	4152
	<i>10</i>	<i>52</i>	<i>22</i>	<i>16</i>	<i>100</i>
Male Workers	404	1681	639	566	3290
	<i>12</i>	<i>51</i>	<i>20</i>	<i>17</i>	<i>100</i>
Female Workers	50	496	233	83	862
	<i>6</i>	<i>58</i>	<i>27</i>	<i>9</i>	<i>100</i>

Source: District Census Handbook, Sikkim- 1991.

Italic forms represent the percentages

From Table 1.2 it can be visualised that at least 4,152 people are engaged in livestock production in the state. Among the four districts, the East District has the highest percentage (52%) of livestock farmers followed by the South District (22%), the West

District (16%) and the North District (10%) respectively. The distribution of livestock farmers both males and females can be compared from Fig.1.3.

It has been observed that though the East district is developed in many respects compared to other districts in Sikkim but the percentage of livestock farmers is more compared to other districts due to suitable climatic conditions for livestock rearing and limited agricultural lands. The distribution of livestock farmers in both rural and urban areas in the state can be compared from Table 1.3.

**Table 1.3 District-wise Distribution of Livestock farmers (Rural and Urban)**

District	Rural	Urban	Total
North	440 (97%)	14 (3%)	454
East	1751(80%)	426 (20%)	2177
South	855 (98%)	17 (2%)	872
West	615 (95%)	34(5%)	649
Sikkim	3661 (88%)	491 (11%)	4152

Source: District Census Handbook, Sikkim- 1991.

From Table 1.3 it is clear that a very small number of urban people are engaged in livestock rearing in the state where as a large number of livestock farmers (88% to total) are from the rural areas in the state. In North District, 97% of total livestock farmers are held from the rural areas where as only 3% of total livestock farmers are from the urban areas. About 80% of total livestock farmers live in rural areas of the East District where as, 20% of total livestock farmers are from the urban (Fig.1.4). It is clear that livestock rearing is dominated in rural areas than the urban areas due to certain grazing and other facilities. So many rural inhabitants are depended on livestock rearing for maintained their livelihood.

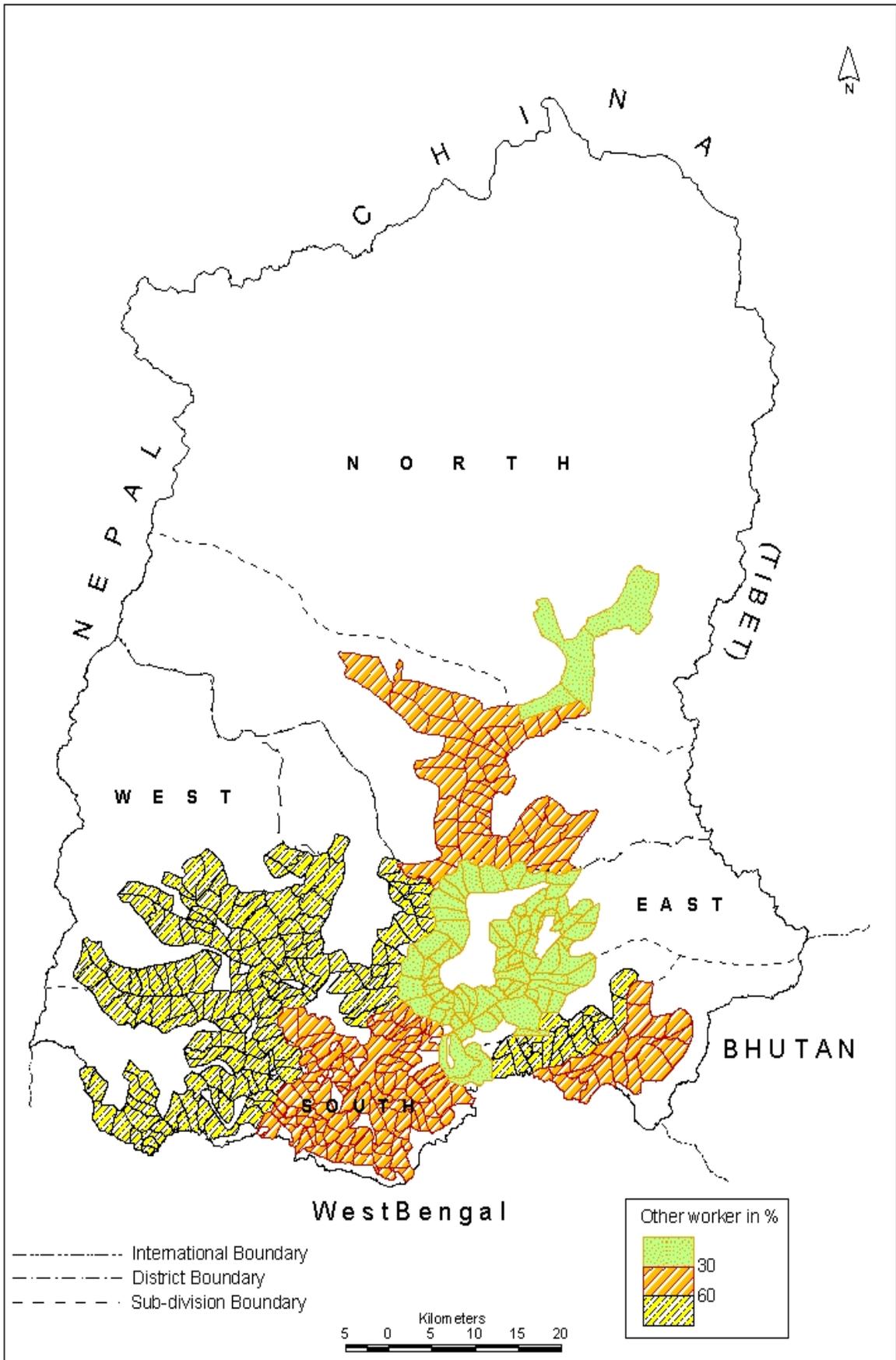
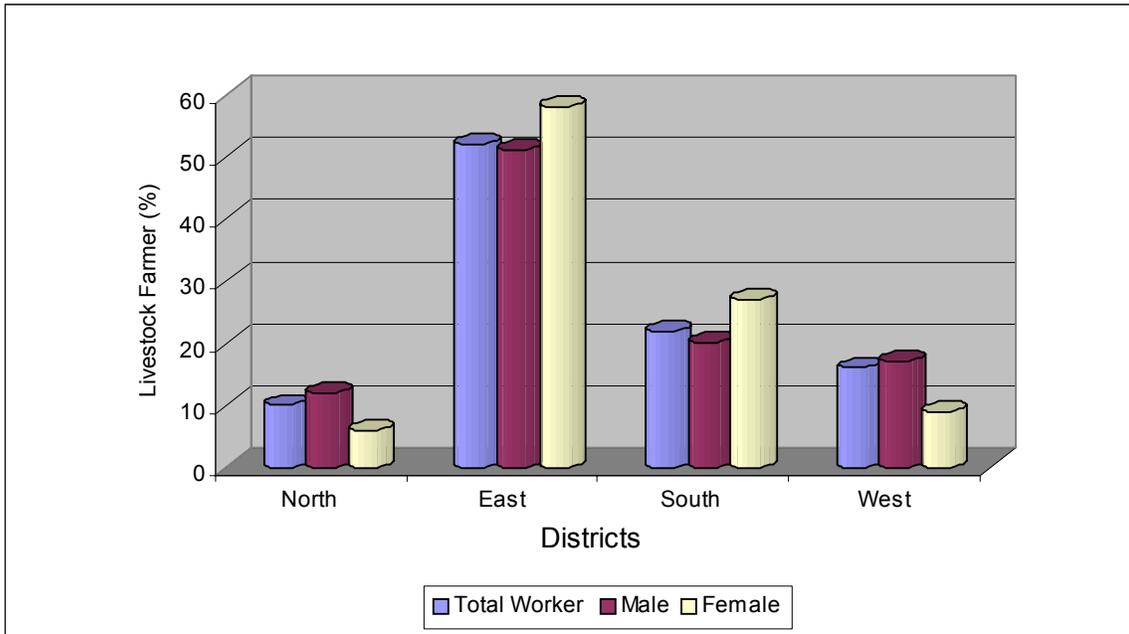
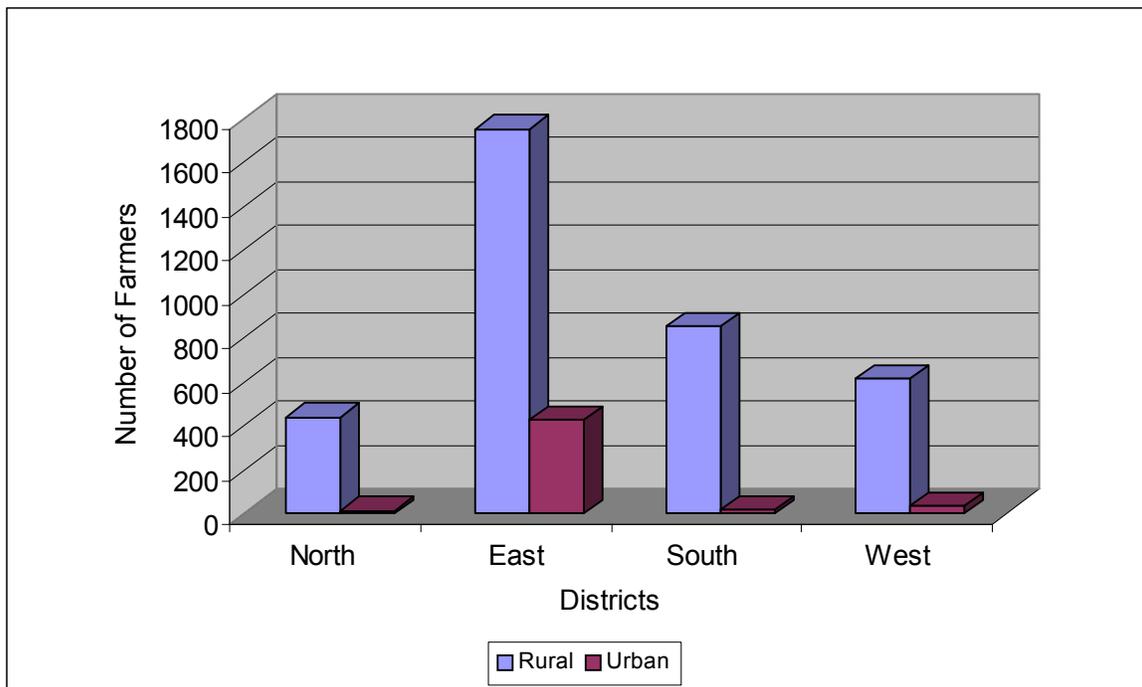


Fig.1.2 Distribution of other workers



**Fig.1.3 Distribution of Livestock Farmers**



**Fig.1.4 Rural and Urban Livestock Farmers**

## 1.2 TRENDS OF OCCUPATIONAL STRUCTURE OF THE PEOPLE

Land and livestock are the natural resources accepted by the people of Sikkim for livelihoods. On the basis of the variations in working system, the main occupations of the people of the state are categorized into 4 sub-headings in which a large number of men, women and children are employed.

**Table 1.4 Percentage of workers in different occupations in the districts (1981- 2001)**

<i>District</i>	<i>Cultivators</i>			<i>Agriculture Labourers</i>			<i>Household Labourers</i>			<i>Other workers</i>		
	1981	1991	2001	1981	1991	2001	1981	1991	2001	1981	1991	2001
North	41.56	46.25	38.82	12.83	14.95	8.87	1.27	1.30	1.21	44.34	36.51	51.10
East	42.63	39.27	32.50	2.50	8.40	6.92	1.51	0.92	1.30	53.35	48.80	39.35
South	72.18	70.79	69.57	1.64	5.12	3.87	0.81	0.68	0.76	25.38	20.69	25.84
West	81.85	77.41	67.30	3.14	7.29	7.69	0.58	0.47	1.72	14.44	13.94	23.29
Total	60.10	57.84	49.91	3.31	7.82	6.43	1.08	0.77	1.24	35.51	30.32	42.42

*Source:* District Census Handbook, Sikkim- 1981, 1991 and 2001

Though it is broadly true to say that agriculture is the main occupation of the majority of people in the state, but its percentage has declined from 60% in 1981 to 50% in 2001. On the contrary, an insignificant percentage increase, in the case of other workers is observed in the state. It has been increased from 35.51% (1981) to 42.42% (2001). Among the districts, the East District has the lowest percentage (32.50%) of cultivators to total workers. According to 1981 census, the percentage of cultivators was 42.63% in the East District because the district is well developed from the point of view urbanization is concerned. Majority of people of the district are engaged in tertiary activities (53.35%) in 1981 Census but the workers in this activities has been decreased to 39.35% in 2001. The percentage of cultivators of the South and the West District were 69.57 and 67.30 respectively in 2001. A decline in percentage from

81.85% to 72.18% during 1981-2001, is noticed in these two districts, respectively. From Table 1.4, it is also clear that the percentage growth of agricultural labourers and household industrial workers were insignificant during the period (1981-2001) in all the districts. Highest percentage (51.29%) of other workers is observed in the North District in 2001 because livestock rearing, plantation, forestry, mining etc. are included in this category of activities. Many people are engaged in fishing, hunting, plantation, orchards and allied activities. Among these, livestock rearing is the main occupation and most of the people from rural areas are engaged in it because there is better scope for livestock development in the district. The growth rate of workers in different occupation during the last few decades were varied from district to district due to various factors like availability of agricultural lands, job opportunities in other services etc (Table 1.5).

**Table 1.5 Growth rates of workers during 1981- 2001**

<b>Workers</b>	<b>North District</b>	<b>East District</b>	<b>South District</b>	<b>West District</b>	<b>Sikkim</b>
Cultivators	81.18	47.79	84.60	13.04	48.13
Agricultural Labourer	30.39	440.04	353.53	239.00	247.86
Household Labourer	98.72	126.97	421.35	401.34	217.53
Other Workers	120.77	150.22	94.33	120.08	383.44

Source: District Census Handbook, Sikkim- 1981 and 2001.

Table 1.5 shows the growth of workers in the districts during the last three decades. This may be attributed comprehensively to the growth rate of total workers in the state, which is reflected high growth rate of other workers (383.44%) from 1981 to 2001. High growth rate of other workers is observed (150.22%) in the East District and the lowest growth rate (94.33%) is found in the South District. From Table 1.5, it is also estimated that a marginal increase (48.13%) has been availed for the cultivators in the state. Because of the cultivators

become agricultural labourers or changed their occupation from agriculture to other services during the period. The percentage (84.60%) of highest and the lowest (13.04%) growth of cultivators are found in the South District and the West District, respectively. Though the numbers of agricultural labourers and household industrial workers are not very much remarkable in the state but the percentage growth rate showed an extra ordinary rise during the period. An increase of 247.86% in case of agricultural labourers and 217.53% in case of industrial workers were noticed during the period. The percentage of people engaged in different occupations were studied from the field survey questionnaires for assessing the true picture about the occupation pattern of the people in the state in general and the revenue blocks in particular. The percentages of people engaged in different occupation are shown in Table 1.6.

**Table 1.6 Percentage of the total workers of the surveyed Revenue Blocks (2005)**

<b>Workers</b>	<b>North</b>	<b>East</b>	<b>South</b>	<b>West</b>
Cultivators	33.83	13.71	51.75	22.48
Agricultural	11.20	7.78	9.60	15.26
Households	0.50	0.08	1.89	0.78
Others	54.47	78.48	39.44	59.19
Total	3053	23522	3550	1953

*Source:* Field Survey, 2005.

It has been observed during the field survey that agricultural and other workers play very significant role in main occupation, which is just a reflection of census data. Amongst the districts, the surveyors observed that the highest (51.75%) and the lowest (13.71%) percentages of cultivators were found in the South District and the East District respectively where as in case of other workers, the

situation is reversed i.e. 39.44% in the South District and 78.48% in the East District (Fig.1.5).

### 1.3 LAND AND ITS USES

Study of land use is most important in point of view of agricultural development and occupations of the people in an area are concerned. Land use of an area mainly depends on its physical and socio-economic situations. The existing land use pattern in different districts of Sikkim has been evolved as a result of action and interaction of various factors, such as, the structure of other resources available and the location of the state in relation to other aspects of economic development. According to capability of use, lands in our country are broadly classified into 6 classes. Sikkim has a total geographical area of 7,096 sq km. The land utilization pattern in the state is given in Table 1.7.

**Table 1.7 General Land Use in Sikkim (1998)**

Land under operation holding	Barren and uncultivable land	Land for no agri - cultural uses	Permanent pasture and grazing land and cultivable waste land	Land under miscellanies crops and groves	Forest land	Total
10.83	28.64	9.58	14.04	0.57	36.34	100.00

Source: Sikkim perspectives for planning and development 1998.

From Table 1.7 it can be said that, major area of the state is covered by forest. Due to mountainous terrain and steep slopes, major part of the state is unsuitable for agricultural operation. The types of land used under other operations are barren and not suitable for cultivation. Only about 11% of land is under operational holdings about 28.64% of the total area of the state is barren and uncultivable.

A very small part of land (9.58 %) is used for non-agriculture purposes. Permanent pastures and grazing lands and cultivable wastelands together cover 14.04% of the total area of Sikkim. In Sikkim, per capita cultivated land is 0.32 ha, which indicates low availability of cultivated land in Sikkim (Table 1.8).

**Table 1.8 District-wise per capita land use in Sikkim**

Districts	Land Capability	Forest Land	Land not available for Cultivation	Fallow land	Cropped land
<i>Per Capita Land availability</i>					
North	0.98	0.52	0.04	0.14	0.28
East	0.18	0.04	0.02	0.03	0.08
West	0.37	0.075	0.03	0.10	0.15
South	0.32	0.073	0.02	0.07	0.14
Sikkim	0.32	0.093	0.023	0.06	0.13

Source: Land Utilization Statistics of Sikkim: 1995-96

Due to low population, the North District has the highest per capita of land (0.98 per capita) and it has 21,270.20 ha of forestland, which cover about 42% of total forest area of Sikkim. The per capita availability of forestland and fallow land is presented as 0.52 ha and 0.14 ha, respectively. Most of the area of the North District is covered by ice sheet and in summer season, a small part of it used for cultivation and fallow lands for livestock rearing. Here, per capita cropland is 0.28 ha. So, the land holdings are basically small in size due to vary steep slopes in the district and inadequate for sustenance's of the people. So, large number of populations is engaged in livestock rearing, business, services, constructions, etc.

In the East District, very low per capita land (0.18 ha) is available for operation. The remaining part of the district is densely populated except for high altitudinal areas. A large number of cultural phenomena like markets, schools, colleges, hospitals, offices, hotels,

and business centre are established here. Gangtok becomes the main business centre of the state where population increases day by day. As a result, the land-man ratio is decreasing continuously. The per capita land not available for cultivation, fallow land and cropped land in this district are 0.02 ha, 0.03 ha and 0.08 ha, respectively, (Table 1.8). The East District shares 15 per cent of total forest land of Sikkim. Per capita forestland is also small (0.04 ha) (Plate 1.1).

The over all scenario of land not available for cultivation in the West District and the South District, is almost same as in the East District. But in the South District, per capita fallow land is 0.07 ha where as in the West District it is 0.10 ha (Plate 1.2).

Per capita forestland is about 0.075 and 0.073 ha in the South and the West District, respectively. The per capita cropped lands in these two districts are 0.15 and 0.14 ha, respectively. Land in the West District is not fully used as major part of the district is situated in high mountainous zones. So, from the observation it can be said that among the four districts, the land use pattern is intensive in the East District followed by the South and the West District. The per capita land in the state is decreasing (0.32 ha). It means that there is enormous pressure of population on lands and it increases day by day. As a result, the cultural land and uncultivated land in the state are used for rehabilitation of the people. A large area of the state is covered by forest. The high steep slopes and ridges of the state are not suitable for land utilization. In the state, total per capita total fallow land and cropped land are 0.06 ha and 0.13 ha, respectively. So, it can be said that high population has created more pressure on lands as well as on the carrying capacity of land in the state.



**Plate 1.1 Fodder cultivation**



**Plate 1.2 Maize cultivation**

## 1.4 LIVESTOCK ACTIVITIES

As there is vast wasteland in the state so livestock rearing is more economic than other primary activities. So, there are many livestock farmers in the state and their number varies due to various socio-economic and socio-cultural factors (Table 1.9).

**Table 1.9 Livestock farmers in different Sub-divisions in Sikkim**

Sub-Division/ Sikkim	Total Main Worker		Livestock Worker	
	Numbers		Percentage to total main workers	
	Male	Female	Male	Female
Chungthang (N)	2318	901	2.27	0.78
Mangan (N)	6847	3336	5.13	1.29
Gangtok (E)	36838	12825	3.97	3.65
Pakyong (E)	10689	5919	2.05	0.47
Namchi (S)	16939	9824	2.08	0.59
Ravong (S)	9919	4536	2.88	3.86
Soreng (W)	12998	12729	1.88	0.31
Gyalshing (W)	13446	7864	2.39	0.56
Sikkim	109994	45398	2.99	1.58

Source: District Census Handbook, Sikkim- 1991

Table 1.9 shows a clear picture about livestock activities in different sub-divisions of Sikkim. In Sikkim, total livestock farmers are 4,152, which is only 2.52% of total main workers. In livestock rearing, only 2.99% of male workers are engaged whereas female participation in livestock rearing is 1.58%. As livestock rearing is less economic, most of the people of Sikkim are engaged in other tertiary activities. Many small and marginal farmers are involved in livestock rearing and among the district; the percentage of livestock farmers to total main workers is highest in Gangtok Sub-division (3.89%). About 5.13% of male workers of Mangan sub-division are engaged in livestock rearing. A very less number of livestock farmers, which is only 1.86% to total main workers is involves in livestock rearing in Chungthang Sub-

division. In livestock rearing, a very low percentage of female workers are engaged in different sub-divisions. The percentages of females in different sub-divisions are 0.78, 1.29, 0.47, 0.59, 0.56 and 0.31 in Chungthang, Mangan, Pakyong, Namchi, Gyalzing and Soreng sub-division respectively.

## **1.5 CONCLUSION**

Occupation structure of the inhabitants is the main determinant by which a clear idea about the present conditions of the state or a region can be assessed. In Sikkim, most of the inhabitants are engaged in agriculture and other primary activities like livestock rearing, mining, etc. About 48.68% of the total population of the state is main workers and rest of the population is in non-workers community. In Sikkim, 2.52% of total main workers are engaged in this sector. During field survey, it is also observed that most of the small and marginal farmers (80%) are engaged in livestock rearing and associated activities for additional income. On the contrary, the females are engaged in other occupations and households industries, construction etc. Permanent pasture, grazing lands and cultivable wastelands together cover 14.04% of the total area of Sikkim. So, per capita land available for agricultural operation is 0.32 ha. So, the inhabitants of the rural areas of the state are mostly depend on livestock farming and allied activities.

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# **CHAPTER - 2**

# **SOCIO-ECONOMIC CONDITIONS OF**

# **THE LIVESTOCK FARMERS**

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# **SOCIO-ECONOMIC CONDITIONS OF THE LIVESTOCK FARMERS**

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## **2.0 INTRODUCTION**

A large number of people live in rural areas compared to the urban areas in our country. In Sikkim 89% of its total people live in rural area. So, the economy of the state is mainly rural. A major portion of the people is engaged in agriculture or other primary activities. Majority of families in the rural area is small to medium in size. They are land less agricultural labourers and are involved in primary activities like livestock rearing, fishing hunting, and mining. Large families are less in number and they are involved in other economic activities like business, Government services etc. where as small and marginal families or those are land less agricultural labourers are involved in primary activities like livestock rearing, fishing hunting, mining etc. In Sikkim, settlements in the rural areas are generally isolated due to lack of suitable agricultural land and terrain conditions (Plate 2.1).

## **2.1 HOUSEHOLDS AND FAMILY SIZE**

Before studying the socio-economic conditions of the people in any area or a state, the study of size of households and families is most important. There is a great impact on income and standard of living by the size of the family. During field survey, it was observed



**Plate 2.1 Isolated settlement with cattle shed**

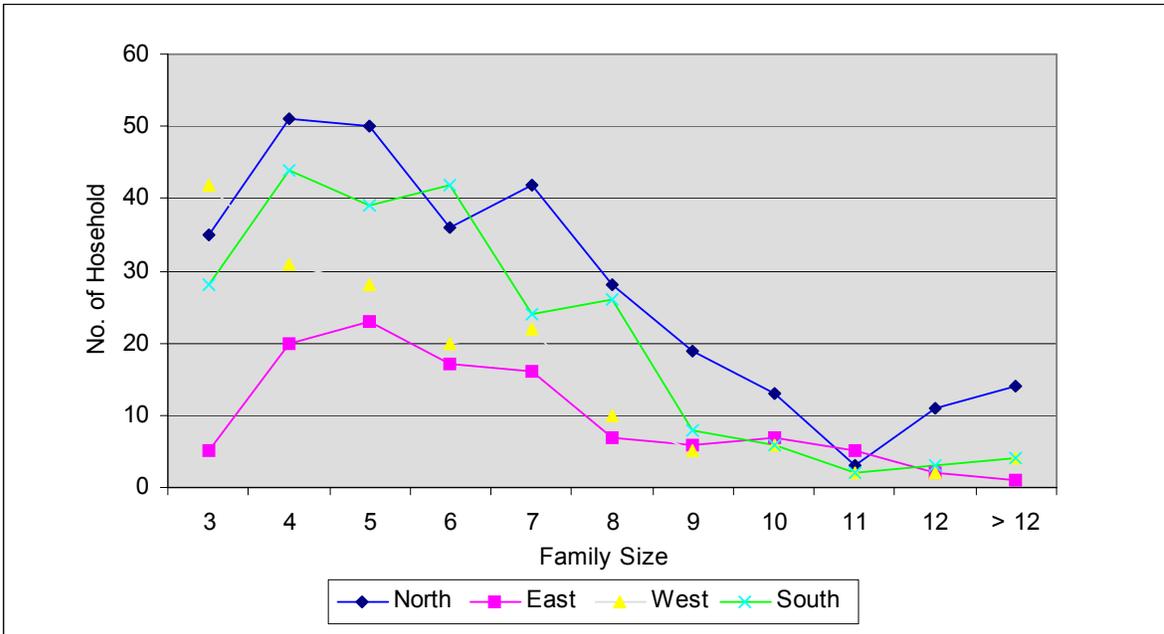
that average size of the households in the state is 5 family members. During the collection of field data in different districts of Sikkim, it was also found that most of the households of Sikkim have 3-6 family members. Number of households is very less having 7 -9 and 10 -12 family members.

The highest percentage of households having 5 family members is about 30% in all the districts of Sikkim. From Fig.2.1, it is revealed that the number of households is high having less number of family members. Among the districts, the North District has the highest number of households having 5-6 family members. Where as the size of family is less in the East district. It is also observed from the field study that there is an inverse relationship between family size and the number of households in all the four districts in Sikkim.

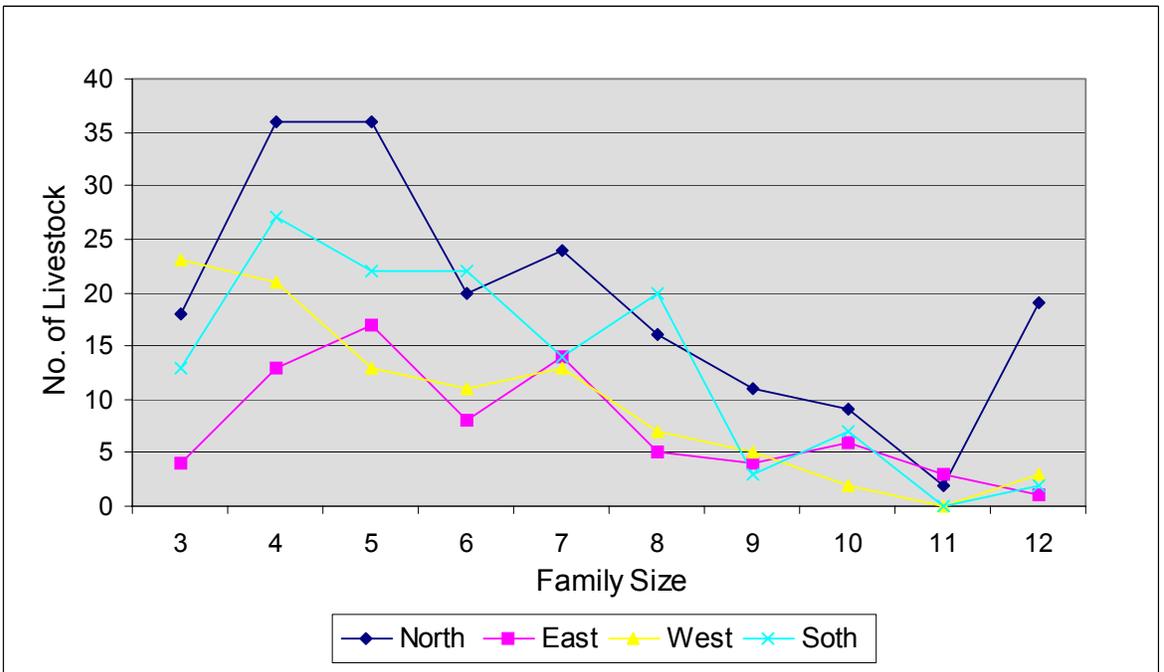
## **2.2 FAMILY SIZE AND LIVESTOCK POPULATION**

Almost each household in the rural areas of Sikkim keeps livestock for different purposes. It is observed from the field study that the family size and number of livestock is highly correlated. It is also revealed from field observations that livestock except poultry are found common in those families having 4-6 members. The families having 4-6 persons share the highest percentage of livestock population to total (20%). Where as the large families (11+ more in number) share only 1% of total livestock population of the state.

So, it can be visualized that the livestock rearing is more common in small families than the large one. From the Fig. 2.2, it is also revealed that as the number of family size increases the number



**Fig.2.1 Household and Family Size**



**Fig. 2.2 Family Size and Livestock Population**

of livestock decreases. There is an inverse relationship between the family size and number of livestock population in each district of the state. It is also noticed that in all the four districts, a large number of livestock is found in a family having 3-6 members. The highest percentage of livestock is found in the North District, which are about 30% of the total. Where as the percentage of surveyed livestock in the East District is only 12%. So, it can be said that the livestock rearing is more economic in the North District than the East District. Because, high percentage of people are engaged in other service in the East District. In South and the West district, livestock rearing is less prominent than the North District. It is noticed that as the number of livestock population increases, the number of households decreases. There is a negative relationship between number of livestock and households. Very small families do not keep livestock and the reasons of keeping less livestock population of most of the households are:

- i) Most of the small and marginal farmers of the state are unable to purchase feed and fodder for livestock from the markets due to their poor economic condition.
- ii) Small and marginal farmers have not much money for treatment of animal diseases so animals die.

### **2.3 SEX RATIO OF LIVESTOCK FARMERS**

It has been observed that the families having higher male members than females keep livestock because the males can take care of the livestock by collecting feed and fodder from the forests or

other places. The average sex ratio of livestock farmers in 1991 was very less (only 262 females per 1000 of males). So, it indicates that males are highly involved in livestock rearing than females in the state. It is noticed that the number of male livestock farmers is more than females in all the districts of this state. The sex-wise distribution of workers engaged in livestock rearing and allied activities in all the sub-divisions of the state is presented in Table 2.1 and Fig. 2.3.

**Table 2.1 Sex ratio of livestock farmers in different sub-divisions of Sikkim**

Sub-Divison	Livestock Farmers	Sex Ratio
Chungthang	60	132
Mangan	394	122
Gangtok	1930	320
Pakyong	247	127
Namchi	411	164
Ravong	461	611
Gyalshing	366	136
Soreng	283	159
Sikkim	4152	262

*Source:* District Census Handbook, Sikkim- 1991

In Mangan sub-division, sex ratio of livestock farmers is only 122 females per 1000 of males. The sex ratio is quite high in Ravong sub-division of South District; it is 611 females per 1000 of males (Table 2.1). Though the East District shares the highest number of livestock farmers, but sex ratio is very less, which is 295 females per 1000 of males. In Gangtok Sub-division, it is 320 females per 1000 of males. So, the female participation in this economic sector are very low in the state (Fig. 2.4).

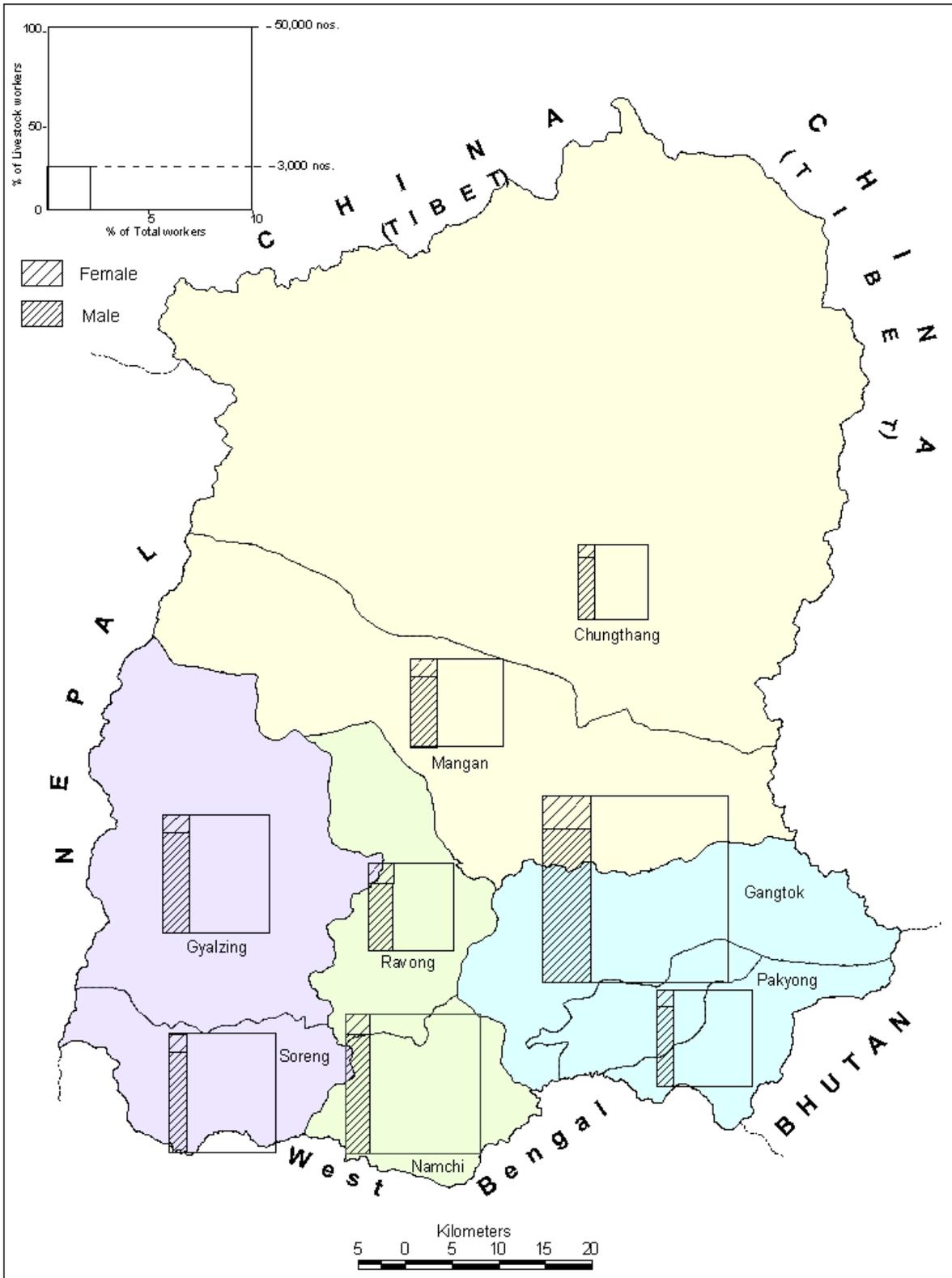


Fig 2.3 Distribution of workers engaged in Livestock and Allied activities

## 2.4 ECONOMICS OF LIVESTOCK FARMING

The Survey Report on the state's income conducted by the Bureau of Economics of Sikkim, reveals that the relative share of the primary sector in real terms, comprising of agriculture and its allied activities i.e. animal husbandry, forestry, fishery, mines and geology, was account for 51.60% to the total net domestic products of the state during 1980-81. It has been increased to 53.44% during 1982-83. However, the contribution of livestock to the NDSP started declining from 1983-84 and reached to 50.96% during 1986-87. The tends and share of contribution of the animal husbandry sector to the NDSP was 9.18% in 1988-89, which has declined to 4.73% in 1991-92 over a period of 3 years (Table 2.2).

**Table 2.2 Contribution of total agriculture sectors *vis-à-vis* the animal husbandry sector to the state's income**

Year	Total Agricultural Sector (%)	Animal Husbandry Sector (%)
1987-88	49.80	5.81
1988-89	48.80	9.18
1989-90	49.70	6.99
1990-91	46.51	5.88
1991-92	45.25	4.73

Source: S. Paljor, 1995

It is seen from Fig.2.5 that the decline in the share of contribution of animal husbandry to state's income has been 2.19% during 1989-90, 1.11% during 1990-1991 and 1.15% from -1991-92. The highest income from animal husbandry was in the year 1988-89.

It could be inferred from Table 2.2 that there is a declining trend in the contribution of income derived from animal husbandry to the total income of agricultural sector in a period of 3 years. The

economic census conducted by the State Bureau of Economics and Statistics in 1990 revealed that the number of identified enterprises (agricultural and non-agricultural taken together) was 10,686, employing as many as 47,296 persons. Out of these, agricultural enterprises account for 689 or 6.45% of the total enterprises (Fig.2.5). On the employment side, agricultural enterprises employed 2,587 persons or 4% of total employed in all enterprises in the state.

**Table 2.3 Distribution of enterprises at three-digit level of Nation Industrial classification**

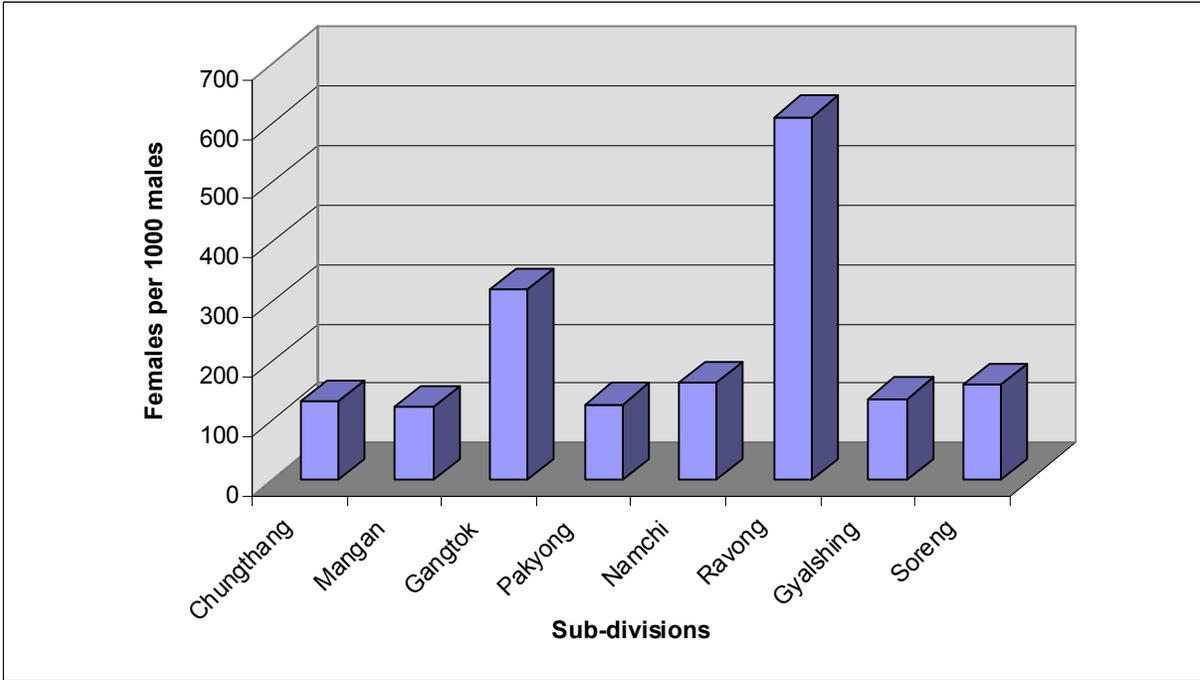
<b>Industrial Group</b>	<b>Description</b>	<b>Share of total enterprises in %</b>	<b>Agricultural Enterprises employment in %</b>
020	Cattle Breeding, rearing production of milk	75.62	63.07
039	Agricultural Services	10.01	19.88
058	Forestry & Logging	5.08	3.60 & 0.59

Source: S. Paljor, 1995

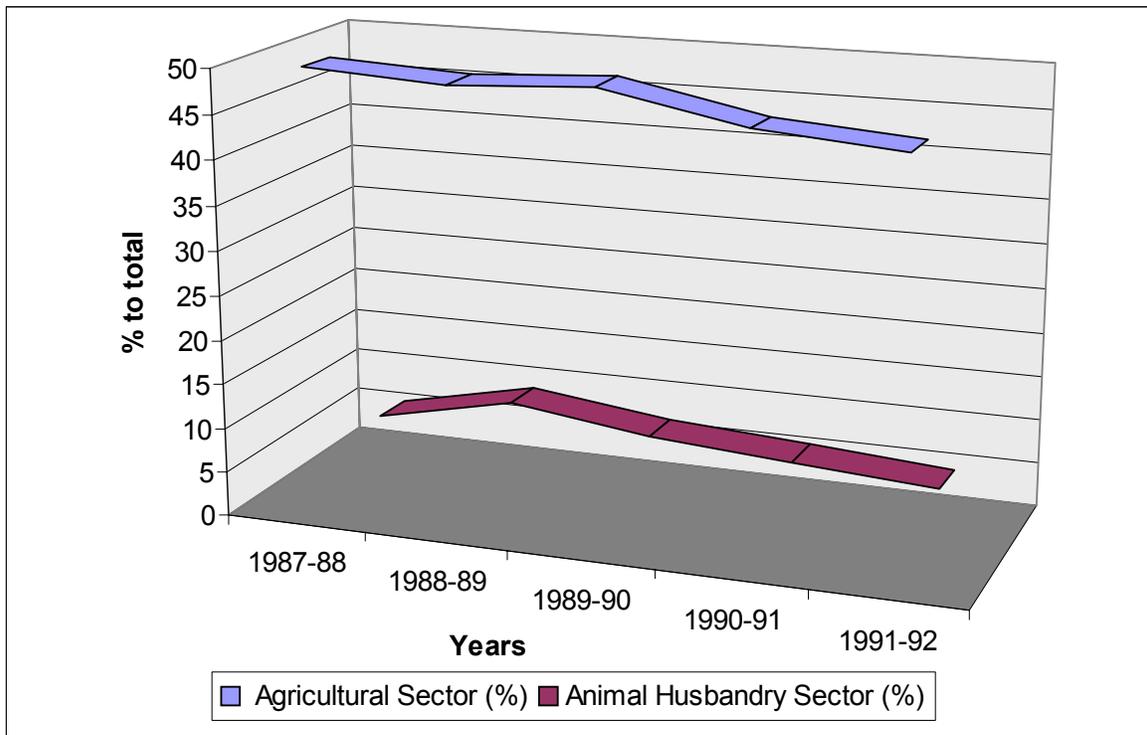
Table 2.3 indicates that about 75.62% to total agricultural enterprises are found in animal husbandry sector i.e. in cattle breeding, rearing and production of milk. As far as the generation of employment is concerned, animal husbandry employs a substantial percentage of the total employment in agriculture and animal husbandry together. The percentage is being 63.07% to the total.

## **2.5 LIVESTOCK DEVELOPMENT**

It has already been said that promotion of livestock carries immense economic significance in the state; it will be meaningful to



**Fig.2.4 Sex Ratio of Livestock Farmers**



**Fig.2.5 Comparison of State's Income from different sectors**

carry out an empirical investigation concerning the economics of livestock production in the area under study. Sikkim has the appropriate geographical conditions for the growth and development of livestock (Maithani, 1992). There is tremendous scope for developing livestock in commercial scales, thereby, generating both employment and income. As commercial farming has to be economically sound and viable, what needs to be done in the state, is to develop a sound infrastructure base such as improved accountability and terms of adequate transport and communication, institutional development, such as banking and cooperative and so on. As far as generation and distribution of income from livestock farming are concerned, data and information related to expenditure incurred on different heads such as rearing of livestock, marketing and sale of livestock products etc. are not available (Jana, 1998).

With the creation of an independent Animal Husbandry and Veterinary Services Department in 1974, a number of livestock farms and veterinary hospitals were established in the state. Primary importance was given to the animal health sector, which was complimentary to the extension wings like the development of cattle, poultry, piggery, sheep and goat and other livestock on one hand and development of feed, fodder and dairy on the other. There was substantial development in health care facilities of the livestock in the state during the last few years (Table 2.4).

**Table 2.4 Livestock health care centres in Sikkim (1994)**

Institutions	Numbers
Veterinary Institutions	11
Dispensaries	25

Stockman Centre	55
Livestock Farms	9
Diseases Check Post	4

Source: S. Paljor, 1995

In addition, the department of Animal Husbandry is running a training centre for stockman, a disease investigation laboratory and a feed analysis laboratory in the state. The staff in this department consists of 72 Gazetted Officers, 156 Para Veterinarians and 246 other supporting staffs. In 1994, Animal Husbandry and Veterinary Services Department had availed themselves the following infrastructure (see Table 2.4).

## 2.6 INCOME STRUCTURE OF THE INHABITANTS

To maintain livelihood pattern of the people in the study area, the participation in economic activities sharply divide the population into two categories i.e. workers and non-workers. It has been observed that to study the present economic conditions and the future development of the people, the grouping of income level is very much necessary. The surveyor observed four main categories of income groups for the purpose of analysis and to assess the level of their economic development (Table 2.5). These income groups are being classified into i) below Rs.20,000; ii) Rs.20,000 to 50,000; iii) Rs.50,000 to 100,000 and iv) above Rs.1 lakh.

**Table 2.5 Income from different sources obtained from field survey, 2005**

Categories	North	East	South	West	Total
	Percentage to Total Population				
< 20,000	51.30	52.12	61.45	47.21	52.74
20,000-50,000	28.50	36.53	22.52	41.00	34.47

50,000-100,000	5.69	5.01	8.95	4.91	5.48
> 100,000	3.11	2.33	4.82	0.87	3.48
Non-Workers	11.40	4.01	2.26	6.01	4.70
Total Population	3446	24504	3632	2078	33660

Source: Field Survey, 2005.

Accordingly to the chosen categories of income groups, the high percentage (52.74%) of people is belonging to an annual income of less than Rs.20,000 which indicates that majority of people of the state belong to poor section of the society. The highest and the lowest percentage in the category of group lie in the South District and the West District respectively. About 34.47% of farmers belong to the very next position of annual income group of Rs. 20,000 to Rs.50,000 (Fig. 2.6). They are mainly Government employees, small businessmen, medium landowners etc. Only 5.48% of the total surveyed populations have an annual income from Rs. 50,000 to Rs.1 lakh. They are large landowners, high Government personnel, large businessmen etc. The last category of people having more than Rs.1 lakh annual income is 3.48%. They are very large landowner and businessmen.

## 2.7 INCOME FROM LIVESTOCK REARING

Most of the farmers especially in the state are well aware of the cost principles involved in livestock farming i.e. the relationship between cost of production and the receipt of revenue in terms of loss/profit to work out real income. It was also observed that the farmers of the region normally increase their income from livestock farming in two ways i.e. first by increasing production and second by reducing cost of production. The cost hereby, refers to the outlay of

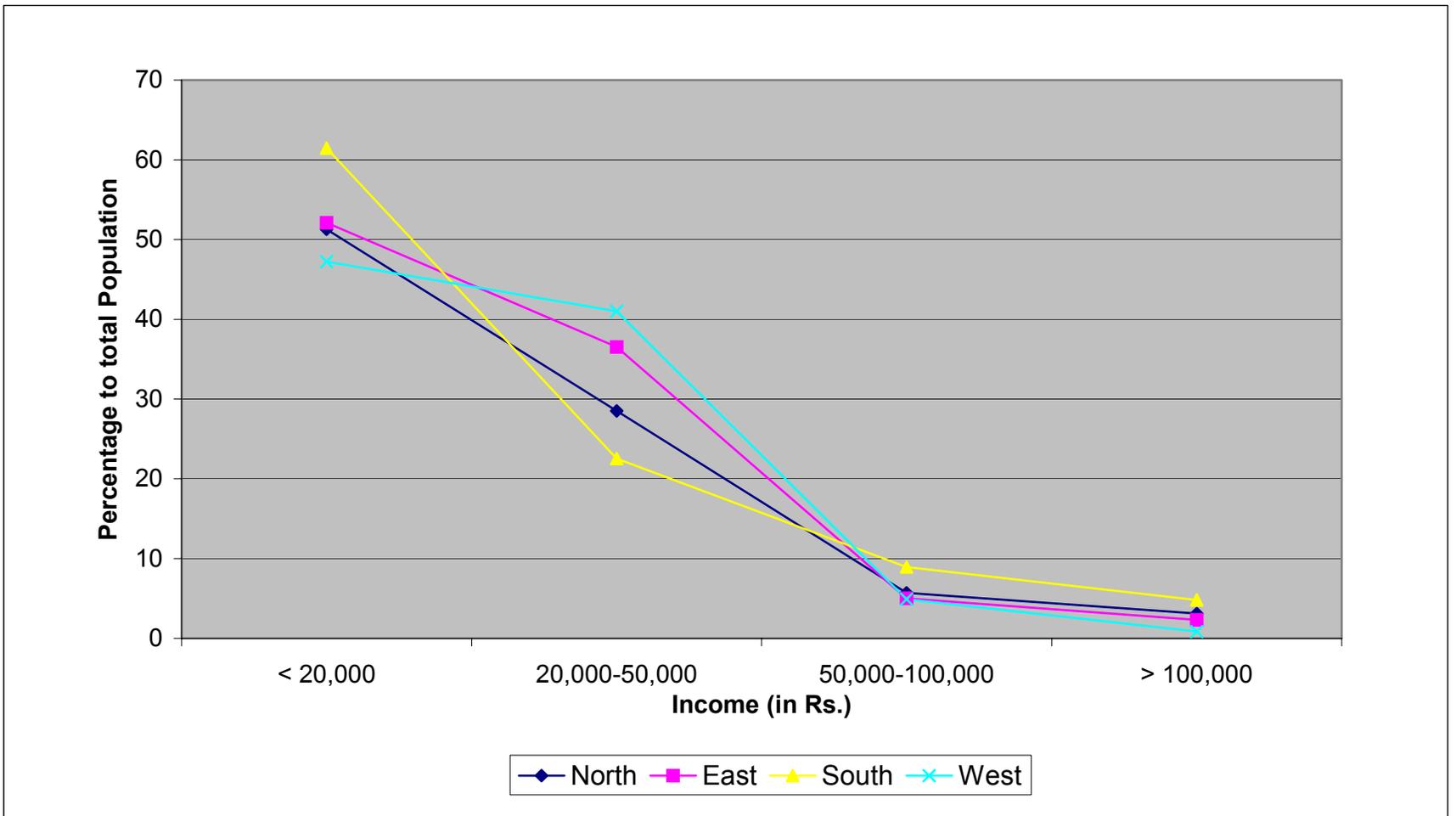
funds used in the production of livestock products e.g. milk, meat and egg etc. Once the farm is established, the farmers are the more concerned about the income from the farms. Therefore, a modest attempt has been made here to analyses the various costs and cash returns in establishing one unit each of yak, local cattle and crossbred cattle during the production period of one location in the state. The second aspect of the study is to analyses the economics of production of one litre of yak (local) and crossbred cow milk.

**Table 2.6 Economics of establishment of one unit of livestock's in one location period**

Details of Expenditure	Yaks		Cows	
	Continental Zone	Dry High Zone	Local	Crossbreed
Capital investment	6407.50	6407.50	5400.00	10500.00
Operating cost	3426.17	2591.05	5859.81	9212.96
Return	5692.50	6357.50	7867.50	17330.00
Profit	2266.33	3766.45	2007.69	8117.04

Source: S.Paljor.

It is seen from Table 2.6 that the initial capital investment to establish one yak unit could be to the tune of Rs. 6,407.50 for both continental and dry high zone. The return as well as net profit per yak per location on the sale of milk, calf and yak hair is better in continental zone rather than dry high zone of the state. Though the capital investment for crossbreed cow is double on the basis of local cows and the return from crossbreed animals is always higher than the local cows one can say that rearing exotic crossbreed animals in the region cannot raise the farm income of the households. Introduction of crossbreed cows in the area can help in commercial production of milk and milk product.



**Fig.2.6 Income Structure of the Farmers**

Keeping in view, the distribution of farmers according to farm size will be worthwhile to discuss the pattern of distribution of income generated from livestock and agricultural farming according to various arbitrary farm sizes. For the purpose, the average income per household derived from livestock farming and agricultural farming has been worked out taking into account the various arbitrary sizes of holding. The average income from livestock and agriculture farming separately per household per annum has been presented in Table 2.7. It is seen from table that the livestock farmers having below 0.5 ha of land earn Rs.16,043.75 per annum and the farmers with the holding size between 0.5 and 1.0 ha earn Rs.23,050 per annum. It could further be observed that income shows an increasing trend as the farm size increases. As regards to income generated from agriculture farming, it was found that the average income per household does not necessarily depend on the size of holdings except those farmers having 2.0-2.5 ha of land. Their average income is Rs.12,000.00 annum, which is more than the income received by the farmers having less than 0.5 hectares of cultivated land.

**Table 2.7 Comparison of income from livestock and agriculture farming**

<b>Holding Size in ha.</b>	<b>Average Income from Livestock farming per household in Rs.</b>	<b>Average Income agricultural farming per household per year in Rs.</b>	<b>Average income from agricultural cum Livestock farming per household per year in Rs.</b>
<-0.5	16043.75	7662.50	12750.00
0.5-1.0	23050 .00	8640.00	25432.35
1.0-1.5	-	7248.75	23939.92
1.5-2.0	-	7220.00	23167.50
2.0-2.5	-	12000.00	27270.00
>-2.5	-	-	21778.12

Source: S. Paljor

Switching over to the average income generated from mixed farming i.e. agriculture-cum livestock farming, it is observed that income from such farming (below 0.5 ha) ranges between Rs.12,750.00 and Rs.27,270.00 per annum from the holding size ranging from 2.0 to 2.5 ha. The farmers with land holding generally less than 0.5 ha earn as much as Rs.12,750 from mixed farming as compared to Rs.7,662.50 per annum from agriculture farming alone. It could thus be seen that holding size generally above 1 ha of land gives relatively better return in terms of cash as far as mixed farming is concerned. It can also be seen that income from livestock farming is more than double as compared to that of income derived from agricultural farming alone. In the plains, as per the study conducted by the Indian Council of Agriculture Research (ICAR) over the period 1962-63-1967-68 concerning a comparative analysis on the economics of dairy farming versus mixed arable farming in Nasipur (Patiala, Panjab), net returns per hectare of land are Rs.1,480, Rs.1,348 and Rs.1,107 per annum for dairy, mixed and arable farming, respectively. Unlike the other climatic zones, the farmers of the dry high zone depend largely on livestock farming for their economic sustenance. They rear yak, sheep and goats in large number to maintain their livelihood. Due to their centuries of physical isolation in the mountain fastness, the highlanders in the region have built up their own traditional ways of livestock rearing.

## **2.8 CONCLUSION**

It can be concluded that the livestock rearing activities in Sikkim have decreased day by day due to various problems. As most of the garucharans and grazed lands are restricted for grazing, the

numbers of livestock has decreased and the people are keen to engage themselves in other profitable activities. So, many people have changes their occupation from livestock rearing to industrial and other economic activities. Livestock rearing being the traditional occupation of the people of the state has a promising future in view of its enormous potentiality. From the economic analysis of livestock farming it is quite interesting to note that high yielding crossbreed animals are increasingly cost effective and the return is substantially higher than the local indigenous varieties. A comparative analysis of livestock versus crop farming in the region also indicates that the farmers are more profitable than the later in terms of cash returns.

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**CHAPTER - 3**  
**LIVESTOCK REARING AND**  
**FODDER AVAILABILITY**

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# LIVESTOCK REARING AND FODDER AVAILABILITY

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## 3.0 INTRODUCTION

Livestock keeping in Sikkim and similar other mountainous states in India has multiple objectives and dimensions. They play multifunctional role in rural system and economy. They have a strong human dimension, as manifested through socio-cultural link and involvement of rural women. Besides, their well-established role in agriculture has played crucial role in food security and as risk aversion mechanism for sustaining family, whenever there is crop failure and other natural calamities. Role of livestock in generating employment and income in rural areas is well established and livestock development has become an important component of rural development programs i.e. equity and extending benefits directly to rural women can be achieved through livestock development since livestock distribution is less skewed than land. Livestock are a part of nature's chain for recycling nutrients, converting low quality and other agro-by-products into good quality and organic fertilizers. The latter is being important for retaining soil fertility and productivity in ecologically fragile hill region of Sikkim. Moreover, the farmers always take holistic views and system manager who has to make decision on variety of factors.

The Himalayan regions are characterised by limited, small and fragmented land holdings, rain-fed subsistence agriculture, less input and low output production system. (Jana, 1991) The regions have sparse population, undulating terrain, poor means of transport and communication, women centered agriculture, out migration of males in search of farm employment, poor productivity of crops and livestock, fragile eco-system, low risk in plant and animal diversity etc. With the application of local wisdom, the hill people have maintained the hill ecology in spite of all those constrains. They have sustained themselves in these difficult conditions and in their endeavor livestock were active particularly indigenous livestock provide practical means of using natural grasslands where crops production is possible but the exotic animals cannot perform well because of higher susceptibility to environment, disease and nutritional stress. Improved livestock management by small landholders would contribute to farm income households' nutrition and sustainability of livestock production.

### **3.1 LIVESTOCK REARING ZONES**

In Sikkim, which constitutes total geographical area of Sikkim in an important repository of genetic variability of plants and animals. The animals mostly include yaks, sheep, goats, and equine and buffaloes etc. The Table 3.1 presents different varieties wild species in four different climatic zones in Sikkim. It will be seen that there are various domesticated and wild related species found in different climatic zones. As far as dry high zone is concerned, the principal livestock include sheep, yaks, Bhutia type goats and horses, mules, donkeys, cattle, poultry and pigs of different kinds are found here. Similarly, the sub-tropical humid zone sustains a number of

domesticated species such as sheep, goats, cattle poultry, pigs and buffaloes etc. However, poultry and pigs in this zone have wild related species as far as the economic importance of these animals are concerned the following (Table 3.1).

**Table 3.1 Varieties of livestock and their related wild species found in different climatic zones of Sikkim**

Sl. No	Type of Livestock Domesticated	Name of the related wild species	Economic Importance
<b>DRY HIGH ZONE</b>			
<b>A</b>	<b>SHEEP</b> Tibetan sheep Sikkimese Sheep Bhera, or banpala	Bharal or Blue Sheep (Pseudois nayaur) Nayan or great Tibetan Sheep (Ovis ammon hillsoni) No recorded of Wild	The domesticated sheep for wool and meat. The meat from this zone are prized meat and very expensive. The wild animals are hunted for meat and fur.
<b>B</b>	<b>YAK</b> Yak (Bos poiphagus grunniens)	Yaks	The domesticated Yaks are used for milk meat, skin, transportation, feet and riding. The wild species is extinct in Sikkim.
<b>C</b>	1. Chengra (Bhutia type Hairy cashmere Type goat).	Himalayan Tahr (Hemitragus jemlahicus)	The domesticated goats are used for hair, meat, skin etc.
<b>D</b>	<b>EQUINE</b> 1. Bhutia Type Horse	Kyang (Equus kiang)	Domestic horse are used for riding and transportation, Not much in use in this area owing to high altitude
<b>CONTINENTAL UPPER ZONE</b>			
<b>A</b>	<b>SHEEP</b> 1. Tibetan Sheep 2. Sikkimese Sheep Bhera or Banpala or Gorpala	Sheep wild Most of the wild sheep found in the dry high zone migrate to continental upper zone during winter.	Domesticated sheep used for wool and watt.
<b>B</b>	<b>YAK</b> 1. Yak 2. Dzo (Yak & Cattle Cross)	No recorded of wild Yaks	Yaks are use for milk, meat, hair, and hide, The tent shade out of yak hair, are rain and snow proof.
<b>C</b>	<b>GOAT</b> 1. Changra (Bhutia type) Goat	No recorded of wild Goats	The domesticated goats are used for hair meats and skin
<b>D</b>	<b>EQUINE</b> (Domestic) 1. Bhutia (type) 2. Mules 3. Donkey	Equines Kyang do not migrate to this Zone in winter Perhaps to Tibet	Riding and Transportation
<b>E</b>	<b>CATTLE</b> Seri Type Jersey Cross	Not available	Meat, Milk, hide and manure and draft.

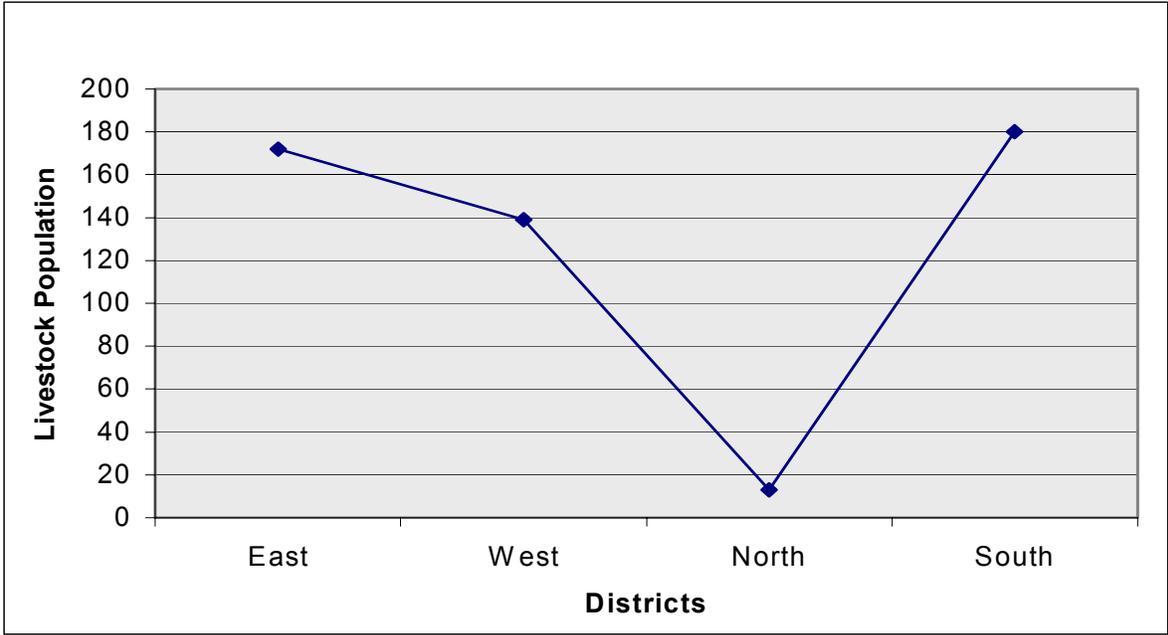
<b>F</b>	<b>POULTRY</b> 1.Indegenous Type Cross Breed Saddle Back & Large White.	Foundry in lower areas of this Continental Zone	Meat, Eggs
<b>SUB-TROPICAL HUMID ZONE</b>			
<b>A</b>	<b>SHEEP</b> Banpala and Garpala	Not available	Meat and wool for making raris (Carpet)
<b>C</b>	<b>GOAT</b> 1.Local Singhali 2.Black Bengal 3. Crosses	Not available	Goat in this zone are reared for meat and milk
<b>E</b>	<b>CATTLE</b> Local Seri Type Jerseeey Cross Holsteen Swiss Brown Cross	Not available	Meat, milk, had hide and droff and manure
<b>F</b>	<b>POULTRY</b> Local Fizzle found Local Fowl Rhode Island Cross White Leghorn Cross	1.RedJungle Fowl (Gallus gallus) 2.Kaliz(Lopura Leucomelanura)	Domesticated birds are reared for Eggs, and meat and wild species for hunting
<b>G</b>	<b>PIGS</b> Lepcha Type Cross Breed-Saddle Back, Hampshire, large white	Wild Pigs (sus scrofa)	Meat and manure
<b>H</b>	<b>BUFFALOES</b>	Not available	Population is very small reared for milk and meat.

Source: Paljor S.: Unpublished Ph.D. Thesis paper on, Livestock Economic & its Impact on the environment of North Sikkim

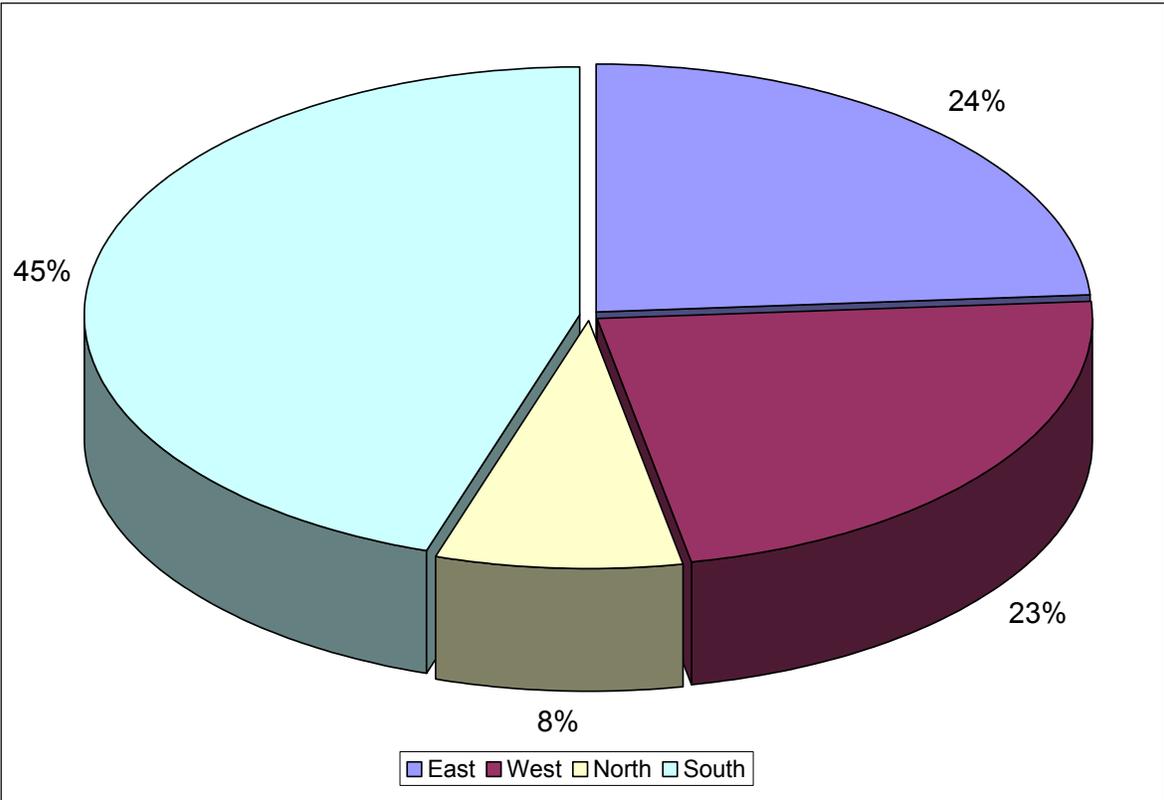
It is evident that average livestock population density is very low in Sikkim (Fig.3.1). The percentage distribution of different livestock is widely varied from district to district in Sikkim (Tables 3.2A & 3.2B) (Fig.3.2).

**Table 3.2A**District-wise distribution of livestock population in Sikkim 2001

<b>Species</b>	<b>East District</b>	<b>West District</b>	<b>North District</b>	<b>South District</b>	<b>Total</b>
Cattle	50431	42502	12841	37250	143024
Buffalo	323	1311	66	270	1970
Sheep	316	1777	2325	605	5023
Goat	24375	24719	8375	25469	82938



**Fig.3.1 Density of Livestock Population**



**Fig. 3.2 Livestock Population 2001**

Yak	953	638	1549	-	3140
Poultry	66066	75316	22023	58001	221406
Pig	8784	8366	3135	6690	26975
Horse/Pony	1087	2272	1522	755	5436
Donkey & Mule	98	-	21	2	121
Rabbit	177	131	54	55	357
Dog	11856	4750	1142	5810	23558
Total	164466	161782	52853	134907	513948
Density	172.33	138.75	12.50	180.00	72.42

Source: Sikkim; A Statistical Profile 2002

India has the largest number of livestock in the world. The state shares about 1% of total livestock of the country. It is only 72 livestock per km<sup>2</sup> of land and there is a considerable decline since 1987, when it was 83 per Km<sup>2</sup>.

**Table 3.2B District-wise distribution livestock population in Sikkim (in Percentage)**

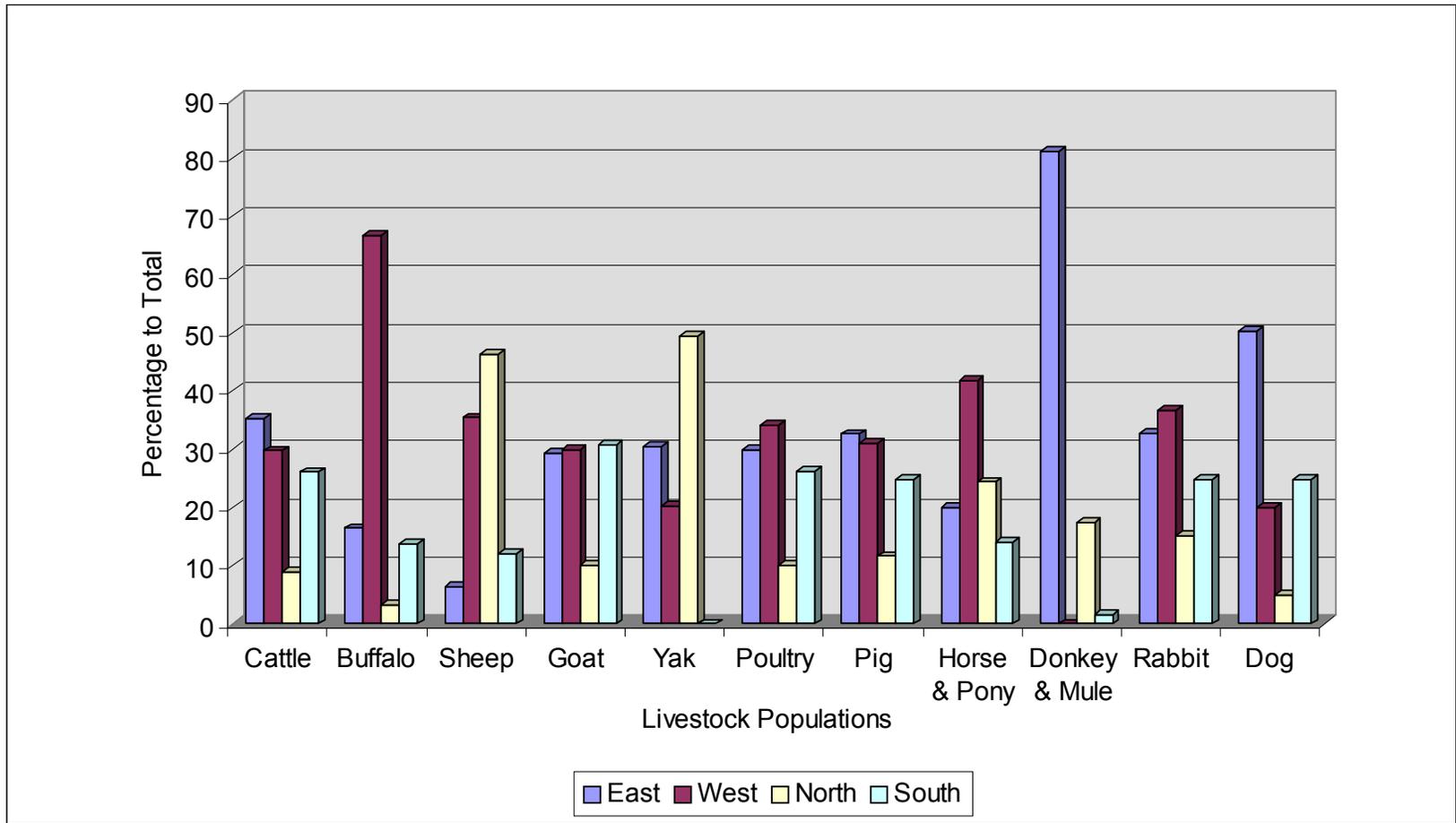
Species	East	West	North	South	Total
Cattle	35.26	29.71	8.98	26.05	100.00
Buffalo	16.39	66.55	3.36	13.70	100.00
Sheep	6.29	35.38	46.29	12.04	100.00
Goat	29.39	29.80	10.09	30.72	100.00
Yak	30.35	20.31	49.34	-	100.00
Poultry	29.84	34.02	9.94	26.20	100.00
Pig	32.56	31.01	11.62	24.81	100.00
Horse & Pony	19.99	41.80	24.32	13.89	100.00
Donkey & Mule	80.99	-	17.36	1.65	100.00
Rabbit	32.77	36.69	15.12	24.80	100.00
Dog	50.32	20.00	4.84	24.66	100.00
Total	31.99	31.48	10.28	26.25	100.00

Source: Sikkim; A Statistical Profile 2002

It is found that livestock population in Sikkim is decreasing day by day chiefly because of shortage of fodder due to restriction to rear the cattle in *garucharan* land and forest. The district-wise livestock population in Sikkim is not uniform due to various social and economic factors.

The distribution of livestock indicates that among the livestock, cattle are the largest in number for their multifunctional activities in

Sikkim (Table 3.3). According to Sikkim Statistical Profile 2002, the highest number of livestock population belongs to poultry and the West District shares the largest number (34.02%) of livestock followed by the East District (29.84%), the South District (26.20%) and the North District (9.94%) (Fig.3.3). After poultry, cattle are the second highest in number and share in major economic activities in the state. The cattle are unevenly distributed all over the state. Highest percentage to the total is shared by the East District (35.26%), followed by the West District (29.71%), the South District (26.04%) and the North District (8.98%). From the field observation, it is found that more than 40 per cent Sikkimese keep cattle for their various uses. They get milk, butter, ghee, etc. and the farmers are using bulls for ploughing their agricultural lands. Goats are most common and widely domesticated animal in Sikkim. Highest percentage of goats is found in the South District (30.72%) and the lowest is in the North District (10.09%). Because goats cannot survive in severe cold climate of the North District. The East District and the West District both share 29.39% and 29.80% of the state's total number of the goats respectively. It is also observed during the field survey that more than 60% Sikkimese keep pigs only. Buddhists do not keep pigs. Highest number of pigs is reared in the East District (32.56%) followed by the West District (31.01%), the South District (24.80%) and the North District (11.62%). Field study also shows that highest number of yaks is recorded in the North District (49.33%) because they can survive even in severe cold climate. Number of horses and ponies are highest in the West District (41.80%) due to its moderate climate. Least poultry farms are found in the North District



**Fig.3.3 Distribution of Livestock Population in percentage**

due to its cold climate, lack of market centres for their sale and low density of population per km<sup>2</sup>. On the contrary, it is found that the highest percentage of poultry is found in the West District (34.02%) due to favourable climatic conditions and high density of population. The people of Sikkim include meat in their daily diet for nutrition and food habits. Sikkim is an important tourist's place so; hotels and tourist lodges are more in number to accommodate tourists. There is high demand of meat, eggs, etc in the tourist's places like Yuksom, Pelling, Gyalzing, etc. situated in the West District

**Table 3.3 Livestock distribution in the districts of Sikkim (in Percentage)**

Species	East	West	North	South
Cattle	30.66	26.27	24.29	27.62
Buffalo	0.20	0.81	0.12	0.20
Sheep	0.19	1.10	4.40	0.45
Goat	14.82	15.28	15.85	18.88
Yak	0.58	0.39	2.93	-
Poultry	40.17	46.55	41.67	42.99
Pig	5.34	5.17	5.93	4.95
Horse & Pony	0.66	1.41	2.50	0.56
Donkey & Mule	0.06	-	0.05	-
Rabbit	0.11	0.08	0.10	0.04
Dog	7.21	2.94	2.16	4.31
Total	100.00	100.00	100.00	100.00

Source: Sikkim; A Statistical Profile 2002.

An increase of livestock population is, however, not a healthy sign for the economic development of the state. This increases the pressure on lands and forests on, which the livestock subsists. Pressure of livestock in the state has reached critical limits, as there are 72.0 livestock per km<sup>2</sup> on land and 5.0 livestock per km<sup>2</sup> on cultivated land. When compared it with the carrying capacity of land, it is found that the state has less number of livestock than it can support under the existing conditions of feed and fodder availability and management practices. The major problems of the livestock

population in the state are its poor quality and lack of care of their health and living environment.

In 1997, livestock population was unevenly distributed in all the sub-divisions, highest cattle, goat and poultry population were found in Soreng sub-division. Gangtok sub-division had gained the top position in the case of pig population (Table 3.4). Highest number of sheep and yak population was concentrated in dry high zone of Chungthang sub-division. Yak and buffaloes were not available or found very negligible in number at Mangan, Gyalzing, Namchi and Ravong sub-division due to unfavorable climatic conditions in these areas (Fig.3.4).

**Table 3.4 Distribution of livestock population in 1997**

Sub-division	Cattle		Pig		Sheep		Goat	Yak	Poultry	Buffaloes	Total
	Cross breed	Indigenous	Cross breed	Indigenous	Cross breed	Indigenous	-	-	-	-	
Gangtok	14558	16227	3110	1860	92	158	14648	1717	23864	236	76470
Pakyong	5804	10842	1145	799	1	65	9727	34	17296	87	45800
Gyalshing	2548	7687	1314	1099	93	289	8537	312	16098	178	38155
Soreng	7755	24512	1382	2805	475	920	16182	551	29718	1133	85433
Mangan	2428	7001	1245	1180	0	644	6766	25	12257	66	31612
Chungthang	902	2450	328	160	69	1612	1609	2142	2720	6	12058
Namchi	13017	9657	2492	1190	0	39	15555	0	24113	4	6606
Ravong	2231	12345	984	1047	0	566	9914	0	10037	266	37384

Source: Livestock Census-1997

During the family survey in different district of Sikkim, it is found that livestock rearing in the rural areas was a subsidiary occupation

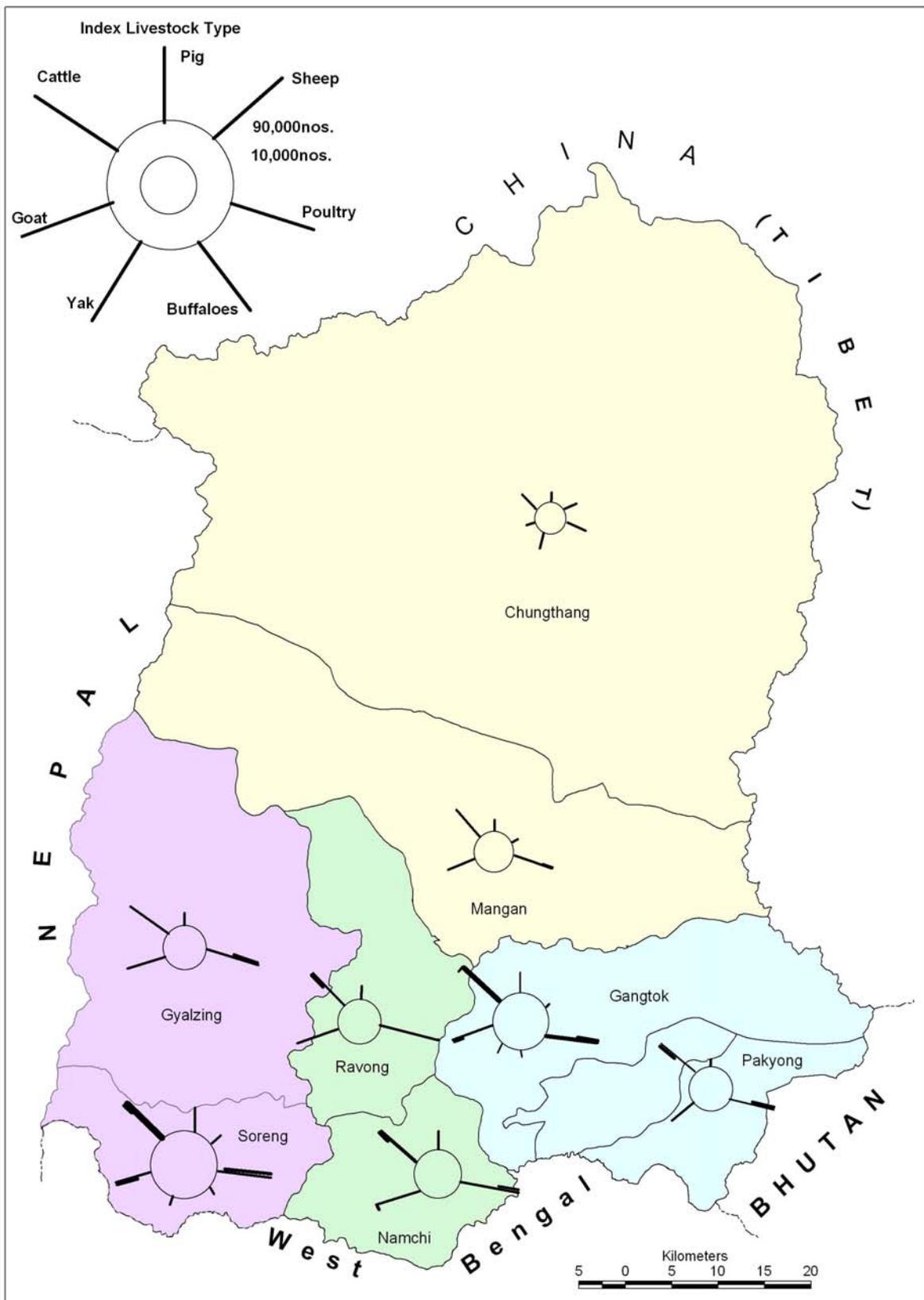


Fig 3.4 Sub-division wise Livestock Population (1997)

and most of the rural people used to keep livestock for additional income. But at present, due to non-availability of green fodder and high cost of market fodder restrict their domestication (Table 3.5).

**Table 3.5 Different categories of livestock in surveyed household in the Districts 2005**

District	No of House holds	No of Surveyed House holds	Cattle	Goat	Pig	Poultry	Total
North	10,921	1,965	756	615	200	1282	2853
			<i>38.65</i>	<i>39.78</i>	<i>39.21</i>	<i>48.06</i>	<i>42.72</i>
East	54,581	9,825	163	140	31	188	522
			<i>8.33</i>	<i>9.05</i>	<i>6.08</i>	<i>7.04</i>	<i>7.82</i>
South	25,477	3,058	820	613	241	907	2582
			<i>41.92</i>	<i>39.65</i>	<i>47.25</i>	<i>34.0</i>	<i>38.64</i>
West	23,244	1,859	217	178	38	290	723
			<i>11.09</i>	<i>11.51</i>	<i>7.45</i>	<i>10.87</i>	<i>10.79</i>
Total	114,223	16,707	1956	1546	510	2667	6679

Source: Field Survey during different field visit. *Italic figures are shown in %*

From the field survey, it was found that more than 80% of the total households keep different types of livestock. Surveyors observed that the highest percentage of livestock domesticated in the state is poultry, (about 40% of the total livestock). Because poultry is the highest income earner for the family compared to other livestock. It can be kept without any expenses. So, people keep poultry for getting meat, egg, hides etc. Their percentages are 48.06 in the North District followed by 38.64 in the South District, 10.82 in the West District and 7.82 in the East District. The cattle development and rearing have also important in the state. Farmers keep the cattle for their daily use like ploughing of agricultural field, milk, and milk allied products like ghee, butter, cheese etc for consumption. These cattle were highest in the South District (41.92%) followed by the North

District (38.65%), the West District (11.09%) and the East District (8.33%) (Fig.3.5). Most of the farmers in the state keep a few numbers of pigs and goats in their households. Consumption of pork, mutton and pork products are very common in Sikkim. Highest consumption of livestock products is found both in South and North Districts. Lowest consumption of these (6.08% pig and 9.05% goat) products is found in the East District where most of the urban areas like Gangtok, Singtam, Rongpo, etc. are located and urban people usually depend on poultry products only.

### 3.2 GROWTH OF LIVESTOCK POPULATION

As per livestock census 1977, the cattle population is 1,57,546, which was increased up to 1,83,385 (16.40 %) in 1987 and it is also decreased up to 1,43,024 (-22.00 %) in the year 1997. On the other hand the population of buffaloes is 5,438 in 1977, which is decreased up to 3,088 (-43.20 %) in the 1987 census. Trends of growth of livestock population in Sikkim can be realized from Table 3.6.

**Table 3.6 Growth of livestock population from 1977 to 1997**

Livestock	1977	1987	Growth Rate	1997	Growth Rate
Cattle	157546	183385	16.40	143024	-22.00
Buffaloes	5438	3088	-43.21	1970	-36.20
Sheep & Goat	105090	109143	3.85	88003	-19.36
Pigs	18595	31207	67.82	26975	-13.56
Poultry	220927	256841	16.25	219552	-41.51
Yak	3995	5354	34.01	4731	-11.36

Source: Livestock census: 1977, 1987 & 1997

The sheep and goat population has increased 3.85 per cent. Their population was decreased in to -19.36 per cent. The highest percentage of livestock population is increased between 1977 and

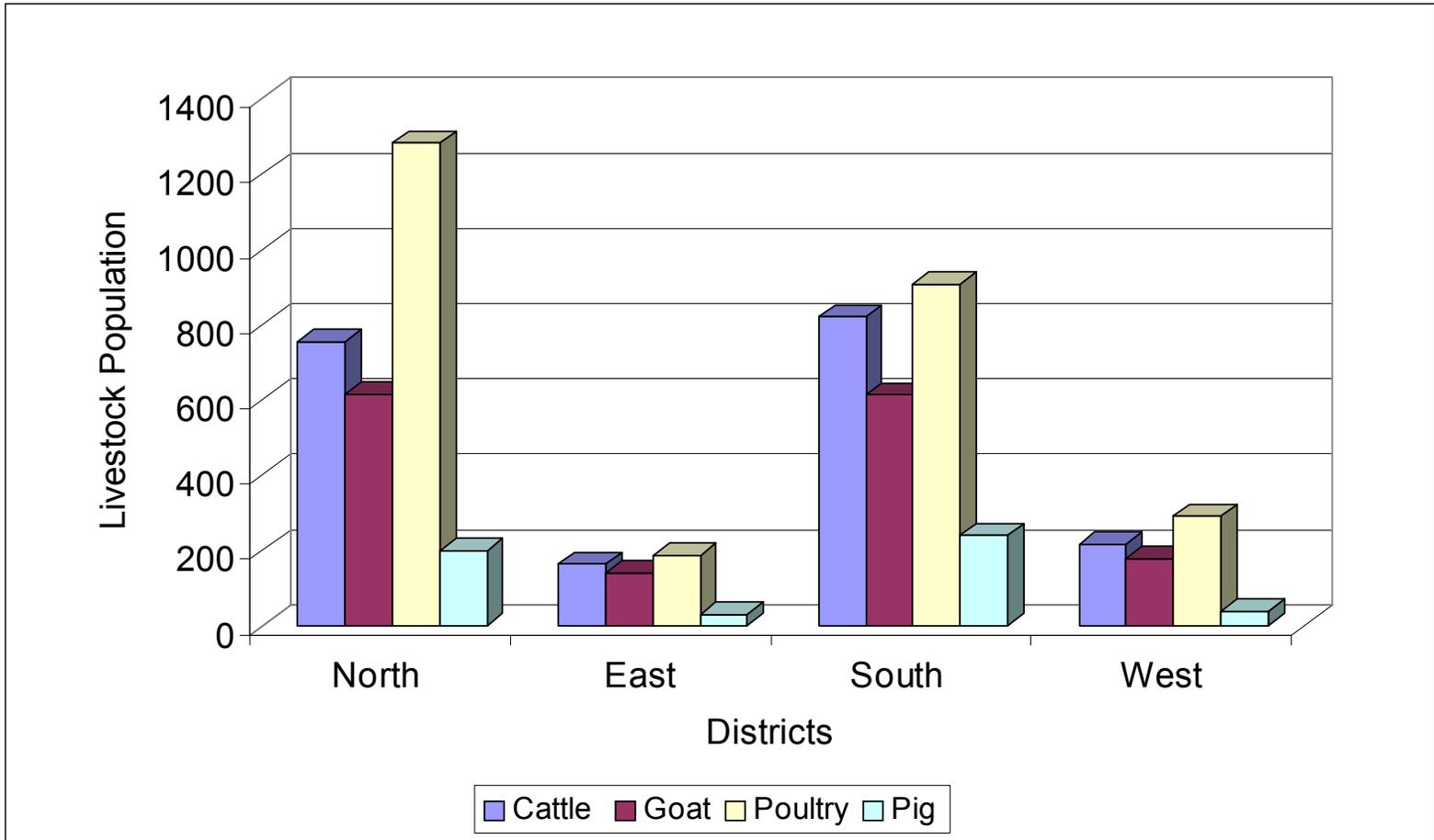


Fig.3.5 Distribution of Surveyed Livestock Population

1987 in piggery population (67.82%) (Fig.3.6). The poultry and yak population is increased in 16.25% to 34.01% between 1977 and 1987 Census. On the above discussion, it is clear that the growth rate of livestock population is increased between 1977 and 1987 census. But in respect to census 1987 to 1997, the livestock population is decreased.

### **3.3 LIVESTOCK MIGRATORY TRACTS**

Tibetan Plateau is contiguous with the undulating alpine plains of North Sikkim and earlier to the closer of Tibetan borders, the Lachen and the Lachung farmers (North District) as well as those near to the Nathu La range (East District) had the benefit of free movement into the Tibetan lands for grazing their animals. About 60-70 farmers in Lachen have yaks and sheep. Each farmer has a few heads of yaks and 100-200 sheep, (N. Balaraman & M.M. Golay). For grazing, there is an agreed custom among the farmers that their animals must move together to any area for grazing, so that good grass in that area will not be eaten away by the early grazers but would be equally available to all animals when grazed simultaneously.

In the high altitude of North Sikkim, a place known as Cholamu, serves as a good grazing ground during winter. Here, snowfall is much less because heavy wind carries away the snow and the summer grass, which is left on the earth as dry grass is grazed by yaks in winter. Lachen and Lachung farmers some time have disputes among themselves as to their rights of grazing in this area (Table 3.7). Bhutias and a few Tibetans mostly inhabit Lachung valley. The Bhutias of Lachung have most of the livestock in this

region. The Tibetan settlers who hold small land just sufficient for their dwelling also possess a few sheep and yaks.

**Table 3.7 The Lachen farmers normally follow the following migratory route**

<b>Period of migration</b>	<b>Places of Migration</b>
March-May	Lachen
June-July	Thangu
August-October	Lachen
November-December	Dalep
January-February	Solep

Field Survey

On the Eastern high altitudes of Gnathang and surrounding villages, the following migratory route is commonly adopted for grazing yaks (Table 3.8) (Plate 3.1).

**Table 3.8 Migratory route of livestock farmers**

<b>Period</b>	<b>Places of migration</b>
October-March	Chungthang
March-April	Lema (Lachung)
May-August	Yumthang
September	Lema (Lachung)

Source: Sikkim Livestock Production (B. Balaraman & M.M. Golay)

Mostly the traditional shepherd tribes in Sikkim, namely Gurungs in western Sikkim and some Tibetans and Bhutan's in the Lachen and Lachung valley in the north rear sheep. The occurrence of poisonous plants is reported to be one of the problems met with the sheep farmers in various sheep tracts in the high altitude in Sikkim (Table 3.9).

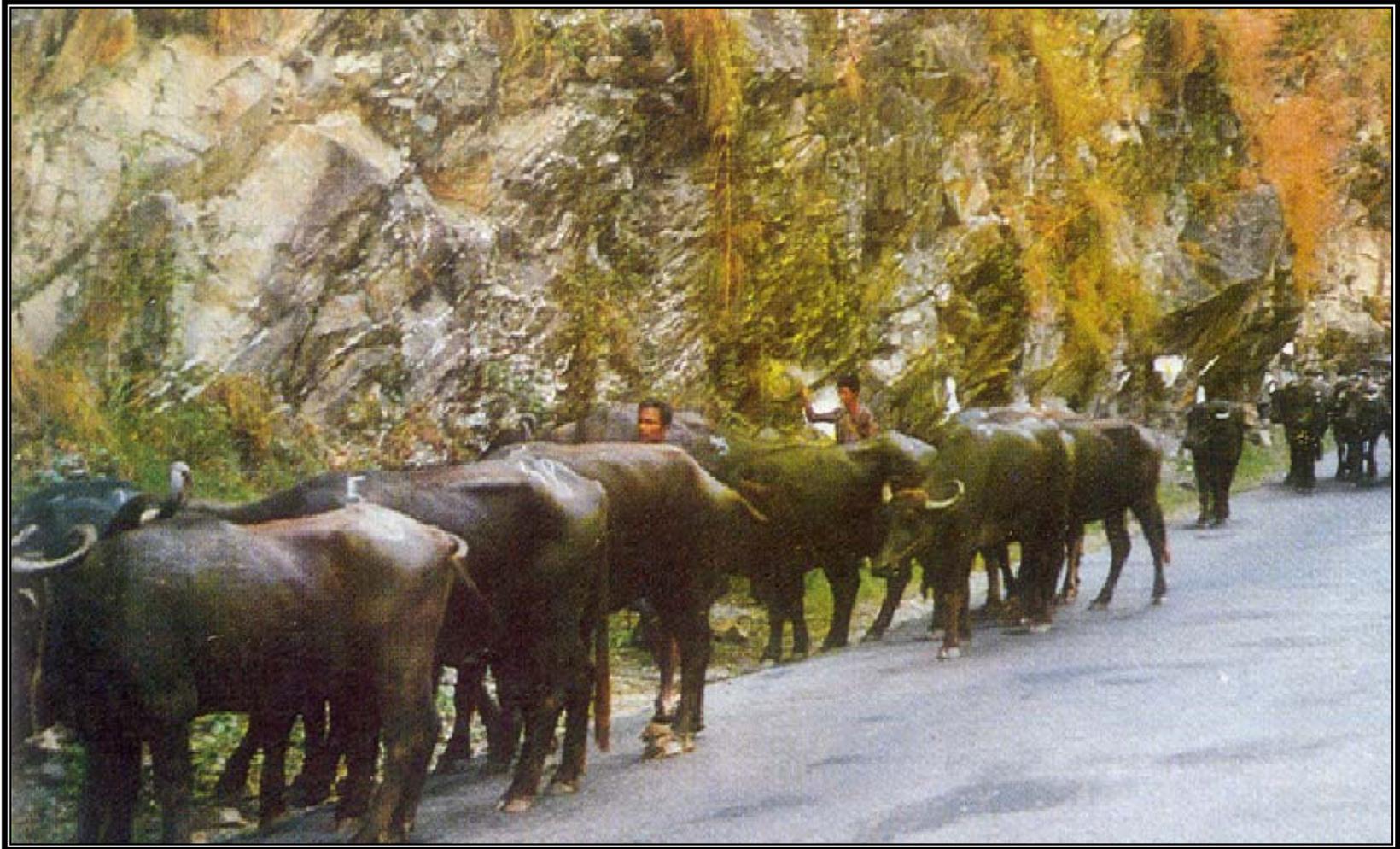


Plate 3.1 Migration of cattle

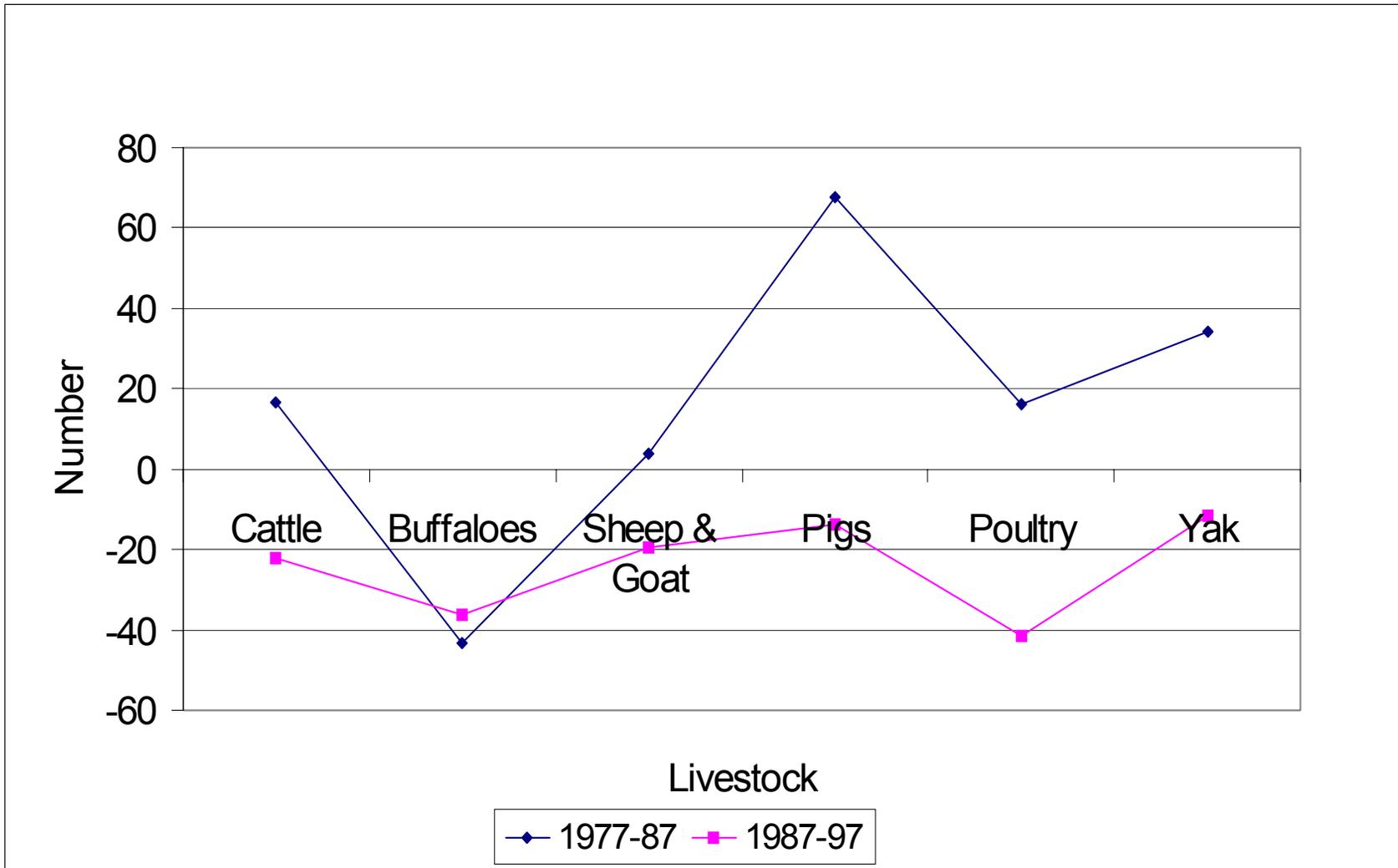


Fig.3.6 Decadal Growth of Livestock (1977-1997)

**Table 3.9 Migratory routes for grazing of yaks**

<b>Periods</b>	<b>Places of Migration</b>
November to February	Below Karponang
March-May	Karponang
June-September	Changu, Gnathang
October	Karponang

Source: Field Survey

In Sikkim, there are extensive grassy meadows at a height from 4,800 to 6,500 m. At lower altitudes the village herds are stall-fed. The forest herds are all grazed in *garucharan* (community forest) which is full with fodder trees sub-tropical grasses legumes species etc. in the forest area the animals are allowed only with proper plantation of high yielding varieties of fodder plants and feeding of tree leaves is very common. According to livestock Census 1997, migration of animals with in the state is not restricted (Fig.3.7). Mainly sheep flocks and yaks have been found to be migratory (Table 3.10). Migration of animals from other states is not allowed. Animal intended for slaughter, however, get entry in the state. These animals are permitted to enter after thorough check up and vaccination in order to check the influx of diseases in the state. With the sealing of borders with Tibet, migratory sheep do not find their way in the state

**Table 3.10 Migratory routes adopted by sheep farmers**

<b>Periods</b>	<b>Places of Migration</b>
January-February	Rishi, Legship, Hindam
March	Forest of Melli, Timbi, Paramchyari
April-May	Melli, Paramchyari
June-July	Daramdin
August	Burtuk
September	Kangdin
October	Sardung
November-December	Rishi, Legship

Source: Field Survey

### 3.4 LIVESTOCK FARMS AND THEIR LOCATION

The efforts are a combination of providing the necessary infrastructure for wide ranging health facilities for the domestic animals, taking preventive measure to avoid occurrences of diseases and up-gradation of stock by introducing highly productive species in different farms of the state (Table 3.11).

**Table 3.11 Distribution of livestock farms and their area in Sikkim (1991-2001)**

Farms	Location		Area in Ha.	
	1991	2001	1991	2001
Exotic Cattle Breeding	Pangthan	Pangthan	85	85
Brown Swiss	Ravong	Ravong	30	30
Bull rearing	Gyalzing	Gyalzing	25	25
State Bull rearing farm	Karfector	Karfector	70	70
Heifer rearing	Chujachen	Chujachen	10	10
Goat	Namthang, Zema	Mangalbarey	N.A	21
Piggery	Gyalzing	Gyalzing	N.A	20
Sheep	Begha, Zema, Rabum	Begha	N.A	10
Poultry	Mangan, Gyalzing, Rhenock	Mangan	N.A	N.A
Hatcheries	Tadung, Jorethang	Jorethang	N.A	N.A

Source: Sikkim: A Statistical Profile, 1991 & 2001

Over all distribution of farms in Sikkim indicates that different types of breeding and production farms of livestock and poultry in 1991 and 2001 are located in same area for exotic cattle breeding, brown Swiss and bull rearing, state bull rearing farm, heifer rearing and piggery farm. But it is cleared from the Table 3.11 that the number of farms related to goats, sheep, poultry and hatcheries, has decreased during 2000-01 due to un-scientific uses.

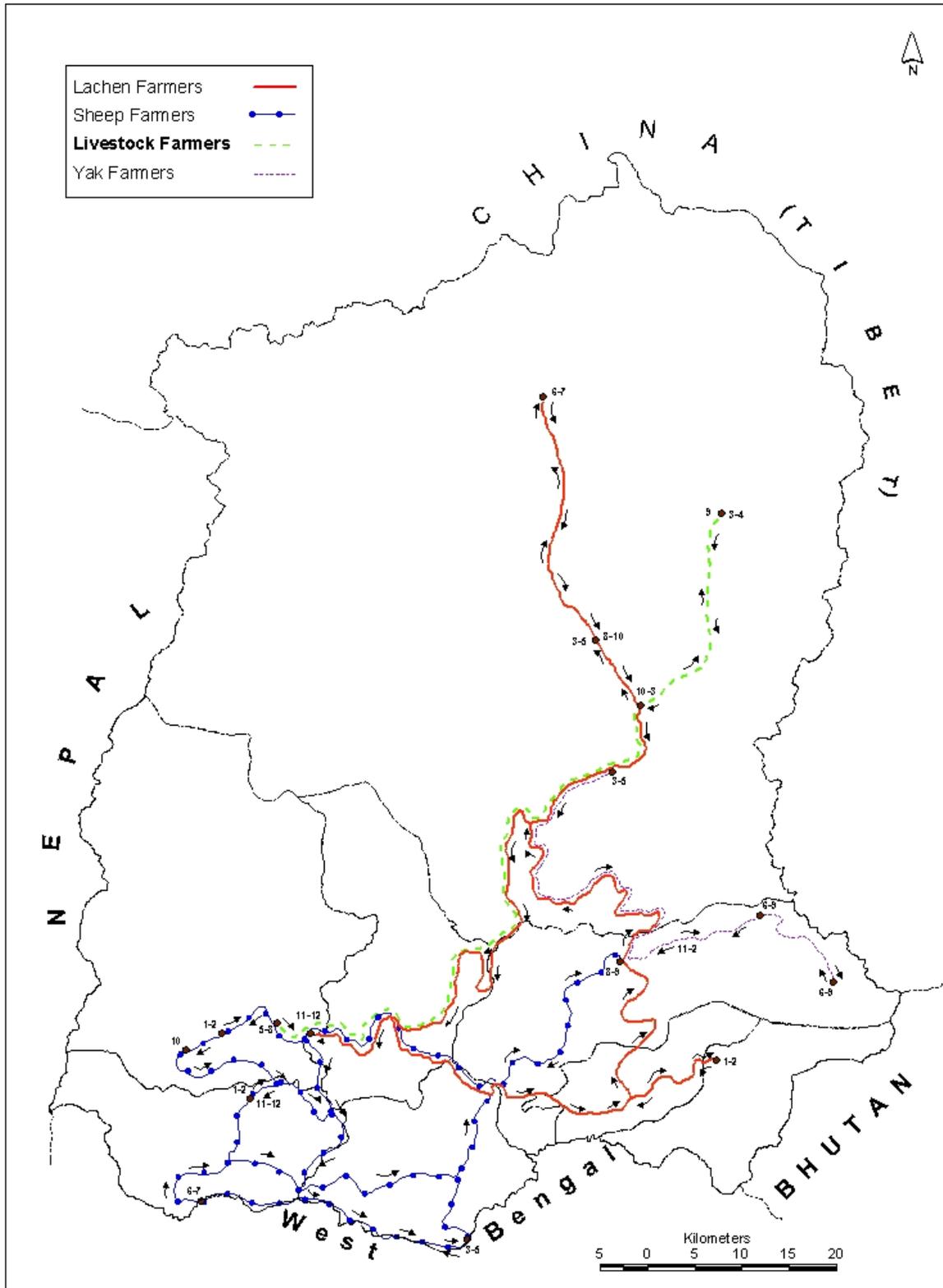


Fig 3.7 Seasonal migratory routes 2005

As it is cleared from the comparative statement of livestock population according to 1977 and 1997 Census that the significant decrease in cattle (-9.22), buffaloes (-63.77), sheep (-68.79), goats (-6.83) and poultry (-0.62) are the indicators of failure to achieve the goals (Table 3.12). Significant increase in other livestock like pigs, and yaks not adequate to fulfill the deficiency (Fig.3.8).

**Table 3.12 Trend of growth livestock population 1977-97**

Livestock	1977	1997	Increases/Decrease in %
Cattle	157,546	143,024	(-) 9.22
Buffaloes	5,438	1,970	(-) 63.77
Sheep	16,104	5,023	(-) 68.79
Pigs	18,595	26,975	(+) 45.05
Goats	88,986	82,980	(-) 6.83
Poultry	220,927	219,552	(-) 0.62
Yak	3,995	4,781	(+) 19.76

Source: Sikkim: A Statistical Profile-2002.

### 3.5 AVAILABILITY OF GRAZING LAND

As livestock are generally eating green fodder, the state is most suitable for their rearing due its large forest cover. The main sources of fodder in the state are unprotected forests and fallow lands for growing of grasses used for grazing land. However, the agricultural crops are the major suppliers of fodder in the form of straw, crop residue, bran and cakes due to non-availability of green fodder. There are no precise ways of measuring the output of fodder from these different sources. The actual quantities of fodder and crop residues would vary depending upon climatic, edaphic and agricultural conditions of the area. Normally, fodder availability from grazing lands is estimated between 1 and 2 tonnes per hectare, from waste and fallow lands, it varies from 1 to 3 tonnes per hectare and from barren

land, it is less than 0.5 tonnes per hectare of gross cultivated area based on field study. Out of the total 7,096 km<sup>2</sup> area of Sikkim; about 1,623.92 km<sup>2</sup> (22%) is available for fodder production and pasture development compared to 15 % of the total land available for cultivation in the state. Area and type of grazing grounds in the state depend on nature of pasturelands and wasteland (Table 3.13).

**Table 3.13 Area under Garucharan, Khasmal and Alpine pastureland in Sikkim**

Categories	Area (Km <sup>2</sup> )	Percent
Alpine Pasture	1070.48	62.68
Khasmal Land	570.73	33.42
Garucharan Land	42.71	2.50
Cultivable Waste Land	23.89	1.40
Total area	1707.81	100.00

Source: Paljor S. Feed and Fodder Resource of Sikkim

The major portions of grazing land in the state that are under alpine pasture (62.68%) followed by khasmal land (33.42%), the garucharan land (2.50%) and cultivable wasteland (1.40%) (Fig.3.9). The state possesses different types of animals and livestock (> 2.5 lakh in 2001). In order to meet the growing demand of fodder and livestock grazing, the State Forest Department has earmarked certain areas known as khasmal and garucharan land for livestock rearing.

However, with the growth of population and large-scale immigration, the people occupied a large part of such land for settlements and agriculture. The district-wise distribution of different types of grazing land indicates that these are not well distributed in the state due to climatic, physiographic and other factors (Table 3.14) (Plate3.2).



**Plate 3.2 Grazing land in the low altitude area**

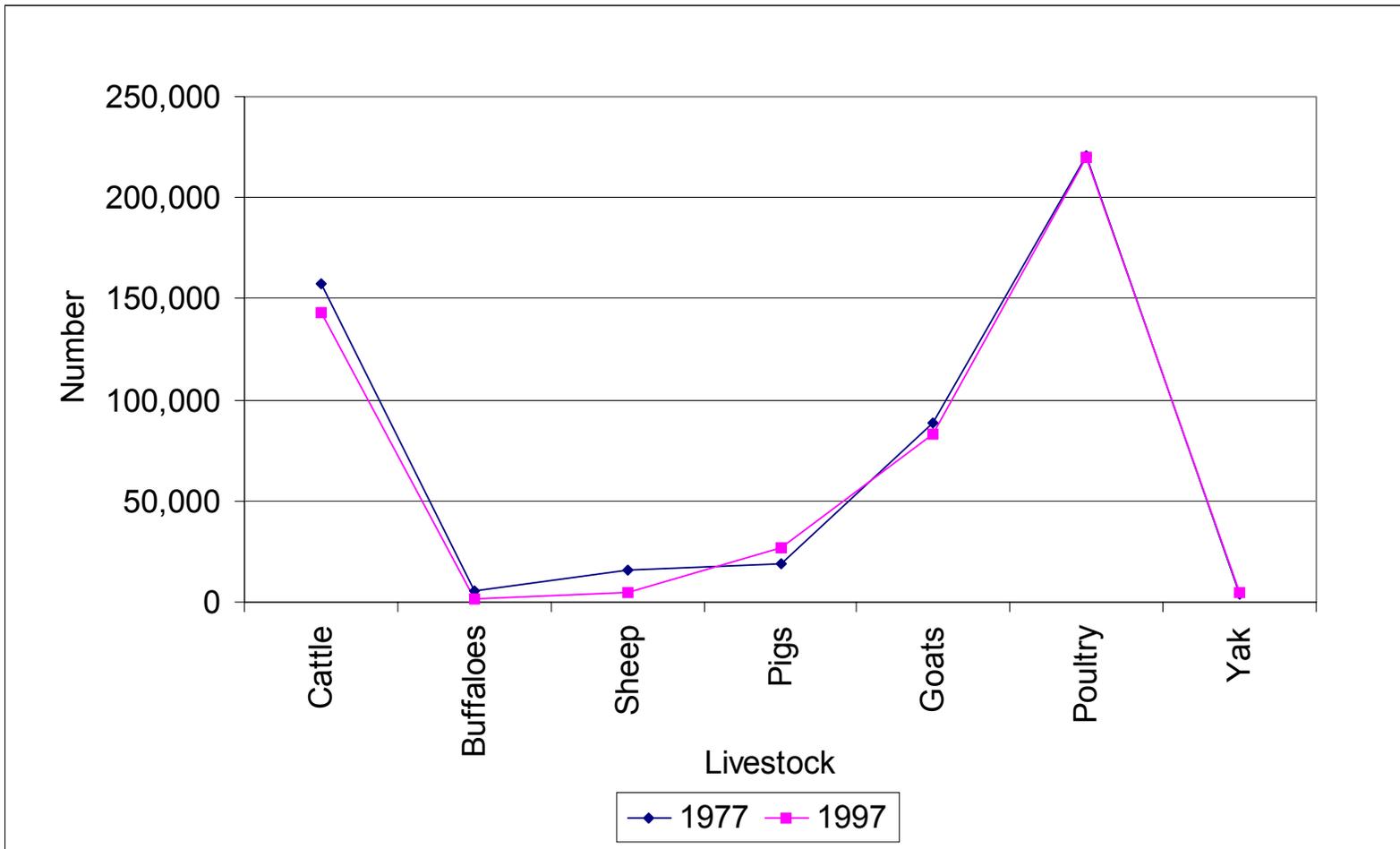
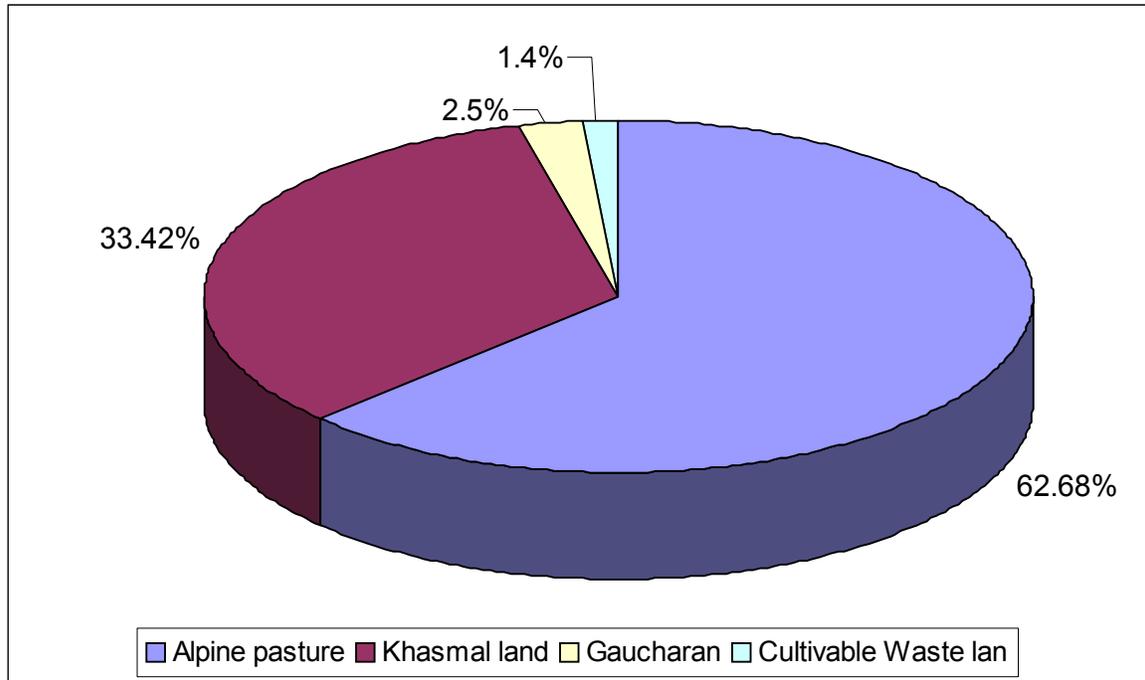
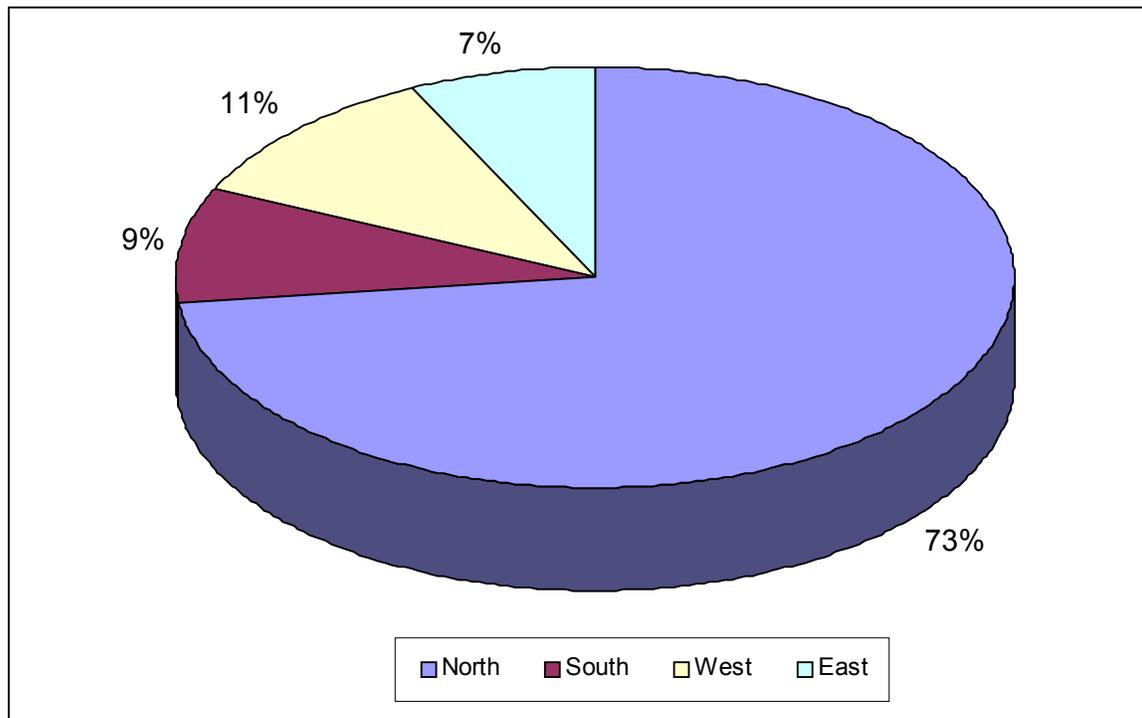


Fig.3.8 Growth of Livestock (1977-1997)



**Fig.3.9 Livestock Grazing Land**



**Fig. 3.10 District-wise availability of Grazing Land**

**Table 3.14 District-wise detail area of alpine pasture, Khasmal, and Garucharan land in Sikkim** (Area in sq km)

District	Alpine pasture	Khasmal	Garucharan	Total
North	908.61 (90.51)	216.07 (42.30)	12.00 (28.10)	1136.68 (73.00)
South	30.32 (3.02)	97.78 (19.15)	10.82 (25.34)	138.92 (9.00)
West	64.87 (6.46)	91.89 (18.00)	10.86 (25.53)	167.62 (11.00)
East	0.06 (0.01)	104.99 (20.55)	9.02 (21.12)	114.07 (7.00)
Total	1003.86 (100.0)	510.73 (100.0)	42.70 (100.0)	1557.29 (100.0)

Source: Paljor S.: Feed and Fodder situation in Sikkim.

Figure with in braked shows in Percentage

Major area of alpine pasturelands is located in the North District (90.51%) followed by the West District (6.46%), the South District (3.11%) and the East District (0.01%). Area under *Khasmal* and *Garucharan* lands are also highest in the North District, (42.30 and 28.10 per cent respectively). Second highest area under *khasmal* land is recorded in the East District ((20.55%) followed by the South District (19.15%), and the West District (18.00%) (Fig.3.10).

The area under fodder cultivation in the state is 21.95% to the total reported area. Fodder production on cultivated land is a difficult proposition in view of presence of large number of small and marginal farmers in the state. At the same time, number of livestock population cannot be increased unless fodder yield is doubled in the specified area. The solution of the problem lies in promoting the plantation of fodder trees in the wastelands as also on the bunds of the cultivated fields and rivers. Fodder production programmes has so far not received adequate attention due to absence of suitable infrastructure, and farmers' oriented extension programmes in regard to technology transfer and non-availability of improved variety of fodder crops.

These sectors will, therefore, have to receive greater attention especially because of the fact that there is a very high deficiency in regard to both green and dry fodder in Sikkim. During the Eighth Plan therefore, a very substantial increase in fodder availability was aimed at. The programmes included in the plan are improving the performance of the existing seed production farms by providing them with irrigation facilities, seed testing laboratories and employing proper quality control methods, development of natural pastures and of garucharan lands, encouragement to farmers to take to fodder cultivation in a much bigger way, and close coordination with the Agriculture and Forest Departments in increasing the area under forests. It is also essential to create fodder banks. It is also proposed that much better and more effective utilization of farm waste such as straw be organized. As regards to poultry feed, improvements will have to be through better performance of the animal feed plant in the state, proper quality control of feed supplies and adequate stock of feed so that during the monsoon period, there is no problem in obtaining adequate supplies of feed (Fig.3.11).

### **3.6 GREEN AND DRY FODDER**

The livestock rearing is an important aspect of each household's total economy to supplement and compliments other components of farming. About 80 to 90 per cent of the nearly 1 Lakh households are depended on green fodder for their livestock feed. (Table 3.15).

**Table 3.15 Fodder Availability Requirement and Deficiency in the area**

<b>Source of Green/ dry Fodder</b>	<b>Availability (M.T)</b>	<b>Requirement</b>	<b>Deficit</b>	<b>Deficit in Percentage</b>
Forest	250	305	55	18
Natural Grass land	475	850	375	44
Agricultural Holding	920	1645	725	44
Fodder Cultivation	480	1770	1290	73
<b>Total</b>	<b>2125</b>	<b>4570</b>	<b>2445</b>	<b>53</b>

Source: Livestock Production in Sikkim- N. Balaraman & M.M. Golay

It was observed that more than 2,200 kg of fodder are collected from green bush, and jungle trees, like cut and carry within the farms (800 kg/ year), cut and carry out side the farms (about 1,300 kg) and from grazing (> 100 kg). It is found that more than 45% of fodders are collected from outside the farms and 28% are within the farms.

It was also observed that about 400 kg of crop residues are available for a livestock. In Sikkim, about 240 kg of maize straw, 150 kg of paddy straw and about 10 kg of other straw are collected for livestock in a year. In a year, about 170 kg of concentrates are also available (maize concentrates are about 110 kg, 40 kg cake and about 20 kg of mixture) as livestock feed (Fig.3.12). The Government should under take the following measures improve the economic conditions of the livestock households.

- i) Development of pastures land-grazing grounds.
- ii) Demonstrations in the farmers' field by introducing extensive fodder production schemes.
- iii) Introduction and implementation of extensive trials of temperate and tropical of grasses and legumes.
- iv) Conservation of surplus fodder, etc.
- v) Consumption of livestock feed and fodder.

Each animal, on an average 2.5 to 3 quintals per month consumes dry and green fodder. This fodder includes paddy straw, crop residues, green grasses etc. The animals are feed with concentration as per the fixed schedule. More than 1000 M.T of concentrate feed are fed to the animals in the state. A livestock needs a 60-70 kg of green fodder bundle for a day without any other dry fodder, which is collected from forestland and jungle (Plate 3.3). But now, they have to buy dry fodder for livestock from the markets at a high cost. So, number of livestock population is decreasing in many households of the state. It is found that 2.5 kg of dry material consumption is required per day for a 100 kg of live weight. Hence, for 250 kg average live weight animals the total dry fodder requirements works out to be 5 kg per day or 1,825 kg of dry material per year. In order to give a uniform picture for fodder requirements, the existing livestock are converted into standard cow equivalent units. The cow equivalent units were assumed as adult cattle =1, young stock cattle = $\frac{1}{2}$ , buffalo 2, buffalo, young stock =1 sheep/goat =  $\frac{1}{2}$  adult yak = 1, young yak stock =  $\frac{1}{2}$ . The fodder requirement has been calculated for a livestock census year 1977 and 1997 (Table 3.16) (Plate 3.4).

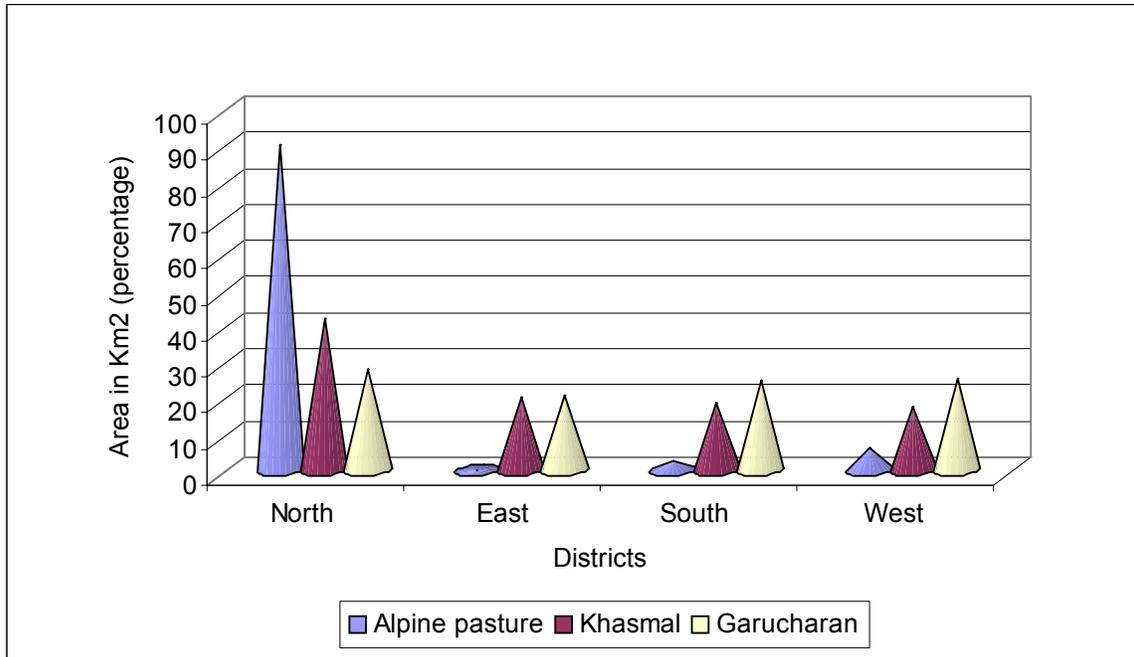
From Table 3.16, it is found that number of livestock population from 1977 to 1997 has decreased because of lack of fodder and marginalisation of farmers. The poor families are unable to purchase fodder from the markets. There was sharp decrease in buffaloes and sheep population during 1977-97 in the state.



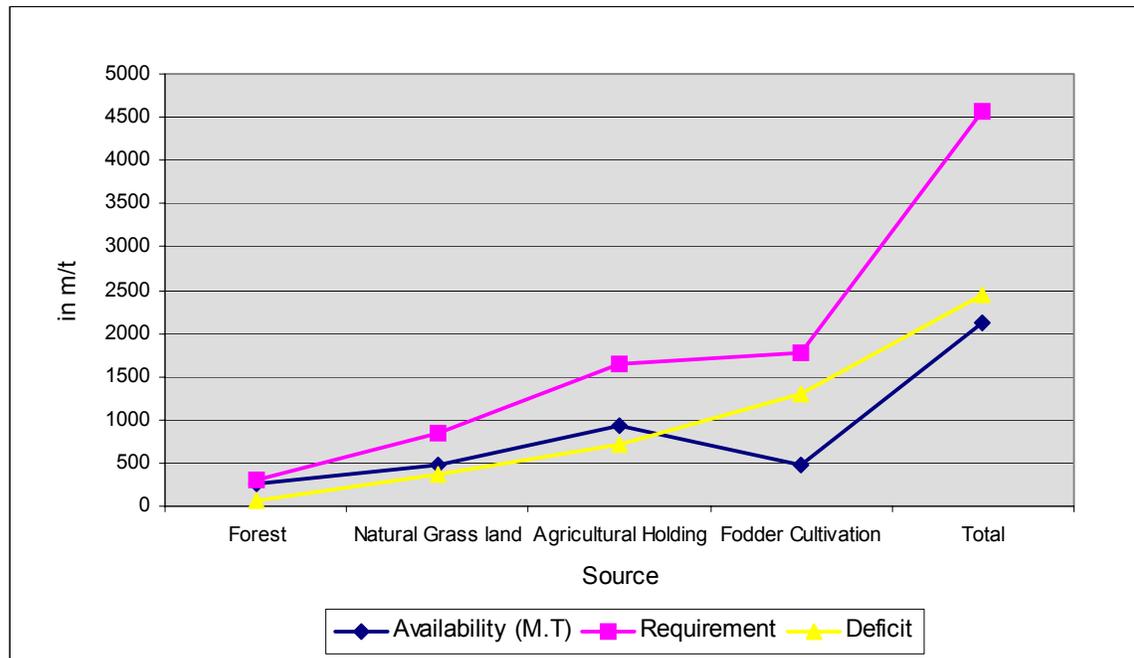
**Plate 3.3 Cultivation of green fodder**



**Plate 3.4 Cows eating green fodder**



**Fig.3.11 Fodder Situation in Sikkim**



**Fig 3.12 Status of Fodder Availability**

**Table 3.16 Requirement of fodder (tonnes) 1977-1997**

Livestock	Livestock Population		Changes in %	Requirement of fodder (tonnes)		Requirement in tonnes
	1977	1997	1977-97	1977	1997	1977-97
Cattle	157546	143024	-9.2	221201.70	200812.00	-9.2
Buffaloes	5438	1970	-63.8	15879.07	5752.44	-63.8
Sheep	16104	5023	-68.8	95882.94	80274.70	-16.3
Goats	88986	82980	-6.7	N.A	N.A	-
Yaks	3995	4781	19.7	N.A	N.A	-

Source: Paljor S.: Unpublished Ph.D. Thesis

Significant decrease was also observed in case of cattle and goat population during the same period. Only there was sharp increase in yak population in the state during the period. As a result of decline of livestock population, requirement of fodder and feed had been decreased in the state during the same period. There was a sharp decrease in case of requirement of fodder and feed of buffaloes during 1977-97. Constructional works like dams constructional in different places of Sikkim and demand of agricultural lands for high growth of population has been increased considerably during the recent times. Inhabited area is increasing in lieu of agricultural and forestlands by encroachment so natural vegetation as well as forest area is decreasing continuously. From the field survey, it was also observed that due to dam construction, tunnel formation and blasting for road construction, environmental pollution, ecological imbalances and livestock diseases are increasing simultaneously. Due to tunnel formation under the hills, upper part of the hills become dry and vegetation density on it is declining due to lack of soil moisture. So, animal feed in these area is totally depending on fodder tree leaves, fodder grasses and crops residues. A few livestock are depended only on grazing land within and outside the farm areas. It was also observed that about 90 per cent farmers grow local grasses known as

Amliso and Napier on the bunds of agricultural fields, steep slopes, etc. Two famous grazing grounds of the North District of Sikkim are known as Lhonak and Chho-Lhamo and both fall under dry high zone of Sikkim. Reddish brown mounds characterise both the areas and hill slopes with broad undulating valleys are common. Lhonak La (5035 m) is situated over a high ridge. Farmers of Lhonak and Chho-Lhamo regions practice rotational grazing system. In the Lhonak high land, the farmers set aside a portion of good grassland, which was not allowed to be grazed by the livestock. The grass is harvested from the month of July to August every year and the same is preserved in the form of hay for winter-feeding. In the region, the grazing is controlled from the month of January to March. However, from April to August, the grazing is decentralized as the rain brings moisture to the soil and helps to grow grasses in plenty. Again, the grazing is controlled from the month of September onwards. Chho-Lhamo lies in the shadow of Dongkhim Mountains. The entire valley is almost flat being certain portion, which seem slightly undulating. The flat area around Mount Khangchendzonga with grassland for yak and sheep grazing on the fringes of the mountain is one of the most remarkable landscapes in the world. The feeding and management system for livestock adopted in this area is very similar to that of the Lhonak region.

### **3.7 CROP RESIDUES**

From the field observations it was observed that quantities of crops residues are available in Sikkim as in other parts of the country are chiefly straws and leftovers of cereals, pulses, oil seeds and vegetables and tuber crops. Apart from these crop residues, by-products like barns, husks shells and other seed by-products are also

obtained in significant quantities. These residues and by-products play important role in meeting the nutritional requirements of livestock. The crop residues are highly fibrous and poor in portability and digestibility. The quality of the crop residues can be improved, among various measures by chemical treatment and microbial degradation. In chemical treatment, agencies such as alkali ammonia and urea are employed. Microbial treatment is resorted to bring and biodegradation of lignin and to increase the protein content of the crop residues. Several fungi, which cause rotting of wool, have been experimented with fungi belonging to the coprinus sp. offer some promise through the treatment cause some loss of dry matter.

### **3.8 REQUIREMENTS OF FEED AND FODDER AND PRESENT SITUATION**

The way of estimating fodder yields from cultivated land is through harvest of crops. The fodder requirement for animals is estimated at the rate of tonnes. Feed and fodder alone constitutes between 60 and 70% of the total cost of production of various livestock products. It has been emphasized that green fodder production is the most important single factor on which it will depend on the success of animal husbandry programme in the state. In India, about 40 per cent of the total geographical area is account for grazing resources. However, it is revealed that the country is deficient in fodder and feed production. As against the requirement of 263.1 million tonnes of green fodder in the country, only 216.0 million tonnes are available leaving a deficit of 47.1 million tonnes. Similarly only 308.5 million tonnes of dry fodder is available as against the requirement of 353.0 million tonnes leaving a deficit of 44.5 million

tonnes. In case of concentrates the deficit is only 8.9 million tonnes, the country produces 16.5 million tonnes of feed concentrates as against the requirement of 25.4 million tonnes.

In Sikkim, a study carried out by ICAR in 1987 revealed acute scarcity of feed and fodder, the deficit being to the extend of 65.60% for green fodder, 44.76% for dry fodder and 78.66% for concentrates. The State Forest Department (1995) also estimated the annual requirement of fodder for the livestock of the state and according to them as against the requirement of 2.08 million tonnes of green fodder, only 1.32 million tonnes of it are available leaving a deficit of 0.76 million tonnes (36.54%). The details of estimated fodder production from different sources are presented in the Table 3.17.

**Table 3.17 Assessment of fodder requirement and source of fodder production in Sikkim**

Sources	Animal Production in million tonnes per annum	Percentage to total
Permanent pasture & grazing lands including cultivable waste land 102,490 ha. @ 4 tonnes per ha	0.41	31
Estimated fodder available from agricultural waste (20% and above)	0.08	6
Fodder production from agricultural waste land 790,600 ha @ 2.5 tonnes	0.20	15
Fodder production from private forest.	0.10	8
Estimated fodder production from forest area @ 2 tonnes per ha. From 26,521 ha.	0.53	40
Total fodder production in state	1.32	100
Total fodder requirement	2.08	
Fodder deficit	0.76	36.54

Source: Paljor S.: Feed and Fodder situation in Sikkim, Sikkim perspective for planning and Development (1998)

It is clear that the source of fodder for livestock is mostly from the forests and pastureland (see Table 3.17). The fodder production from the agricultural land holdings constitutes only 15% whereas, 8% comes from the private forestlands. Fodder availability in the state varies from area to area. Tarnutzer and Batting (1994) of Indo-Swiss project carried out detail studies in 10 villages involving 100 farmers and their findings on an average feeding schedule and estimated feed and fodder availability per livestock are given in Table 3.18.

**Table 3.18 Composition of the average feeding ratio and estimated feed availability per livestock unit**

Types of Fodder	Feed Stuff	Estimated Availability	
		Kg. DM/LU/Year	Composition of Ratio in %
Grass and Top Feeds	Cut and Carry with in farm	810	28
	Cut and Carry outside farm	1270	45
	Grazing	200	7
	<i>Total</i>	<i>2280</i>	
Crop Residues	Maize Stoves	240	8
	Paddy Straw	150	5
	Other Straw	10	+
	<i>Total</i>	<i>400</i>	
Crops Cocentrates	Maize	110	4
	Cakes	40	1
	Mixture	20	1
	<i>Total</i>	<i>170</i>	
<b>Grand Total</b>		<b>2850</b>	<b>100</b>

Source: Paljor S.: Feed and Fodder situation in Sikkim, Sikkim perspective for planning and Development (1998)

They reported that there was no indication of shortage as against the annual requirement of 2,740 kg per livestock. About 2,850 kg of fodder is available in the villages in Sikkim.

### **3.9 FEED AND FODDER: REQUIREMENT AND THEIR MANAGEMENT**

As indicated earlier that the state has 65.92% area under alpine pasture and 34.08% under *khasmal* and *garucharan* land, therefore, fodder availability and management can be done considering the existing feed and fodder production in the village level and managing alpine pasturelands.

Feed processing and technology are emerging field in animal nutrition. They help in the optimum utilization of existing feed and fodder resources. Knowledge accumulating as a result of detailed study of nutrition, physiology and biochemistry of domestic animals provides an insight into how far innovative manipulation is feasible to utilize the existing resources profitably. As the livestock sector is getting organized, mechanical, automatic and time-saving devices are microbial treatments as well as macro and micro handling of feed material are resorted to in perfecting these technologies, chaffing, washing, soaking dry and wet treatment, grinding, pelting ammunition etc. are among the various processing techniques available for different feed materials as per specific circumstances. Feeding of complete feed is a new approach, which is gaining momentum. It involves the processing and mixing of roughage and concentrate ingredients together to provide a single “mash” or “pellet” feed which will have all major and micro- nutrients well balanced to meet the requirement of particular category of livestock.

Fodder preservation is important to ensure fodder availability throughout the year. Unless surplus fodder is available, forage preservation measures cannot be adopted. In spite of the fact that

Sikkim faces acute shortage of quality fodder, substantial quantities of cut jungle grass material are available which can be preserved and utilized during period of scarcity. When intensive fodder production is undertaken either by individual farmers or by organized livestock sectors such as Government farms and dairy cooperatives, enormous surplus can be created during monsoon season. The proven method of forage preservation is silage making and hay making. Heavy monsoon and pre-monsoon rains may be one of the limiting factors to hay making, but could be overcome by resorted to shaded drying and conical structures of hay stacking. Silage making is eminently suitable except in very high altitudes, where lower temperature may slow down the fermentation process. In pit silage method, seepage may pose a problem, necessitating impervious soils with proper drainage provision.

### **3.10 CONCLUSION**

In conclusion, it can be said that livestock is an important resource in the rural area of the district. It is not a healthy sign of extra pressure of livestock population, because main sources of fodder for livestock are the unprotected forests, cultural wastes, fallow lands, and agricultural lands, which are affected by over grazing and fodder collection. All the farmers also have fodder trees with an average of 56 trees per farm or 40 trees per ha. The highest coverage of fodder trees was found in a village Luing, with 162 fodder trees per farmer followed by Central Pendam and Martam with a range from 72-99 trees per farm. There are also available crops residues like paddy straws maize straws in the state dry fodder are also available here. In off-season they are mainly used dry fodder and crops residues for livestock feeding.

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**CHAPTER - 4**  
**LIVESTOCK PRODUCTS AND**  
**THEIR MARKETING**

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# LIVESTOCK PRODUCTS AND THEIR MARKETING

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## 4.0 INTRODUCTION

The livestock farming in Sikkim is very much suited for local people that generally based on traditional skills, socio-economic considerations and interest in rearing cattle, pigs, sheep, and poultry. The per capita land availability for agriculture is decreasing due to high growth of population. Overall area available for agricultural operations is limited to 15.37 per cent of the total geographical area of the state. With increasing population, the livestock rearing might be the supplementary source of income, which is needed to existence of livelihood for the rural families. This influences in formulating programs for livestock development during the 6<sup>th</sup> and 7<sup>th</sup> five-year plan periods. Main livestock products of the state are milk, milk products, meat, bones, horns and hoofs, hides and skins and wool. Improved breeds of cattle i.e. Jersey, Holstei Friesian. Brown Swiss bull has been introduced in the state. To sell at subsidized prices to the families, the Govt. is trying to manufacture cattle, pig and poultry feeds in the state.

## 4.1 DAIRY PRODUCTS

The dairy development programme in the state was initiated in the year 1976. In 1991, main dairy farms were situated in Tadong and Karfecter, but another two dairy plants were built in

Mangan and Kabi in the North District in 2001 (Sikkim: A Statistical Profile; 2002). Out of 170 organized milk societies in Sikkim, only 108 registered societies were functioning in 2001-02. According to Department of Animal Husbandry and Veterinary Services, per day milk requirement in the state was 7,360 lit during 2001-02. The Operation Flood-II programme has so far been implemented in the state with a target of registered organization 160 Milk Societies. It was expected that the performance of Sikkim Milk Unions would be improved but the Milk Unions of the state had not yet been able to organize a number of co-operatives and generate regular and reliable marketing channels for the milk producers. Milk, eggs and wool production in the state has increased during last five-year plans.

**Table 4.1 Trends of production of milk, eggs and wool in five-year plans**

<b>Production</b>	<b>Unit</b>	<b>5<sup>th</sup></b>	<b>6<sup>th</sup></b>	<b>7<sup>th</sup></b>	<b>8<sup>th</sup></b>	<b>9<sup>th</sup></b>
Milk Production	'000 Tonnes	10.95	19.00	27.00	34.00	37.00
Eggs Production	Millon	1.25	3.50	12.00	17.00	10.03
Wools Production	Lakhs/Kg	0.24	0.24	0.26	0.36	0.15

Source: Sikkim: A Statistical Profile, 2002.

From Table 4.1, it is clear that there was a sharp increase in the production of milk during 5<sup>th</sup> - 9<sup>th</sup> plans. According to Annual Credit Plan 2002-03 of the State Bank of India and Sikkim, animal husbandry and dairy development play important role in raising rural economy. Because annual production of milk during 5<sup>th</sup> - 9<sup>th</sup> five-year plan was increased from 11,000 metric tonnes to 37.000 metric tonnes and per capita availability of milk was increased to 243 ml in the state during the period (Fig.4.1) (A Statistical Profile 2002). SIKKIMILK and the Department of Animal Husbandry and Veterinary

Services are doing some extension work in the villages to promote growth in the sector.

On account of the wide spread practice of dairy farming, which is one of the key activities in all the revenue blocks of the state under SGSY. In the 5<sup>th</sup> plan, milk production was 10,950 metric tones, which was less than 238% according to the production of milk of the 9<sup>th</sup> plan. The milk products in the state during 2001-03 were not significantly high except the milk production (Table 4.2).

**Table 4.2 Sale of milk and milk products for the year 2001-03**

Products	Unit	2001-02	2002-03	2002-03
Milk	Lakhs Litres	31,83,808	32,3,778	+ 53970
Butter	Kg	10,320	8070	-2250
Chhurpi	Kg	5166	3563	-1603
Cream	Kg	922	923	+1
Paneer	Kg	5104	5314	+210
Curd	Kg	458	477	+19

Source: Sikkim: A Statistical Profile, 2002.

Sikkim Cooperative Milk Producers Union Ltd. was created in 1980 for handling 7,000 lit/ day milk with 103 registered milk societies and 4,500 milk producers in the state (Annual Animal Husbandry Report 2004-05). The organization has not so far break the business of 2001-02 in 2003-4 due to high production and transport costs of the products (Fig.4.2).

## **4.2 POULTRY AND EGGS PRODUCTION**

The high demand for meat and eggs in the state for domestic consumption is largely met by imports from out side the state. To meet the growing demand of eggs and meat as well as to establish

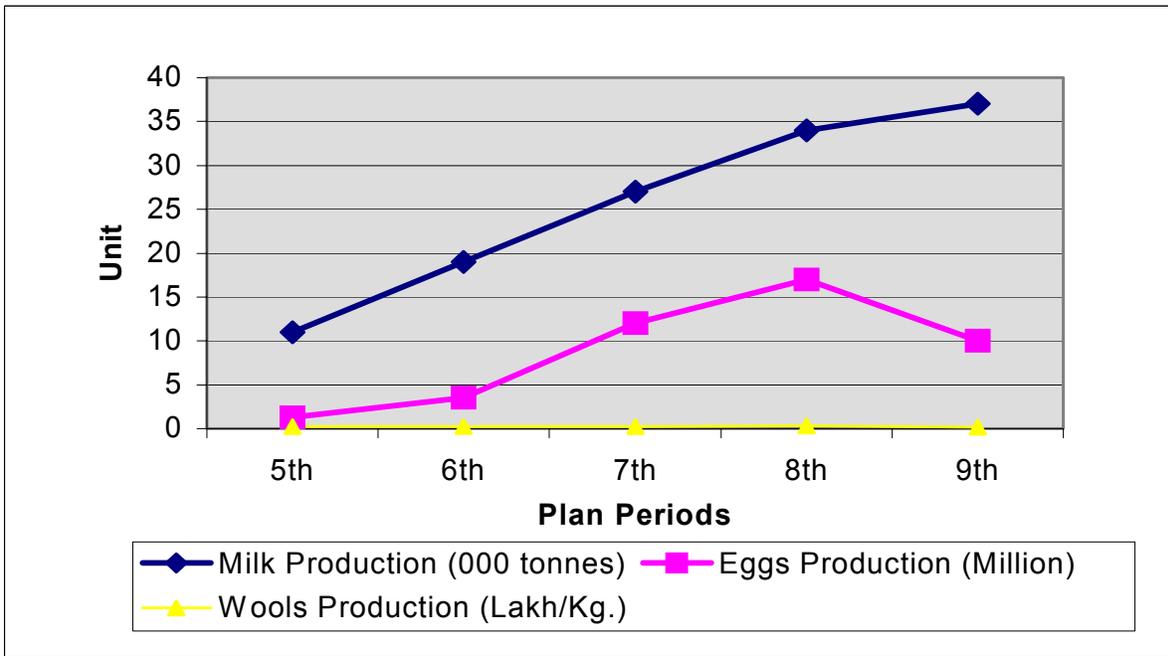
viable poultry farms, the Department of Animal Husbandry and Veterinary Services in collaboration with M/S Venkateswara Hatcheries Ltd. have initiated a number of farms in the state. They supply chicks and distribute feed to the farmers. It is assessed that each household in Sikkim consumed 13.52 kg of poultry meat and 117 numbers of eggs annually in the year of 2002-03. Eggs production in the 5<sup>th</sup> plan was 1.25 million and it has increased in the 8<sup>th</sup> plan, but declined in 9<sup>th</sup> plan. Per capita availability of eggs and milk during five year plans is increased (Table 4.3).

**Table 4.3 Per capita availability of Livestock products (5<sup>th</sup> to 9<sup>th</sup> plan)**

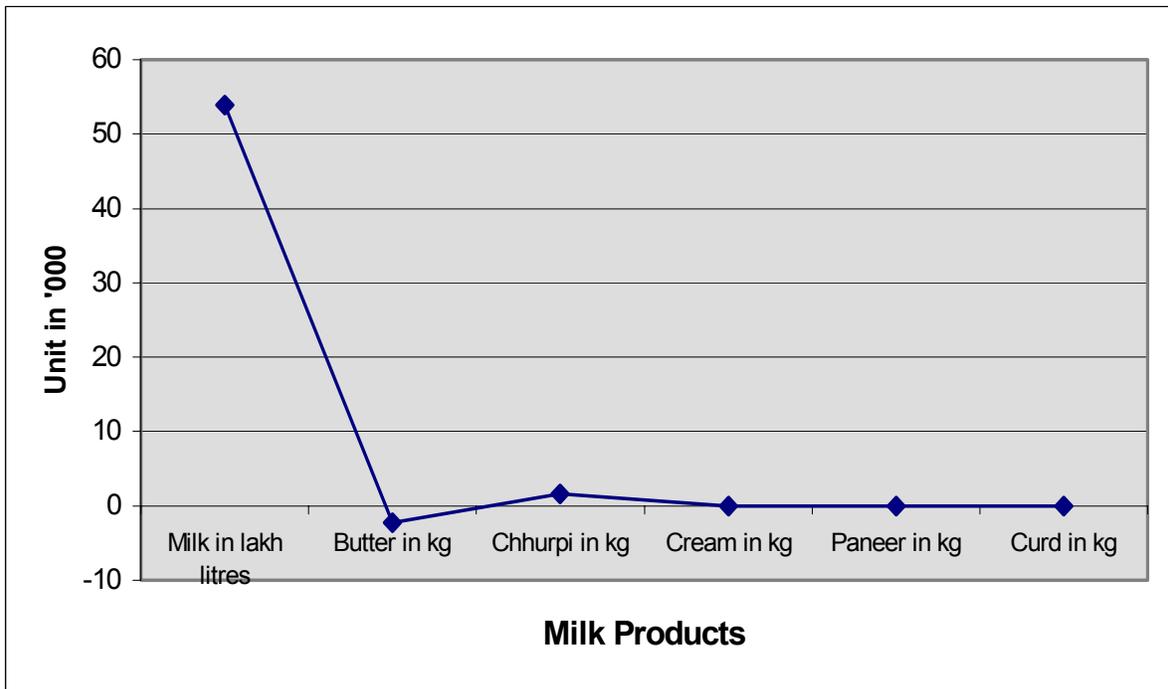
Plan	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>
Milk Availability (ml.)	132	148	163	213	243
Egg Availability (No.)	6	10	28	37	25

Source: Sikkim: A Statistical Profile, 2002.

By extrapolation, the quantity of consumption comes to 894,473 kg of meat and 4,798,170 numbers of eggs (Annual Credit Plan of Sikkim 2002-03, State Bank of India). The army and para military establishments in the state are the largest consumers of poultry products and they consume approximately 1,876 thousand kg of poultry meat and 24,091 thousand numbers of eggs per annum during 2002-03. As it is stated that in the 9<sup>th</sup> plan, 1,003 million numbers of eggs were produced in the state. To meet deficiency, a reasonable estimate indicates that only 1% of the total requirements of poultry meat is available from Sikkim. Balance 99% is brought in from Siliguri (West Bengal). In case of eggs, the position is somewhat better with indigenous egg production and it meets roughly 10% of the requirements of the state.



**Fig.4.1 Livestock Products**



**Fig. 4.2 Changes of Milk and Milk Products (2002-03)**

There are number of poultry farms in Sikkim and these are located in Rhenok, Sarwani of the East District; Mangan of the North District, Dodak, Mangalbarey, Gyalzing of the West District and Namchi, Tarku, Mellidara, in the South District. (Draft 9<sup>th</sup> five year Plan of Sikkim 1990-95).

### **4.3 WOOL PRODUCTION**

The dry high zones of North Sikkim adjoining Tibet and Nepal have extensive grassy meadows, suitable for grazing yak, sheep, and goats. Accordingly, special emphasis is required on increasing its number and productivity in respect of hair fabric through suitable planning for breeding programme. The development of wool production from yak, sheep and goats is not very much improved since the 5<sup>th</sup> plan, but there was a remarkable fall in wool production in the state from the 8<sup>th</sup> to the 9<sup>th</sup> plan Periods. There was reduction in production up to 58 per cent in the state. A specialised carpet and blanket industry was established in North Sikkim and similar industries were set up in the West District for the manufacture of felt clothes like Lukuni and Rari. The demand of wool is growing steadily in the Sikkim.

### **4.4 MEAT PRODUCTION**

The demand for meat in the 9<sup>th</sup> five-year plan has achieved the target point, as aimed. Amount of meat production over Sikkim was 3 thousand metric tonnes. So, there is an opportunity for piggery, goaterly and sheep farms in the state to produce large amount of meat and its by-products for domestic consumption. The farms will be

in a position not only to increase their flock size but also at the same time enhance the production of quality mutton for export.

#### 4.5 ACHIEVEMENTS IN LIVESTOCK PRODUCTIONS

From Table 4.4 an indication of the scenario tells about high development of livestock and livestock products from the 5<sup>th</sup> to the 9<sup>th</sup> five-year plan. Egg production is recorded 724% increase as well as 238% rise in milk production is the extra ordinary advancement according to Sikkim Government, (A Statistical Profile 2002).

**Table 4.4 Development of livestock product (5<sup>th</sup>-9<sup>th</sup> plans)**

Availability	Unit	Production		Increase/ Decrease (%)
		5 <sup>th</sup>	9 <sup>th</sup>	
Milk Production	'000 Tonnes	10.95	37.00	(+) 238.00
Egg Production	Million	1.25	10.30	(+) 724.00
Wool Production	Lakh/Kg	0.24	0.15	(-) 37.00
Milk Availability	Per Capita (ML)	132ml	143 ml	(+) 84.00
Egg Availability	Per Capita (Nos)	6 nos.	25 nos.	(+) 317.00

Source: Sikkim: A Statistical Profile, 2002

In the field of wool production, the development is not yet rich the target in the state. A comparative statistics between 1977 and 1997 Census showed the decrease in number of sheep up to 68.79% (see Table 4.4). The main causes for this was lock out of the sheep farms located in Zema and Rabum and decreased in wool production. With an increase in production capability of milk and eggs, the per capita availability of those is raised up to 84% and 317%, respectively.

## 4.6 MARKETING OF LIVESTOCK PRODUCTS

In Sikkim, there are many plants for processing and preservation of milk. These include one chilling plant and 2 of fluid milk plants. Chilling plant is situated at Gyalzing (West District) and the plant handles 4 TLPD milk (Thousand lit per day capacity). The refrigerant feron- 12° C is used for covering the normal temperature of water that facilitates various chilling processes of the plant. The chilled milk from Gyalzing is brought to Karfecter Dairy in an insulated milk tanker. The distance between the Karfecter Dairy and Gyalzing chilling plant is approximately 42 km. At Karfecter, the milk is pasteurized before it is transported to Gangtok. There were two dairy plants one at Gangtok and the other in Jorethang in 1995. The capacities of these plants are 10 thousand LPD and 5 thousand LPD at per day respectively and are expandable to 25 thousand LPD and 15 thousand LPD respectively in future. The chilling of milk in these plants (ammonia (NH) processing) is done by HTST method by subjecting the milk at a temperature not less than and not more than 71.5<sup>0</sup>C (+) 0.5<sup>0</sup>C for at least 15 second. Karfecter and Gangtok dairy plants established one LTPD IM CU at Mangan. The unit could be compact and could process and Micro-therm pasteurizer, which is electrically operated and does not need any broiler for, steam production.

From the discussion it could be inferred that Sikkim in generally and north Sikkim in particular have the right condition for the development of dairy plants in a big way. Processing plants can thus be established if necessary infrastructures and developed to preserve large quantities of milk even ranging from 2,500 lit/ day to 30

thousand lit / day. At present, a number of processing plants have come up at different locations in the state with required infrastructure development to process and preserve quantum of milk ranging between 2500 lit/ day to 30 thousand lit/ day. Trade movement in respect of dairy and poultry is partly undertaken by the State Livestock Development Corporation, which sell of about 40 thousand eggs and 300 kg of poultry meat per month. Marketing of milk is organized through milk co-operatives under the Sikkim Milk Union apart from numerous private milk vendors who supply milk at door of the customers. Most of the population of Sikkim consisting of rural farming households, their domestic requirements of livestock products are met within the farm holdings and in quantitative terms, this represents a considerable portion of livestock produce utilisation. Market requirement of the state arises from Gangtok and other towns along the highways connecting Gangtok and Jorethang and the district capital like Namchi, Gyalzing, and Mangan. In addition to civil population, substantial military population and floating tourist population visiting Sikkim almost through out the year constitute demand zone the main consumers of livestock and it products. Besides demand for livestock in hotels, hostel, hospitals and domestic uses are increasing continuously.

The basic guidelines must be observed for operating an efficient marketing system for livestock products.

- i) Supply of inputs such as feeds, seeds, supplements; medicines etc. must be coupled with marketing of products to economies the cost of transport.

- ii) Processing and preservation units like chilling plants and dressing units have to be linked to the marketing channels so that spoilage is reduced and products are handled effectively.
- iii) The State Livestock Products Marketing Agencies must play the role of buffer between the producer and the consumer so that during situations of varying supplies and demands, these agencies can help in procurement, supply and maintenance of price levels.
- iv) The sale counter and booths for livestock products must take up publicity and advertisement for high quality products to create public awareness and quality consciousness.
- v) Training programme for farmers on processing, preservation, packing, transportation and marketing will help both as an educative process and as a feed back for the development agencies involved in the task.

There are poor production and distribution of various commodities in Sikkim, more and more market centres are required for selling livestock products. But poor transportation, low per capita cost, income and inaccessibility are some of the factors for poor development in the sector of achievement in livestock products. To strengthen the Sikkim Milk Union and Sikkim Livestock Development Corporation for providing proper marketing facilities for milk, meat and other livestock products and by products, from the 7<sup>th</sup> plan, there had been a noticeable improvement in the performance of Sikkim Milk Union. Operation Flood II has also been implemented in Sikkim. The collection of milk, the provisions of veterinary aids and number of participating co-operatives in the Sikkim Milk Union have all shown substantial increase. The S.L.D.C has completed building up of a

cheese plant in North Sikkim. The cheese plant supplies quality cheese to the markets but more importantly generates a ready demand for milk produced in that area as also encourage the farmers to take to milk production in a big way. With a view to ensure availability of meat processed under proper hygienic conditions, a modern slaughterhouse was established and it commissioned in the 8<sup>th</sup> plan itself. With a view to introduce a more hygienic utilisation of bye-products, a modern slaughterhouse of Majitar had been initiated in 1988-89 financial year at an estimated cost of Rs. 80 lakhs, providing wholesale clean good quality meat to the people is one of the main objectives of the establishment of slaughterhouse in the state. A large number of animals like bullocks, buffaloes, sheep, goats, poultry birds and pigs are brought in to Sikkim from the neighboring states of West Bengal and Bihar. Only 30-40 per cent of the total consumption is produced in Sikkim.

From the 8<sup>th</sup> Five-Year Plan, a separate Corporation known as Sikkim Livestock Processing and Development Corporation is envisaged. It is responsible for sale, processing and collection of meat in Sikkim. This scheme gives benefit to the poor farmers and the consumers can get good quality meat at a reasonable price.

In the North District, it is proposed to build two piggery farms, one at Dzongu and another at Bop in the tribal area. These farms were set up to meet the demand of meat for the poor tribal people. The Sikkim Livestock Processing and Developing Corporation (SLDC) has constructed one slaughterhouse in the area. The Sikkim Livestock Development Corporation and Sikkim Organic are undertaken programme for poultry and piggery development,

marketing of hides and skins and producing organic products from animal source in the East District. SLDC also decided to set up the cheese plant, which will generate considerable demand for milk, milk products in the area and provide employment opportunity for the people.

#### **4.7 LOCATION OF MILK COLLECTION CENTRES**

The problem of marketing is not isolated entity in the state its scope and importance lie in its relation to over all infrastructure framework necessary for production. It is basically related to the roads and transport network of the region. It is the lifeline linking the farming households where the production occurs at one end and the marketing avenues where the demands prevail at the other. As the livestock products are highly perishable, processing and preservation measures determine to a great extent the qualities handled and the duration and distance of transport.

Sikkim possesses a fairly extensive network of road connections. According to Livestock Production in Sikkim, by N.Balaraman & M.M. Golay, the surface road length in Sikkim is 480 km per 100 thousand population as against the country's average of 113 km. and the un-surfaced roads measure about 1300 km while the country's figure is 179 km. provide regular marketing avenues. The over all transport and movement of goods are managed by a fleet of about 130 trucks run by the State Government's transport agency (SNT). According to Statistical Supplement of the 7<sup>th</sup> five year plan (1985-90), availability of milk collection centres in the revenue blocks are not significantly good in Sikkim (Table 4.5).

**Table 4.5 Distribution of revenue blocks with respect to location of the milk collection centres**

<b>District</b>	<b>Within R.B</b>	<b>1-2km</b>	<b>2-5 km</b>	<b>&gt; 5 km</b>
North	6	3	6	30
East	26	15	29	44
South	18	10	27	80
West	21	19	26	45
State	71	47	88	199

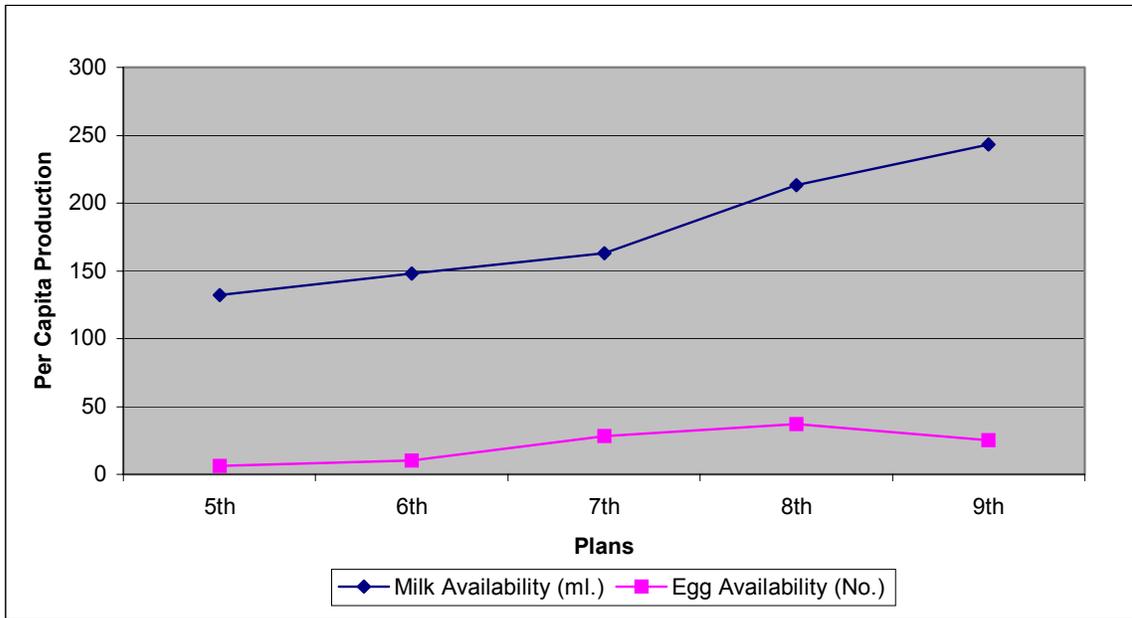
Source: Statistical Supplement to 7<sup>th</sup> five year Plan (1985-90)

The Table 4.5 explains that about 50% of revenue blocks are located far away from the milk collection centres. Out of 411 inhabited revenue blocks, 6 revenue blocks could not receive an advantage of milk collection centre.

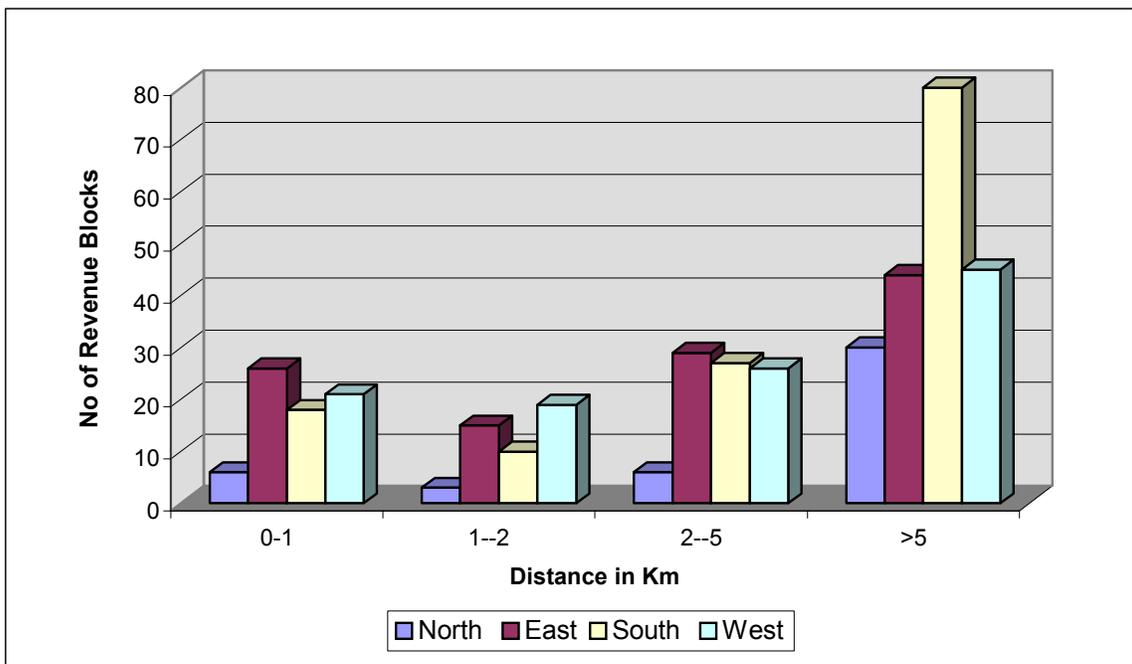
Only 17.53% of the revenue blocks have the facility of collecting centres within the revenue block. But in the case of others, the centre is available at the distance of 1- 2 km for 11.60% revenue blocks and 2-5 km for 21.73% revenue blocks (Fig.4.4). Therefore, it is cleared that the villagers of a large number of revenue blocks had to travel up to 5 km to sell their dairy products.

#### **4.8 PROBLEMS OF TRANSPORTING AND MARKETING OF LIVESTOCK PRODUCTS**

The steep slopes, difficult terrain and remote, far fetched rural habitations of Sikkim present formidable constraints against a viable marketing strategy for intensive livestock production activities. The problem of marketing is not isolated entity. It's scope and importance lie in its relation to the over all infrastructure framework necessary for production. It is basically related to the roads and transport network of the state. It is the lifeline linking the farming households where the production occurs at one end and the marketing avenues where the



**Fig.4.3 Per Capita Livestock Production**



**Fig.4.4 Distribution of Milk Collecting Centres**

demands prevail at the other. Since livestock products are highly perishable, processing and preservation measures determine to a great extent the quantities handled and the duration and distance of transport. Sikkim possesses a fairly extensive network of road connections. Trade movement in respect of dairy and poultry sell of about 40,000 eggs and 300 kg of poultry meat per month. Marketing of milk is organized through milk cooperatives under the Sikkim Milk Union apart from numerous private milk vendors who supply milk at door of the customers. Most of the population of Sikkim consisting of rural farming households, their domestic requirements of livestock products are met within the farm holdings and in quantitative terms, this represents a considerable portion of livestock produce utilization. Market requirement of the state arises from Gangtok to other towns along the highways connecting Gangtok and Jorethang and the district capitals like Namchi, Gyalzing, and Mangan. The following basic guidelines must be observed for operating an efficient marketing system for livestock products.

- i) Supply of inputs such as feeds seeds supplements; medicines etc. must be coupled with marketing of products to economies the cost of transport.
- ii) Processing and preservation units like chilling plants and dressing units have to be linked to the marketing channels so that spoilage is reduced and products are handled effectively.
- iii) The State Livestock Products Marketing Agencies must play the role of buffer between the producer and the consumer so that during situations of varying supplies and demands, these agencies can help in procurement, supply and maintenance of price levels.

- iv) The sale counters and booths for livestock products must take up publicity and advertisement for high quality products to create public awareness and quality consciousness and
- v) Training programme for farmers on processing, preservation, packing, transportation and marketing will help both as an educative process and as a feed back for the development agencies involved in the task.

#### **4.9 MILK PRODUCER'S COOPERATIVE SOCIETIES**

Co-operative societies have been rendering satisfactory services for economic upliftment of poor people both in rural and urban areas in the state. From 1998 to 2002, each year 5 new Cooperative societies had been registered in the state. To give shape to livestock production and development, Sikkim Government had not yet recognised with a view to effectively gear up the co-operative movement in the state. As a result, a very slow rate of increment in livestock products by the co-operative societies can be observed. During the period 1991-92, there were 80 Milk Producers' Co-operative societies available in Sikkim. About 31.25% new co-operative societies were established in 2001-02 (Sikkim; A Statistical Profile 2002). Amongst the districts, the West District represents highest number of societies where as least number of societies is found in the North District. But the actual developmental work has been done in the South District where the growth rate of number of cooperative society was 75% during 1991-92- 2001-02. With an increase in number of Milk Producers' Co-operative Societies in the state, the production of milk is increasing with the plan periods (Table 4.6).

**Table 4.6 District-wise livestock dairy and marketing co-operative societies in Sikkim (1991-2002)**

Type of Society	East		West		North		South		Total	
	1991	2002	1991	2002	1991	2002	1991	2002	1991	2002
Dairy Union Society	31	37	33	39	0	1	16	28	80	105
Livestock Co-Operative	-	2	-	1	-	-	-	2	0	5
Marketing Co-Operative	3	20	-	2	-	-	-	13	3	35

Source: Sikkim: A Statistical Profile, 1991 & 2002.

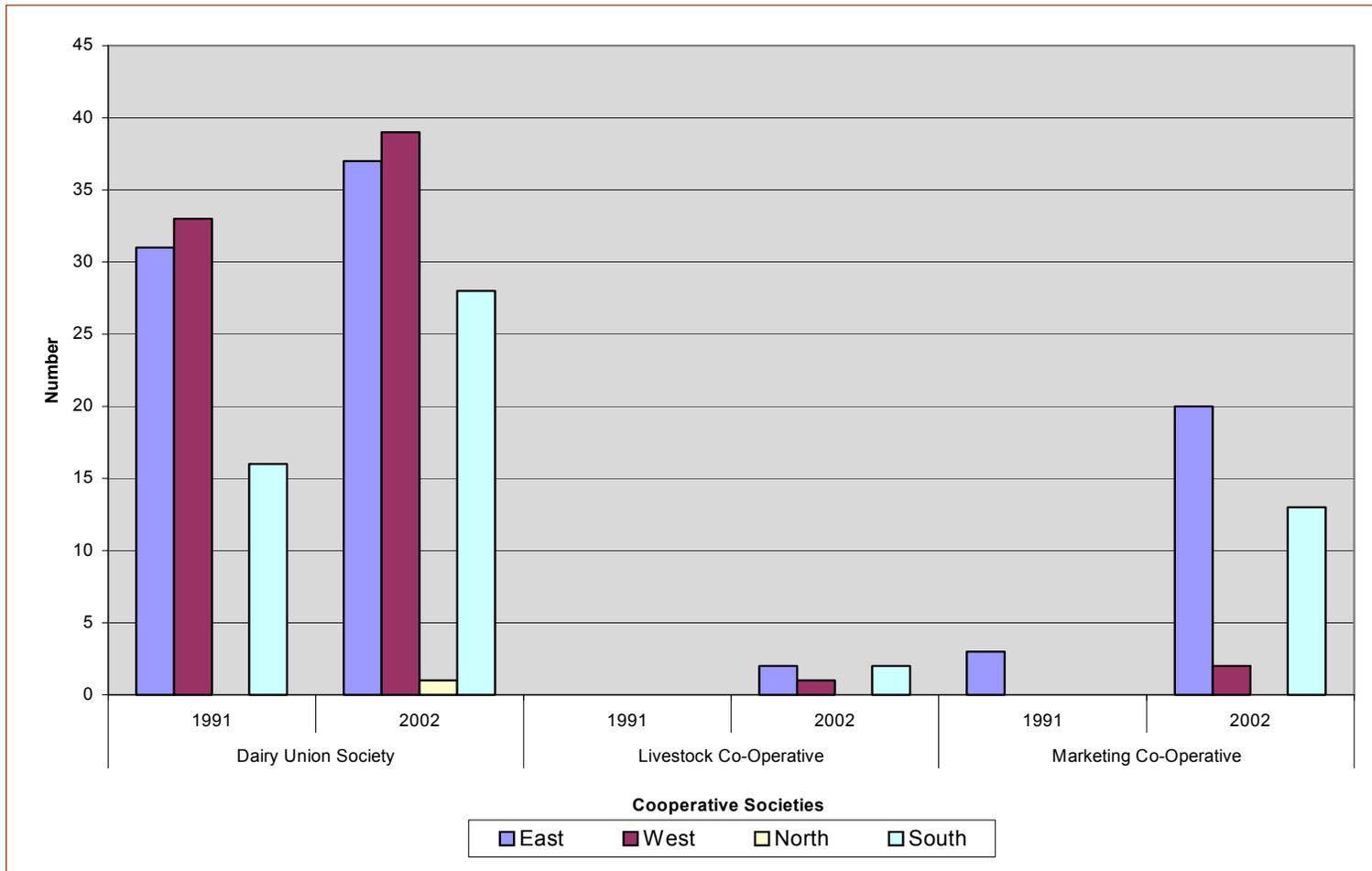
In 1991-92, only three marketing co-operative societies were found in the East District but now 35 marketing co-operative societies are established in the state. The East District shared 20, the West District shared 2 and the South District shared 13 marketing cooperative societies in 2001-02 (Fig. 4.5). The Sikkim Co-operative Milk Producers' Union situated in East District has been able to organize a number of dairy co-operatives and generates a regular and reliable marketing channel for the milk producers'.

In 1991, there were 16 milk produces' co-operative societies and these are located in important villages /revenue blocks like Bermaik, Temi, Tarku, Namthang, Turung, Chalanthang, Namphing, Peeku, Chisopani, Bikmat, Gom, Damthang, Assangthang, Rateypani, Majitar and Suntaley of South District. In West District, 33 societies were situated in villages/ revenue blocks like Thanbong, Soreng, Tharpu, Pacharek, Samdong, Khandu, Khartok, Hee-Patel, Shanku, and Kaluk. Out of 31 Dairy Cooperatives, some of the important societies were located in west Pendam, Rumtek, Dikling, Central Pendam, Thekabong, Rongli, Ray-Mindu, Tumin, Ranka and other revenue

blocks or villages in the East District. The main centre of milk producers' co-operative societies has been built up in the East District.

#### **4.10 CONCLUSION**

The major livestock products available in Sikkim include milk, meat, egg, wool, skin and hides. With increasing of population, the livestock rearing might be the supplementary sources of income, which needed to existence of livelihood for the rural families. The production status of the livestock in general, is only based on numbers not on the quality of livestock. The livestock of high altitudes such as sheep, yaks, and upland cattle have shown a declining trend in their numbers between 1977 and 1982. With a very limited population, these species may not be expected to contribute much towards the livestock economy of the state as a whole. The state has 170 organised milk societies and only 108 registered societies which responsible for marketing and transporting of dairy products. Poultry and egg production of the state is not sufficient so these are imported from out side the state. Sikkim Livestock Development Corporation (SLDC) has created many co-operative societies to maintain regular and reliable marketing channels for the milk and other products. The market sector is basically related to the roads and transport network of the state. The state possesses a fairly extensive network of road connections. Most of the livestock products are highly perishable. So, processing and preservation measures determine to a great extent on quality and the duration and distance of transporting the commodities. So, it is said that development of road network is essential for over all development in livestock sector in the state.



**Fig. 4.5 Livestock & Marketing Co-operative Society (1991-2002)**

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**CHAPTER - 5**  
**ANIMAL HUSBANDRY DEVELOPMENT**

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# ANIMAL HUSBANDRY DEVELOPMENT

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## 5.0 INTRODUCTION

Animal Husbandry has been one of the important occupations of the people of Sikkim. Sikkim is blessed with vast livestock resources with considerable genetic diversity and adaptability, which can help the country to meet the growing, need of animal protein for rapidly increasing human population. The topography and agro-climatic conditions prevailing in these areas offer better scope for livestock development activities. Livestock play a vital role in the economy of rural areas in Sikkim. An increase of population, limitation of agricultural land and unemployment call for a revolutionary revamping the agricultural situation in the state (Bhutia, 1980). So, livestock production has enormous potential in bring about a favourable change in the rural scene by uplifting the economic levels of the marginal and small farmers units (Singh, 1994).

Animal husbandry is an integral part of farming in the Himalayas in general and Sikkim in particular. In addition to supplying milk products, wool, meat, skin, and energy for ploughing, livestock play an essential role in maintaining soil fertility by converting fodder into manure (cow dung). However, continuous increase in livestock population and over grazing, the pasturelands are the major issues threading to the livestock industry today.

## 5.1 ANIMAL HUSBANDRY DEVELOPMENTAL SCHEMES

The yaks, sheep and goat graze in the high altitudes and in the lower hills; the climate is very congenial for crossbreed milch animals like Jersey and Holstein Frisians. Today, about 80 per cent of our milch animals have exotic blood. Even though the Department of Animal Husbandry was given separate status in 1974, the manpower, infrastructure in terms of animal treatment centre and number of programmes was taken to improve the economic condition of scheduled tribe and scheduled caste families. Under these schemes, piglets, crossbreed cows, poultry birds were distributed among the families and 2,500 families have been benefited in it. Similarly, in 1989-90, a special livestock breeding programme for small, marginal and land less farmers was launched, as a result of which 855 farmers were benefited within two years (According Phenomenal Twelve Years, 1979-92).

From the field survey, it is observed that for dairy development, the Sikkim Milk Cooperative has been playing a pivotal role in encouraging milk production within operational flood project areas, which include South, West, and East Districts as well as in ensuring reliable marketing outlets. The union has already set up more than the target number of milk collection centres including primary societies and has established a procurement mechanism as well as the processing system. The physical achievement on major Animal Husbandry Programmes as 31-3-1980, 1980-91 and 1991-92 are given in Table 5.1.

**Table 5.1 Animal husbandry programme in the state**

<b>Heads</b>	<b>1980</b>	<b>1980-91</b>	<b>1991-92</b>
Frozen Semen Station	Nil	1	1
Veterinary Hospital	7	10	12
Veterinary Dispensaries	23	25	26
Stockman Centres	-	54	56
Livestock Farms	3	12	13
Poultry Farms	1	2	2
No. of Disease Check post	-	4	5
Disease Investigation	-	1	2
Nutrition Lab.	-	1	1
Stockman Training Centre	-	1	2
No. of Progressive farmers adopted under Bankable Subsidy Scheme	Nil	139	25
No. of Small and Marginal farmers adopted under Special Livestock Breeding Programme	Nil	855	480

Source: Sikkim: Phenomenal Twelve Years (1979-1992).

## **5.2 DAIRY DEVELOPMENT SCHEMES**

The dairy development programme in the state was initiated in the year 1976. The Government of India approved a centrally sponsored scheme costing Rs.1.63 lakhs. Under this scheme, two dairies were set up with the capacity of handling 10 thousand litres at Tadong (East District), and 5 thousand litres at Karfecter (South District). These dairies were commissioned however, only in 1981 and 1982 respectively. The Sikkim Milk Union as an apex co-operative was also established and from 1982, onwards, 90 Milk Societies were function. The Sikkim Milk Union has not also been able to generate any surplus and continues to rely on subsidies, primarily because of the fact that the cost of collection of milk from the remote areas has proved to be extremely high and cannot be covered from the

realisation through sale of milk. In the 10<sup>th</sup> plan, there will be considerable improvement in the performance of Sikkim Milk Union. It cannot however, be denied that the milk union has able to organize a number of co-operatives and generate a regular and reliable marketing channel for the milk producers. The operations therefore, have been seen in the wider context of the socio-economic benefits that the milk union has been able to generate. The effective integration of the livestock farming with animal husbandry at the village level is essential for optimum utilization of the farms and their by products, engagement of farm labourers all the year round and to augment an income of the rural population as well as to make available adequate quantities of protein rich food items such as milk, eggs, meat etc. for the state. With these objectives in mind, the Department of Animal Husbandry aims to bring about an overall improvement in livestock management and improvement in the breeding programmes through the departmentally run breeding farms for genetic up-gradation, fodder development, consolidation of the infrastructure for ensuring effective and timely veterinary services and embryo transfer technology. The subsidy schemes for setting up dairy farms linked with Bank finance have been initiated. The introduction of hybrid livestock from outside the state and consolidation of infrastructure inputs and services by the Animal Husbandry and Veterinary Service Department are essential to maintain the tempo in the development of the dairy sector (Table 5.2). The following measures have been taken for dairy development.

- i. Good quality cross breed milch cows required for dairy farm scheme that might be made available on regular basis to the prospective dairy farmers.

- ii. Artificial Insemination Centres, Veterinary Services may be expanded to ensure ready access and availability of the requirements of the beneficiaries in far from rural areas.
- iii. Arrangements for adequate supply of cattle feed as is being done in other state may be ensured.
- iv. The Sikkim Milk Producers Co-operative Society may be further strengthened with improved infrastructure and extension services.
- v. Training in improved dairy farming techniques may be arranged.
- vi. Timely releases of subsidy to be ensured in respect of loan applications are sponsored under Government Sponsored Schemes.

**Table 5.2 Physical targets and achievements in 9<sup>th</sup> and 10<sup>th</sup> plan for dairy development**

Item	Unit	9 <sup>th</sup> Plan (1997-02) Target	Anticipated Achievement	10 <sup>th</sup> Plan (2002-07) Target	Annual Plan (2002-03) Target
Milk Processing Plant	Nos	3.00	3.00	4.00	4.00
Milk Chilling Plant	Nos	2.00	1.00	4.00	2.00

Source: 10<sup>th</sup> Five-year plan, Govt. of Sikkim.

### 5.3 POULTRY DEVELOPMENT SCHEMES

The huge demand for eggs in the state for domestic consumption is largely met by imports from outside the state. The potential for development of poultry in the state to meet the growing demand for eggs and meat as well as to establish viable poultry farms has been initiated by the department of Animal Husbandry and Veterinary Services in collaboration with M/s. Venkateswara Hatcheries Ltd., Pune to implement an integrated poultry

development programme in the state. The establishment of a hatchery and breeding farm, Sikkim Hatcheries Ltd. a joint venture company promoted by Sikkim Poultry Development Corporation and M/s. Venkateswara Hatcheries Ltd. and establishment of six poultry societies for the maintenance and supply of chicks, distribution of feed and provision of veterinary services to the poultry farmers of the state. According to Annual Credit Plan 2003-04, it is assessed that on an average each household in Sikkim consumes 13.52 kg of poultry meat and 117 nos. of eggs annually. On extrapolation, the quantity of household consumption comes to 894,473 kg of meat and 47,98,170 nos. of eggs. The army and paramilitary establishments are the large consumer of poultry products in the state and they consume approximately 18,76 thousand kg of poultry meat and 240,91 thousand of eggs per annum.

From the field observation it is found that only 1 per cent of the total requirement of poultry meat is available from the state. Balance 99 per cent is brought in from Siliguri in West Bengal. It is also found that most of the unemployed youth will be imported training and each will be provided with bank loan for taking up poultry farms for egg or for meat. For the development of poultry production following steps are necessary

- i) Promotions of Co-operative Societies for providing infrastructure support to the farmers by way of imparting of training to the prospective farmers.
- ii) Supply of quality chick supply of feed prompt veterinary services, buy-back of eggs and broilers (live) would be enable

the activity to achieve stability, self-sustaining level and success.

- iii) Provide proper training and subsidy for poultry farmers.

The following physical targets and achievements are taken in 9<sup>th</sup> and 10<sup>th</sup> plan for poultry developments (Table 5.3).

**Table 5.3 Physical targets and achievement in 9<sup>th</sup> plan and 10<sup>th</sup> plan for poultry development**

Item	Unit	9 <sup>th</sup> plan (1997-02) Target	Anticipated Achievement	10 <sup>th</sup> plan (2002-07) Target	Annual plan (2003-03) Target
Layer production	Lakh	5.00	2.00	5.00	1.00
Broiler production	Lakh	10.00	5.00	35.00	7.00
Intensive egg Production Hatching	Nos	1.00	2.00	4.00	3.00

Sources: 10<sup>th</sup> five-year plan Govt. of Sikkim.

#### 5.4 CATTLE DEVELOPMENT SCHEMES

Cattle rearing are an important enterprise amongst the farmers of Sikkim irrespective of castes and creeds. According to Annual Report 2004-05 (unpublished), about 90 per cent of the farmers of Sikkim rear cattle and other livestock in stall fed condition as the majority of the farmers are small and marginal. Over the last 10 to 15 years there has been an increasing trend towards using crossbred cows in Sikkim. For the development of cattle, the department of AH & VS has a definite cattle breeding policy in the state. As per the policy, the indigenous animals are to upgrade cross jersey breeding bulls/A.I. are used to maintain the exotic inheritance level up to 50 to 62.5%. In Sikkim, the Animal Husbandry Development has its own set

of breeding policy form the cattle development. The policy envisages the crossbreeding programme with high yielding cross breed jersey with the locally available breed mostly SIRI, thereby maintaining 50 to 62.5% blood of exotic jersey blood. For these programmes, the extensive work on genetic up gradation either by natural services (use of breeding bulls for natural services) artificial insemination has been carried out. For natural services, cross breed bulls are produced in the state itself with ten times milk recording methodology carried out per cows in areas of Intensive Cattle Breeding Areas (ICBA) of Dentam, Central Pandam and Gangtok. The standard for milk yield for elite cow identification was kept of 2000 litres per location as of now. There are many cows with higher yield with the peak of 8000 lit of location. Similarly the growth rates of male calves at the farmers' premises have increased from the daily 200 gm/ day to 500 gm/ day.

During field survey it is also found that most of the calves are purchased by the SLDB (Sikkim Livestock Development Board) and reared at bull rearing farm Karfecter for two years until those become fit and healthy crossbred breeding bull. The Government and Department of AH & VS have taken many steps for their development. Firstly, they have taken up for genetic up gradation in artificial insemination (A.I) for which frozen semen normally used bought from out side the states. The state has at present 72 AI centres, which are regularly refilled at an interval of twenty-one days. Secondly the establishment of breeding cell is also an important step for cattle development. The breeding cell is the heart of breeding activities and the cell has established a simple and efficient system of information collection and disbursement. The cell plays a vital role in

imparting training and disseminating the new technologies to the livestock farmers for economic upliftment.

The state bull rearing farms, where, selected bull calves from ICBAAs are received and reared till the age of maturity. The farm is a role model for farmers since regular farm operations like silage preparations; vaccinations, fodder cultivation and livestock management practices are shown to interested visiting farmers. This farm is to produce 50 numbers of quality breeding bulls every year and distribute them in the panchayats and veterinary institutions. The following targets and achievements are taken in 10<sup>th</sup> five-year plan for cattle development (Table 5.4).

**Table 5.4 Physical targets and achievements in 9<sup>th</sup> and 10<sup>th</sup> five-year plan**

Item	Unit	9 <sup>th</sup> Plan (1997-02) Target	Anticipated Achievement	10 <sup>th</sup> plan (2002-07) Target	Annual plan (2003-03) Target
Frozen Semen Station	Nos	2	2	-	-
Nos of A.I Centre	Nos	40	41	100.00	50.00
Distribution of Breeding Bull	Nos	200	200	400.00	80.00

Sources: 10<sup>th</sup> five-year plan Govt. of Sikkim.

The objective of this plan is to increase the productivity of the local animal through cross breeding so that it is economically beneficial to the farms by providing production enhancement inputs. For better development include setting up of new AI centres with frozen semen, setting up heifers production and bull rearing frame and providing semen of highly pedigreed exotic breed. Loans to marginal and progressive farmers are provided through bank and subsidy for setting up new cattle farms. Vaccination programme

against FMD, Anthrax, HSBQ etc., which should be free of cost are implemented.

## **5.5 PIGGERY DEVELOPMENT SCHEMES**

The state is a vast scope for development of piggery farms in view of the large demand for meat and its by-products for domestic consumption. The Animal Husbandry and Veterinary Services Department is currently engaged in strengthening the piggery breeding farms established in the state to meet the growing demand of the farmers for quality piglets. The State Government has taken different schemes for setting up piggery farms in rural areas. In order to popularise the piggery schemes, it is important that the farmers be provided with the balanced piggery feed. This venture will not only improve the quality of pigs but at the same time the farmers would fetch better price for the quality pork. In eight plan, it was proposed to cover 50 per cent of the piggery population in Sikkim. The subsidy components were 50 per cent for scheduled tribes and scheduled castes and 30 per cent for general poor farmers. The subsidy component was remitted to the capital expenditure incurred in buying stock and construction of modern piggery. At present, it is necessary to take following measures for its development.

- i) Adequate supply of cross breed is piglets to be ensured.
- ii) Availability of adequate supply of pig feed for the farmers.
- iii) Training in improved piggery farming techniques may be arranged.

For the development of piggery farms in Sikkim, the State Government and Central Government both have taken different plans and programmes. The physical achievements under various programmes during the plan periods (9<sup>th</sup>, and 10<sup>th</sup>) are given in the Table 5.5.

**Table 5.5 Physical targets and achievement in 9<sup>th</sup> and 10<sup>th</sup> five year plan for piggery development**

Item	Unit	9 <sup>th</sup> Plan (1997-02) Achievement	Anticipated Achievement	10 <sup>th</sup> Plan (2002-07)	Annual Plan (2002-03) Target
Breeding cum demonstration farm	Nos	5.00	3.00	5.00	4.00
Distribution of breeding boars	Nos	100.00	50.00	100.00	20.00
Distribution of piglets	Thousand	10.00	5.00	10.00	2.00

Source: 10<sup>th</sup> five-year plan, Govt. of Sikkim.

## 5.6 SHEEP AND GOAT DEVELOPMENT SCHEMES

Rearing of sheep has been traditional activities amongst the people of border areas in the North Sikkim and certain communities of the South and the West District of Sikkim. During the fifth and sixth five-year plans, a specialised carpet and blanket industry was established in North Sikkim and similar industries were set up in the West District for the manufacture of felt clothes like Lukuni and Rari. The demand of both mutton and wool is growing steadily in the state. Sheep and goats are reared in Sikkim primarily as meat animals. Sheep and goats are reared by almost all categories of farmers, about 3 per cent by the land less farmers and over 90 per cent together by the marginal and small farmers for different kinds of additional income. (Unpublished Annual Administrative Report, 2004-

05). Sheep and goats constitute important sources of supplementary farm income. Though sheep and goats substantially influence the livelihood of over 60% of its rural households, the Government of Sikkim has not yet articulated an official policy for their breeding and development. Chicken and mutton are very popular meat (Chicken more so) in Sikkim and the market pull arising from the popularity had been instrumental in ever increasing meat prices and declining small ruminant populations.

Apart from cattle, numerically most important species of livestock in Sikkim is goat. They are nearly, 0.82 million in numbers (26% of the total livestock population) and there was decrease in (-7) per cent of goats during the period 1977-79. Goats are reared all over the state as meat animals by 61% of households surveyed at the time of field study. Sikkim has two important breeds of goats *Black Bengal* and *Betal* both are small animals but famous all over India for their meat quality. There are some crosses of *Jamnapari* as well. The average body weight of a goat is 20-25 kg. Meat yield from the animal is estimated to be 10-12 kg. Since, local goats of Sikkim are poor in milk production and slow in growth, stress has been given to their improvement both in terms of milk and growth rate. *Jamnapari* and *Betal* goats have been used to some extent for breeding programmes.

In recent field observation, it is observed that some bucks have been stationed at different panchayats and veterinary dispensaries have to be used in upgradation of local goats. Free mass vaccination and drenching against worms have been conducted on a regular basis. New goat farm has been established in different places in four

districts. However, owing to wide spread occurrence of soil erosion, especially on the steep slopes where the goats graze, farming is slowly being discouraged. However, the existing goat farms will be continued without any further expansion. In view of possible risk to vegetative cover and soils by excessive grazing by goats, stall-feeding of goats has been recommended to the farmers.

Sheep rearing is traditional practice and demand for wool and meat is growing steadily in the state. The total sheep population in Sikkim is only 5,023 (2% of the total livestock) distributed mainly in the North and West Districts (Administrative Report 2004-05). There are two recognized breeds of sheep in Sikkim like Banpala and Gharpala. The adult body weight of the breed is average 50 – 60 kg and meat yield is about 25 - 35 kg. There are also some exotic crosses of *Corridale* and *Rambouillet* breeds. The sheep population in the state has declined steeply over the year from 16,104 in 1977 to 5023 in 1997, a decline of nearly 70% of its population. In this regard, the Department (AH &VS) in collaboration with National Bureau of Animal Genetic and Resources, Karnal, Haryana is currently carrying out a study on characterization of *Banpala* sheep of Sikkim with an objective of knowing the socio-economic impact of the forest acts especially on livelihood of the traditional shepherds depending solely on the income from sheep rearing, with or without landholdings. They also studied the role of state Government as well as NGOs for generating suitable alternative means of livelihood for the shepherds. Most of the sheep in Sikkim are reared under extensive grazing conditions by constant migration from place to place. Most of the sheep farmers belong to extremely weaker sections of the society and they are not in a position to increase their flock size. During 5<sup>th</sup> and

6<sup>th</sup>, plan periods, temporary facilities at transit camps were provided by means of vaccinations and de-worming. The following targets and achievements have taken in 9<sup>th</sup> and 10<sup>th</sup> five-year plan for sheep and goat development (Table 5.6).

**Table 5.6 Physical targets and achievements for sheep and goat development**

Item	Unit	9 <sup>th</sup> Plan (1997-02) Target	Anticipated Achievement	10 <sup>th</sup> Plan (2002-07) Target	Annual Plan (2002-03) Target
Established of Sheep farm	Nos	-	-	-	-
Establishment of Goat farm	Nos	1.00	1.00	2.00	1.00

Sources: 10<sup>th</sup> five-year, Plan Govt. of Sikkim.

## 5.7 YAK DEVELOPMENT SCHEMES

The dry high zone of Sikkim and adjoining Tibet and Nepal in the north has extensive grassy meadows, suitable for grazing of yaks, sheep and goats. Three types of yaks are described in the Gazetteer of Sikkim. They are *Lho-Gyag*, found in North Sikkim (Large size yak in West Sikkim), *Bho-Gyag* (Smaller than *Lho-Gyag*), found in North Sikkim and *A-gu* a polled yak, found in higher altitudes of the state. The yak population in Sikkim is showing a declining trend in the past few years. Since, they are in limited numbers and are reared mostly on extensive alpine and sub-alpine scrublands and meadows. In Sikkim, the yak population is estimated around 4,000 as per livestock Census 1982. In 1977 livestock Census, it had been estimated to be about 5,000 nos.

Yak has a special place in the economy of the rural people in Sikkim. Yaks are the only species, which produces milk, meat, hair,

fibre and also provides transport in high altitude. The Yak is an exceptionally hardy animal and is very popular with the tribes of Lepcha and Bhutia on account of its surefootedness and ability to thrive even in a severe winter with snowy environments. Thus, yak is also called *Camel of Snow*.

Inter specific crossing between yaks and cattle gives rise to progenies with hybrid *Vigour* in terms of milk yield and work capacity and also tolerance to warmer weather conditions. The crossbreed progeny yak, bull and local female cow is called “*Joe*”. The *male Joe* is sterile. The *female Joe* yields more milk (3 to 4 litres). They are hardier and tolerate heat at lower altitudes as well as high altitudes where as the pure yak cannot thrive at lower altitudes. The state possesses sample potentialities in the shape of wide spread grassy meadow at the high altitudes in the north, some parts of the East and West Sikkim, which are remain inadequately, utilized. The programmes for development of yaks in Sikkim have been drawn up with the following major objectives.

- i) To preserve indigenous *germplasm* of yaks and improve them are by selective breeding.
- ii) To develop new stains of yaks and bring are technical advancement in the rearing of yaks.
- iii) To intensify yaks X cattle hybridization programmes to bring about more adaptability, more work efficiency better milk production and better meat production.

For the hybridization programmes, local or jersey cattle may be used. A land of about 40 ha was acquired in North or East Sikkim to

establish a yak-breeding farm. The following targets and achievements are found in 9<sup>th</sup> and 10<sup>th</sup> five-year plan (Table 5.7).

**Table 5.7 Physical targets and achievements for yak development in 9<sup>th</sup> & 10<sup>th</sup> plan**

Item	Unit	9 <sup>th</sup> Plan (1997-02) Target	Anticipated Achievement	10 <sup>th</sup> Plan (2002-07) Target	Annual Plan (2002-03) Target
Yak breeding farm	Nos	1.00	1.00	2.00	1.00

Sources: 10<sup>th</sup> five year, Plan Govt. of Sikkim.

## 5.8 FEED AND FODDER DEVELOPMENT

In view of the acute fodder scarcity in the state, it is proposed to bring about a substantial increase in fodder cultivation area and fodder availability. According to Annual Administrative Report 2004-05 (Unpublished) feed and fodder accounts for 60 – 70% of total cost of production of various products. It has been emphasized that the green fodder production is one of the most important single factor, which depends on the success of Animal Husbandry Programme. Out of total 7,09,600 ha area of Sikkim, about 1,62,392 ha (22%) is available for fodder production and pasture development. The existing pastureland particularly of the alpine region is barren and devoid of any vegetation due to over grazing by cattle, sheep, yak, etc. Now, it is necessary to improve these pasturelands where most of the herds from West, East, and North are proposed to be shifted to higher altitude for grazing during summer. ICAR report in 1987 revealed acute shortage of feed and fodder in Sikkim and the deficit being to the extent of 65.60% in green fodder, 44.76% in dry fodder and 78.66% in concentrate. The shortage of fodder occurs particularly

during lean period of winter season. To tide over the situation, preparation of silage has already started as a pilot project at Karfecter and Chungthang. Minikits are being distributed every year to meet the fodder seed requirement. Oat cultivation in winter becoming popular as more and more farmers cultivate oats to meet their winter green fodder shortages. For fodder development, it is necessary to improve in the performance of existing seed production farms, seed testing facilities, introduction of quality control measure, development of natural pasture and garucharan lands and encouragement of farmers to take intensive fodder cultivation in a much bigger way (Table 5.8).

**Table 5.8 Physical targets and achievements for feed and fodder development (9<sup>th</sup> & 10<sup>th</sup> plan)**

Item	Unit	9 <sup>th</sup> Plan (1997-02) Target	Anticipated Achievement	10 <sup>th</sup> Plan (2002-07) Target	Annual Plan (2002-03) Target
Establish of fodder farm	Nos	1.00	1.00	2.00	1.00
Intensive fodder Demonstration Centre	Nos	30.00	15.00	30.00	20.00

Sources: 10<sup>th</sup> five-year, Plan Govt. of Sikkim.

## 5.9 VETERINARY SERVICES AND ITS DISTRIBUTION

Animal Health is the foundation of the animal production. For the development of animal husbandry and livestock, adequate veterinary services are extremely necessary to provide sufficient health coverage in the state. The State Government and Department AH &VS take steps to establish more veterinary hospitals, dispensaries and stockman centres besides providing optimum infrastructure facilities in the centres already established. It is also necessary to make services and basic facilities available to farms within reasonable distance and remedial measures taken in time as far as the infections and

communicable diseases are concerned. Adequate diagnostic facilities would be made available in all the district hospitals for prompt diagnosis of diseases and their efficient treatment. A proper disease reporting system and disease surveillance, which form the core of field veterinary care during the 9<sup>th</sup> five-year plan shall further strengthened during 10<sup>th</sup> plan. Following table shows the district wise establishment of veterinary services (Table 5.9).

**Table 5.9 District-wise establishment of veterinary services**

Items	North	East	South	North	Total
Veterinary Hospitals	3	4	2	3	12
Veterinary Dispensaries	4	8	6	5	23
Disease Investigation Laboratory	1	2	1	1	5
Artificial Insemination Centre	-	11	6	18	35
Stockman Centre	7	21	22	15	65
Livestock Check Post	-	2	1	1	4

Source: Sikkim, A Statistical Profile –2002.

In Sikkim, 12 veterinary hospitals are located. The East District has the highest number of veterinary hospitals (4) (Table 5.9). On the other hand, number of veterinary dispensaries and disease investigation laboratories in the state is 23 and 5, respectively. The West District has the highest number of artificial insemination centres (18) out of 35 in the state. In Sikkim, number of stockman centres is 65 and the livestock check post is 4 (Fig. 5.1). As a whole, the states have 12 Veterinary Hospitals and all have laboratory, where routine work like blood testing, urine test stool, examination etc are done.

Complicated or unidentified sample is required to be sent Disease Investigation Cell (DIC) at Gangtok. They are also responsible to carry out the schedule vaccination programme. Rabies

control, de-worming farm management, castration, A.I. work to attend out break cases and daily routine treatment of animals in hospitals and also at the doorstep of livestock owners in case of large animals.

The primary function of veterinary centre is to make an effective investigation, prevention and control of the diseases of livestock, poultry and pets to ensure better health coverage of the animals through out the state. In addition to it, there are various centrally sponsored schemes viz. Rinderpest control, FMD Animal Disease Surveillance and systematic control of disease of national importance, where priority are given for Rabies Control, Tuberculosis and Brucellosis. Emphasis is also given to control of Pullorum Disease of poultry. In respect of animal health, the State Government has taken many steps for development in veterinary services. Following physical targets and achievements have taken in 10<sup>th</sup> five-year plan (Table 5.10).

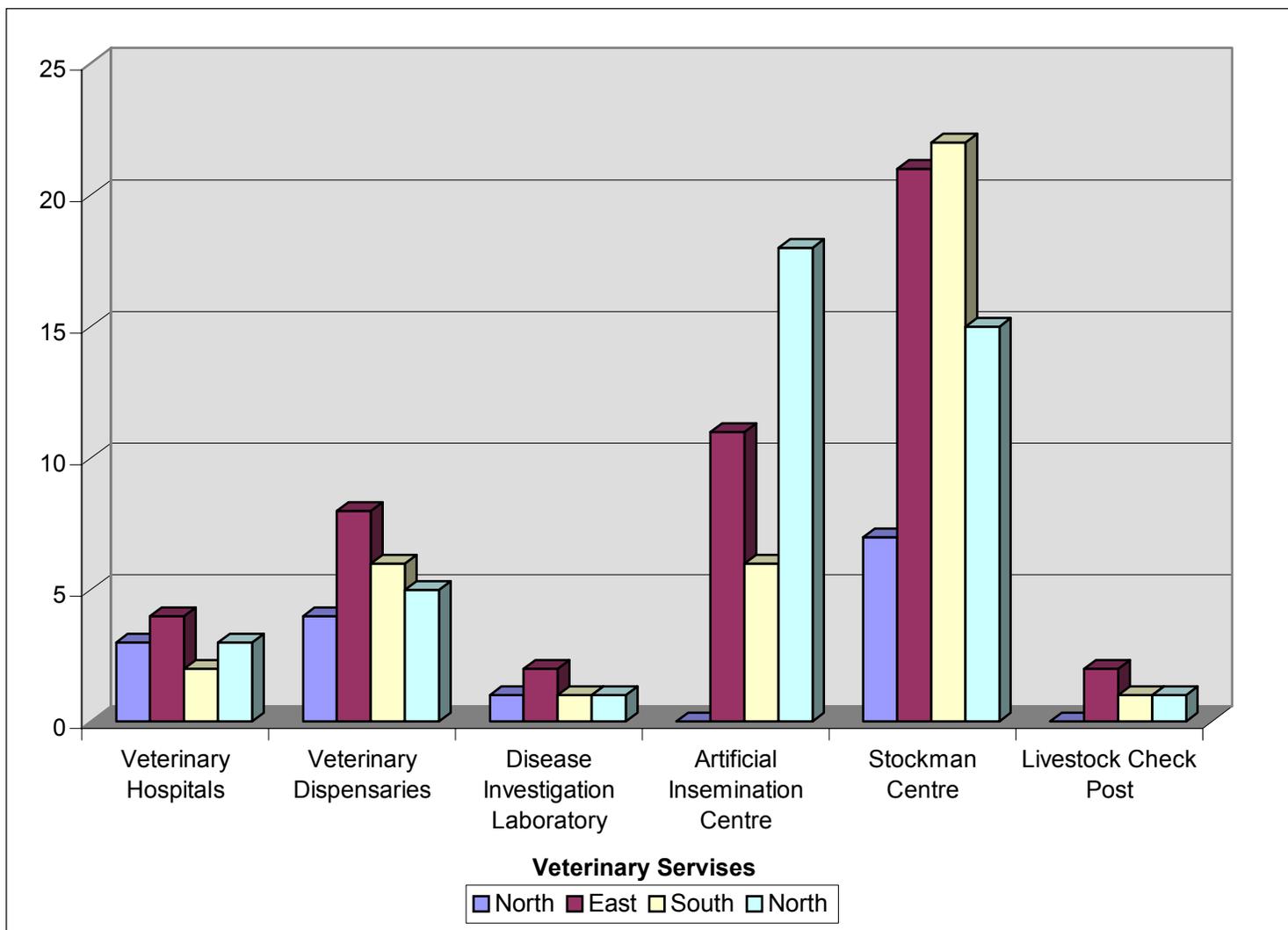
**Table 5.10 Physical targets and achievements in 9<sup>th</sup> and 10<sup>th</sup> plan for veterinary services**

Item	Unit	9 <sup>th</sup> Plan Target 1997-02	Anticipated Achievement	10 <sup>th</sup> Plan Target 2002-07	Annual Plan Target 2002 -03
Established of Polyclinic	Nos	Nil	Nil	1	1
Establishment of Veterinary Hospital	Nos	16	12	16	13
Establishment of Veterinary Dispensaries	Nos	25	25	-	-
Establishment of Stockman Centre	Nos	71	65	71	68

Sources: 10<sup>th</sup> five year, Plan Govt. of Sikkim.

## 5.10 INVESTMENT IN PSU FOR LIVESTOCK DEVELOPMENT

The Animal Husbandry Department, the Sikkim Livestock Development Corporation and the Sikkim Livestock Processing and



**Fig.5.1 District-wise distribution of veterinary services**

Development Corporation have taken important steps (public sector investment) for their own development. The amount earmarked for the development in the 8<sup>th</sup> and annual plan during 1990-91 were Rs.50 lakhs and Rs.15 lakhs, respectively. The Sikkim Livestock Processing and Development Corporation are responsible for the construction of the slaughterhouse in the state. The other two corporations have been responsible for undertaking programmes for poultry and piggery development, marketing of hides and skins and producing organic products from animal sources. The organizations need to be supported further for investment in order to see that their activities are expanded. In particular to the SLDC needs considerable support, as it is also responsible for managing the cheese plant, which has setup in North Sikkim as part of the Tribal Development Programme. The operation of cheese plant will generate considerable demand for milk production in the area and provide employment opportunity for the local people. A total provision of Rs. 50 lakhs was proposed for the eight-plan period with the provision of Rs. 15 lakhs for the year 1990-91.

### **5.11 LIVESTOCK INSURANCE**

Natural, calamities, infection diseases and accidents result in loss of valuable animals and cause economic distress to the farmers. Every year many animals are died due to different diseases. Hence, in order to help the farmers from such unforeseen difficulties, insurance cover especially to crossbreed cattle is necessary. In this scheme, the premium payment for first 3 years will be exempted for small and marginal farmers and also for SC and ST farmers. General farmers will be needed to pay 50% of the premium during the first 3

years. According to Draft 8<sup>th</sup> Five-Year Plan, over fifty thousand farmers will be benefited and they will be in position to purchase the livestock for replacement without the government aid.

## **5.12 CONCLUSION**

It can be concluded that the topography and agro-climatic conditions in the state offer better scope for livestock development activities. The main objective of development of Animal Husbandry and Veterinary Services Programme is to increase productivity per unit of cattle, sheep, goats, and poultry, eliminate poor livestock in order to reduce pressure on the lands and forests and encourage the occupational diversification of the people by providing subsidiary occupations to marginal and small farmers, landless labourers and the weaker sections of the society. At present, the development in all animal husbandry sectors, like dairy, poultry, cattle and goat and sheep have under the Department of AH &VS. The Government has taken many steps for their development in different plan periods. According to livestock census and recent field survey, it is found that an increase of population and the limited availability of land (as 70 per cent of the land holdings in Sikkim are smaller than 2 hectares), there is already great pressure on the cultivable lands and forests, on the environment as well in the state. Hence, under such situation livestock farming which requires minimal use of land, labourer and capital would be ideal sustainable model for the development in such difficult mountain terrain. The development of livestock would only provide supplementary source of income but would provide high protein-rich food items such as milk, eggs, meat and organic manure for crop production.

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# **CHAPTER - 6**

# **LIVESTOCK REARING AND**

# **ITS PROBLEMS**

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# LIVESTOCK REARING AND ITS PROBLEMS

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## 6.0 INTRODUCTION

Sikkim has been a state of Indian Territory of prosperity and well being since early times. Science and technology have come to be recognised as major tools, which could shape the process of economic progress. The economy of Sikkim is basically a rural economy. Picturesque hills and green vegetation with numerous rivers are the great assets of Sikkim. The livestock in this state have been evolved as an integral part of their own ecosystem. In the history of human civilisation, domestication of animals was a major intervention with nature, which has come to stay in the course of an eco-social process. The major livestock products available in the state include milk, meat, eggs, wool, skins and hides. Livestock wealth of Sikkim is constituted by 0.4 million livestock and 0.3 million poultry which play a significant role in the economy of the state. The domestic livestock of the state include cattle, sheep, goats, yaks, pigs, horses, ponies, mules and poultry etc. In Sikkim, increase in human population forced the people to keep livestock for family wealth, security and expands animal power. Introduction of modern technology in livestock farming and crop husbandry has also added to the environmental problems. Due to various infrastructure development programmes for commercial livestock farming, the hill environment is being seriously affected. However, in view of the

favourable geographical conditions for the growth of specific kinds of livestock for commercial farming is always brighter with scientifically organised management system.

## **6.1 PHYSICAL PROBLEMS**

The key physical factors that would primarily affected the livestock population, are as follows:

### **6.1.1 Bio-climatic regime**

Among the environmental factors, atmosphere has the greatest influence on livestock, Change in climate and atmospheric temperature thus, effect the internal combustion i.e. metabolism, respiration, body temperature and behaviour habits and production etc. of an animal. It has been shown that different kinds of animal diets play a significant role in combating the cold or low temperature conditions, there by increasing the resistance of the animals against the environmental hazards. As, yak is high altitude-animal and is able to survive even in very low temperature conditions.

### **6.1.2 Scarcity of water source**

Water is the greatest limiting factor in the livestock management. Without water any type of animal can die. Water plays a very important role in the process of digestion in rumen by creating media, which enables bacteria to grow and helps digest course cellulose roughage. In Sikkim, water has never been a problem,

particularly during monsoon season i.e. from May to October. But from November to April, the monsoon is immediately followed by a prolonged drought period. During this period, the livestock have to depend largely on various water sources such as rivers, ponds, and lakes etc. As most of the grazing lands are found in steep slopes and there are neither ponds nor lakes around therefore, animals have to travel down to the rivers and other sources of water.

### **6.1.3 Topographical constraints**

The state is highly undulating and mountainous with steep slopes. These lands are, however not found suitable for pasture. Since, the grasses available in the high altitude grasslands are limited to particular season in a year, the livestock migrate from place to place, especially to higher altitudes in summer and relatively lower altitude during winter months. In Sikkim, land use pattern as existing presently, provides scope mostly for a subsidiary form of livestock maintenance among the settled households in the mid and lower altitudes and extensive rearing of upland livestock by grazing in higher reaches. It has been observed that goats and wild related species keep grazing in the steep lands unabated (Plate 6.1).

### **6.1.4 Incidence of natural hazards**

The most important mountainous region threatened with ecological disaster is Himalayas. Generally, nature is being destroyed and human, animals and aquatic life are being shortened by the effects of development, in the form of landslides, sedimentation, the

eutrophication of reservoirs, lakes and rivers, the drying up of springs etc. Sikkim is a landslide-proned state. The northern part of the area is very landslide prone zone (Plate 6.2).

Except this, the East District, the South District and the West District have also landslide-prone zones. Due to heavy landslides in the rainy season, the pasturelands are degraded. Inappropriate land use has limited the full utilization of the potential for livestock productivity and has caused varied problems of soil erosion, landslides, silting of riverbeds, unexpected flooding of rivers and streams and other natural calamities. Fodder banks and godown can be established in high altitude regions where processed and preserved food material can be stored and utilised for feeding livestock during lean periods and under conditions of unforeseen droughts, floods, earthquakes and other natural calamities.

#### **6.1.5 Soil degradation**

The major problem of livestock rearing are heavy loss of soil, frequent land slides, toe erosion, river bed toe cutting and a permanent geological erosion process, which are further accelerated and aggravated by the heavy precipitation, formation of unstable soil and rock and over grazing in the lands. The intensive increasing of population, heavy pressure on land created many problems. The practices of pasture development in the Teesta catchments area are not applicable due to lack of proper land for grazing and pasturage. Among the major factors leading to soil disturbances; are intensive agricultural practice, denudation of forest cover, heavy rainfall and construction of roads. Overgrazing in the garucharan lands and

excessive tree felling in the khasmal lands have led to extreme soil degradation in these areas. At least 30 to 35 major landslides and slip zones each covering over an area of about 500 hectares have been identified in the state. During 1977-2001, the number of livestock population has decreased because of dam construction in different places of Sikkim especially in Rangit Nagger Hydel Project near Legship in Ravong sub-division in South District and Gyalzing Sub-division in the West District, near Lachen, Lachung and Lum revenue blocks in the North District. Beside these, Dikchu and Singtam dams are also under construction in the East District. The livestock rearing are facing various environmental problems. Inhabited area is increasing so natural vegetation as well as forest area is decreasing which affects on availability of animals' fodder. So, people, to feed there animals have to depend on fodder tree leaves, fodder grasses and agricultural residues and few fodder crops concentrates followed by occasional grazing within and outside the farm areas. This type of livestock rearing causes huge soil erosion.

## **6.2 DECLINE TRENDS OF LIVESTOCK POPULATION**

The increasing problems of populations, limitation of land and unemployment call for a revolutionary revamping of the agricultural situations in the state so as to incorporate science and technology contents of the farming efforts in extant measure. In Sikkim, the major portions of the local population are involved in livestock rearing. The subsidiary system of livestock rearing is the most predominant livestock rearing system prevailing in most rural areas in our country. It is a part of the mixed farming in the middle and lower hills of Sikkim in which agriculture, horticulture and agro-forestry form major



**Plate 6.1** Variation of topography and forest



**Plate 6.2** Land slides degrade the grazing land

components. But now a day the number of livestock population is decreasing in the state.

According to the Census Report 1977, the number of livestock population was very high (more than 510 thousands). Total number of livestock in 1997 census in the state was 4,84,304 and their number was decreased by 5.63% during 1977-97. The percentage of cattle was 30.79% in 1977 and it decreased to 9.22% in 1997. The number of buffaloes was decreased about 63.77% during 1977-97. In 1977, the number of sheep was 16,104 and their number was decreased (by 68.79%) during 1977-1997. The number of pigs and goats was increased by 45.05% and 19.76%, respectively during 1977-97. The over all scenario of livestock production is very poor in Sikkim.

### **6.2.1 Economic problems**

In Sikkim as well as the Teesta Basin of Sikkim, about 89 per cent of the livestock populations are rear in rural areas. Livestock production has enormous potential in bringing about a favourable change in the rural areas by uplifting the economic level of the marginal and small farming units. Livestock plays a very useful role in the social economy of the hill farmers. Animal Husbandry and Dairy Development play as important role in the rural economy of the state. The annual production of milk in the state in the 9<sup>th</sup> five-year plan period was 37,000 metric tonnes and per capita availability of milk was 243 ml. Sikkim Milk and the department of Animal Husbandry and Veterinary. Services are doing much extension work in the villages to promote the growth in the sector. The major livestock

products available in Sikkim include milk, meat, eggs, wool, skins and hides (Table 6.1).

**Table 6.1 Status and availability of livestock productions in Sikkim**

Dairy Products	Annual Production	Per capita availability
Milk in Tonnes	20,200	175ml/Day
Eggs in million	3.3	10 eggs/ Annum
Beef & Mutton in Tonnes	600	8 gm/day
Pork in Tonnes	300	"
Chicken in Tonnes	56.25	"
Fish in Tonnes	24	"
Wool in Tonnes	23	73 g / Annum

Source: Livestock Production in Sikkim; N. Balarama and M.M. Golay 1991.

The sizeable section of livestock population is genetically of poor quality, lacking in economic traits of a high order such as growth rate, early maturity. It must be admitted that the production level is poor and uneconomical by any standard. It is apparent that the production status of the livestock in general is only based on numbers and not on the quality of livestock. The economic conditions of farms are good and they always run on benefit where the economic conditions of general farmers are bad.

### **6.2.2 Poor health condition of livestock**

It needs hardly any emphasis that there are the needs for the availability of adequate health cover to the entire animal and poultry population in the state. The 8<sup>th</sup> five-year plan was to consider establishment of more veterinary hospitals, where the coverage is not sufficient, and increase in number of dispensaries and stockmen

centres so that basic facilities are available to the livestock farmers within reasonable distance and preventive measures are taken well in advance as far as communicable diseases are concerned. The health of the overall livestock cattle is not so good in the state. The animals kept by the farmers are however, still not descriptor type having slow growth, negligible production in terms of milk and meat, late maturity etc. The health of the jersey and their crosses are very good in the state. The conditions of traditional cattle are poor in all the districts of Sikkim. The quality and quantity of the jersey and crosses are good and these cattle get more validity. The other reason for the development of the jersey and crossbreed are the good accommodation for their living, where the local traditional cattle have not sufficient good accommodation. These animals are small in size and the fat content in milk is high. As these animals are imported from plains, most of the cattle are kept in low altitudes. About 30 per cent cattle are rearing in high altitude lands mostly in the North District, the East and the West District. At least 70 per cent of cattle are rearing in low land valleys, as it is good for their health.

### **6.2.3 Lack of pasture and grazing lands**

When the farm resources are geared up to sustain intensive level of production, more number of high quality livestock can be raised per unit area and the return over rate in terms of production can be increased. The grazing lands in this region are undeveloped, over grazed, contain poor quality grass and are infested with weeds. However, villagers do not appear to attach due importance to aspects like carrying capacity, nutritional status, soil compaction and degradation due to unawareness. There is lack of awareness regarding low digestible crude protein, total digestive nutrients and

mineral contents in various feeds. The loss of production found to be common problems, which are generally due to feeding low quantity and poor quality feeds.

**Table 6.2 District wise per capita land distribution of livestock (2001)**

District	No. Of livestock	Khasmahal in ha	Per capita land in Ha.	Garucharan in ha	Per capita land in Ha.
North	25156	21607.23	0.86	1200.15	0.05
East	76398	10499.53	0.14	902.13	0.01
South	63594	9777.57	0.15	1081.96	0.02
West	70947	9188.80	0.13	1086.35	0.02
Total	236095	51073.15	0.23	4270.15	0.02

Source: Sikkim A Statistical Profile.

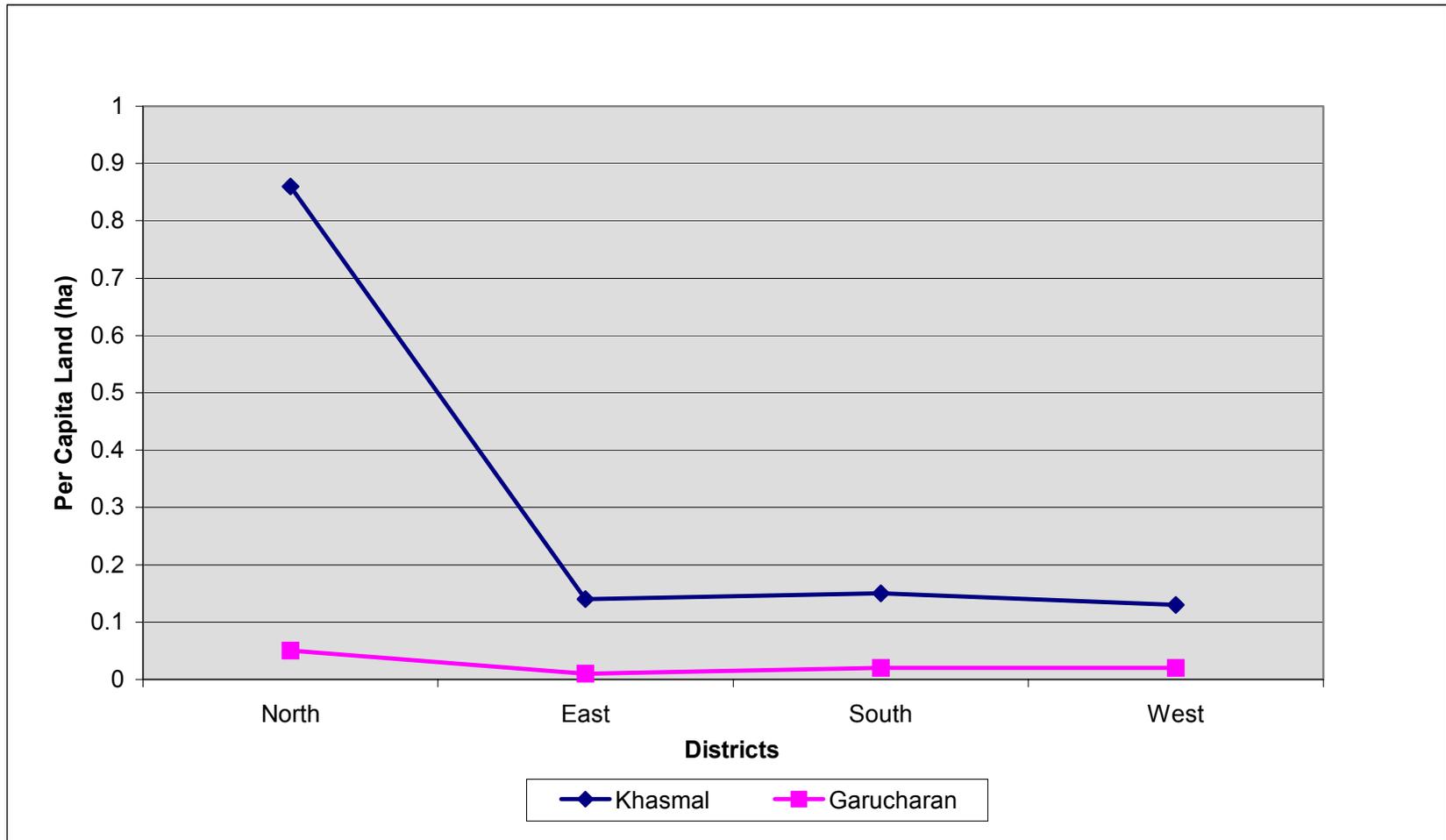
The large number of grazing land is under the alpine pasture followed by “Khasmal” land and “Garucharan” land. Major area of alpine pastureland is in the North District followed by the West and the East District.

From Table 6.2, it can be said that a large number of khasmal and garucharan lands are located in the North District. Here, per capita khasmal and garucharan land are 0.86 and 0.05 ha, respectively. Numbers of livestock in the North District (included cattle, buffaloes, sheep goat and yak) is less than the other three districts of Sikkim. Among the four districts, the East District shares a large number of livestock populations. But per capita land for livestock and khasmal and garucharan land are only 0.14 ha and 0.01 ha, respectively. The overall per capita land for livestock in the state is only 0.23 ha and per capita khasmal and garucharan land is about 0.02 ha (Fig 6.1).

The average holding of the villagers is not more than 0.6 hectares and the adjoining khasmal and garucharan are not significant enough to develop a pastoral ground with rotational grazing practices. From the observation, it is clear that the scenarios of livestock rearing in the khasmal and garucharan land are not well developed. At the time of field observations, it was observed that due to different constructional work in different parts of the state, sufficient fodder are not available for livestock. So, people have to depend on crop residues or dry fodder. The green fodder collected from the forests and jungles are meager. Now the Government has restricted these people to collect fodder from forestlands. Naturally, people have to buy dry fodder to feed their livestock. Most of the marginal farmers of Sikkim have not enough money to buy sufficient dry fodder to feed their animals from markets. So, the number of livestock the families is decreasing day by day in the State. In such situation, the practice of fodder development would do much well on sustained basis.

#### **6.2.4 Restriction on migration livestock**

Migrations of animals are most common in the state. Some times, animals have been found migrated through Nepal and Bhutan. On the international border or western border, earlier there was migration from Tibet. This has totally stopped in Sikkim. Since, the availability of grasses in the high altitude grasslands is limited to particular seasons in a year; the livestock are migrated from place to place, especially to higher attitudes in summer and relatively lower places during winter months. A large number of migratory livestock are cattle, yak, and sheep. When most of the grazing lands in upper



**Fig.6.1 District-wise per capita land distribution**

altitude of the state are covered by ice, the livestock is taken to lower altitude for graze.

In the high altitudes of the North District, a place known as Cholamu serves as a good grazing ground during winter. The farmers of the North District are normally followed the migratory route from the month of March to May and they arrived at Lachen. In August and September they return to the low altitudes. Where, snowfall is much less because heavy wind carried away of snow and the summer grasses, which are left on the earth are dry grass which is grazed by yaks in winter. On the eastern high altitudes of Gnathang and its surrounding villages, the farmers followed the migratory route from November to February and they migrate from below Karponang in March and in May, they travel to Karponang

From June to September they move to Changu and Gnathang. In various migratory routes, the farmers faced various problems like

- i) Lichen cause considerable difficulties to the persons gathering fodder from the jungle lands.
- ii) Slipping and death of animals while they graze on steep mountain slopes is quite common.
- iii) Hailstorms and snowfall cause considerable damage to the crops, grasses and plantations.

#### **6.2.5 Incidents of animal diseases**

Important livestock diseases are haemorrhagic septicaemia, anthrax, foot and mouth disease. Parasitic infestations are main diseases by which the cattle, goats, sheep are attacked. It has been observed that in almost all the villages, the livestock has faced some problems created by virus or bacteria. As the economic condition of

most of the villagers is not good, there is a pressure on them to compensate the loss of livestock. Poor quality of grass does not give the animal's proper nutrition. Livestock health in Sikkim is prone to be adversely affected due to the prevalence of several predisposing situations. Large sections of the livestock species rear in the households of Sikkim are non-descriptor and hardy. Acute scarcity of feeds and fodder in Sikkim is another important situation, which has a practical bearing on the health status of livestock. Malnutrition affects the health of animal. However, the housing systems need vast improvement to avoid stress due to extreme conditions of heat, cold and humidity. Major livestock health problems are

- i. Infection of livestock and poultry,
- ii. Nutritional and metabolic diseases,
- iii. Health hazards due to adverse and incriminating factors,
- iv. Disorders of non specific nature and
- v. Strategy for improved veterinary health measures.

The Government of Sikkim possesses a wide network of veterinary hospital, dispensaries and first aid units, which function as windows for rendering services on animal husbandry development and veterinary health. Changing situation due to development processes, resources constraints and need for scientific and technological input at higher levels call for strengthening of research component in veterinary health in the state.

#### **6.2.6 Poor condition of livestock sheds**

The most important problem, which arises during livestock rearing, is the housing of the animals. The housing condition of the livestock in the State is generally two types. One is permanent and

another is temporary structure. The number of permanent shelter for livestock is very few in the state. Only the large and rich farmers construct permanent cattle sheds for the livestock. Bamboo wall and thatched roofs livestock houses are most common among the poor and small farmers. Stones are generally used to make the floors of the cattle sheds. The temporary sheds are not so good and unhygienic for the cattle. At the time of seasonal hazards like heavy rainfall, drought, thunderstorm, the livestock suffer a lot. During winter, the sheds are equipped to protect the animal's farm extreme cold stress. To keep the livestock in good conditions, the livestock require appropriate floor and moving space to live in so that stress factors may not come in the way of high livestock productions. In the high altitudes, the livestock is also not being kept in good condition. In the livestock housing is one of the limiting factors to be attended seriously to enhance productivity. The whole scenario of housing conditions of Sikkim is generally found bad in all the districts. The view of the prevailing house was unhygienic conditions. A few per cent of farmers have a good shelter for their livestock. A large number of marginal farmers have no proper house for their livestock. But now, the Animal Husbandry Department has started providing financial assistance to farmers for construction of cattle sheds under the I.C.D Schemes. The cattle sheds were built scientifically. The livestock farms are kept in modern technique. The department advised the villagers about the need and importance of improving the shelters of the livestock (Plates 6.3 – 6.5).

### **6.3 POOR SUPPLY OF LIVESTOCK PRODUCTION**

The livestock of high altitudes such as sheep, yaks, and upland cattle have shown a declining trend in their number between 1977



**Plate 6.3 Cattle shed and its environment**



**Plate 6.4 Goat's shed**



**Plate 6.5 Pig's shed**



**Plate 6.6 Damages of house due to blasting at the time of dam construction**



**Plate 6.7 Damage of house due to blasting at the time of dam constructio**

and 1997. With an increasing in population, people exploited agricultural lands and livestock. In the regions of dam construction, number of population has increasing continuously. As a result demand of shelter, food and energy, all essential needs are increasing.

**Table 6.3 The Physical targets proposed for the 8<sup>th</sup> plan (1991-95)**

<b>Products</b>	<b>Quantity/ annum</b>	<b>Anticipated per capita availability.</b>
Milk in Tonnes	46,000	250ml/day
Eggs in million	22	43/annum
Meat including Beef, Pork Mutton and Goat Meat in Tonnes	10,000	70 gm/day
Wool in Tonnes	35	6.7 kg/ annum

*Source:* Livestock production in Sikkim in 1991(Balaran & M.M.Goal)

From Table 6.3, it can be said that the overall production of livestock is not enough for the population. As population increases, the demand of food increases. The annual production of food cannot achieve the target. As a result, food is imported from other states. For this reason, the cost of livestock increases day by day in the state. Major portion of the state belongs to non-vegetarians, the demand of animal products is high. It has been observed that 83,000 cattle, 3000 buffaloes, 20,000 sheep 114,000 goats and 5,000 pigs were brought to Sikkim from the near by places for slaughter which supply over 60 per cent of the meat consumed in Sikkim during last three years (1983, 85). The Government rate of milk per kg in the state is Rs.14. But as the demand increases, the price of milk goes up. The rate of poultry meat and goat meat is Rs. 85 and Rs. 200 per kg by the Govt. It is revealed that the cost of livestock products is very high in the state. Another reason for increasing the cost of livestock is tourism development. In the

hotel business and in tourist places, there are many restaurants, which demand animal protein in large quantities. Due to arrival of huge number of non-vegetarian foreign tourists in the state, the cost of meat increases. So, the cost of meat and poultry and eggs increases with demand.

#### **6.4 MAN MADE HAZARDS**

There are many problems due to anthropogenic action in the villages of Sikkim. One of these is due to development by construction of dams and roads. It has been observed during the field study that a large proportion of homesteads and agricultural land of a certain number of villages were affected by the construction of dams and roads for the project. All the villages around the dam sites faced very frequent blasting and consequently environmental degradation enhanced. For these developmental works, cracks are appeared on the walls of almost all the houses. Moreover, the slopes of the land were also changed due to high rates of erosion for construction (Plates 6.6 & 6.7).

#### **6.5 CONCLUSION**

The livestock in their wild state have been evolved as an integrated part of this own ecosystem. Domestication has been limited to those animal species which are enable to domestication and those sufficient which have proved their services have received food, shelter and protection. The livestock production appropriates for hills, but also in highly compatible to maintenance of an ideal hill environment and ecological balance in the hills. There is a good demand for food of animal products such as milk, meat, and eggs and there exists a good scope to utilise other livestock products like skin, hide, wool, fur, bone

and other slaughterhouse by-products. The climate of Sikkim is by and large cool and conducive for high producing livestock breeds to express their productive potential. The Government should take some measures for the development of livestock:

- i). Good housing conditions reduce stress on the animal due to heat and cold to keep up productivity.
- ii). Health measures must be strictly observed so as to keep down the annual mortality rate to below 10 per cent.
- iii). A co-operative approach must be adopted to avail of facilities regarding procurement transport and marketing on the basis of cost sharing.

As the pressure of population increases in the state, demand of food, livestock products increases. As a result, the over grazing takes place in the pastureland. Government of Sikkim banded to collect fodder from the forests, so the cost of fodder increases in the markets. Thus, the cost of meat and livestock products has increased. Government has taken many measures by which the good quality and better quantity of milk, meat and poultry products can be supplied to the inhabitants of the states.

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# **CHAPTER - 7**

# **MEASURES FOR LIVESTOCK FARMING**

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# MEASURES FOR LIVESTOCK FARMING

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## 7.0 INTRODUCTION

Adaptation of modern innovations in various economic enterprises is a phenomenon, which has considerably helped boost the level of farm productivity. At the same time, the farm income has also gone up many folds due to this technological break through in the production process. As far as agriculture and animal husbandry is concerned in the state, application of modern technology is though a relatively recent phenomenon but due to construction of new towns, urban areas, highways and many hydel projects, the sharp decline in the agricultural activities are shown in some short for a progressive market economy. As a result, time has come closer that being the secondary activity like animal husbandry or livestock rearing has been said to be an important economic sector and an integral part of state's rural economy. However, the productivity of the state's millions of livestock has not been very satisfactory over the decades despite the fact that there has been a concerted effort in raising the productivity level of the animals by bringing into its fold particularly in the rural country side.

In this context, it is certain that certain socio-cultural indicators such as the educational background of the farmers and the level of their exposure to modern technology, sources of communication of knowledge about new innovations such as different electronic media

like radio and TV, tradition of rearing livestock etc are the major factors to know the level of receptivity of the farmers to new innovations at farm level.

## **7.1 INTRODUCTION TO MODERN TECHNOLOGY**

The educational status of the people of the rural households in the state is generally improving and majorities of farmers who appear to be educationally enlightened are found receptive to new innovations particularly at their occupation level, which is predominated by livestock farm. The farmers were accordingly asked to indicate whether they come to know about the modern technology in livestock farming through programmes of Krishi Darshan show in T.V or through any other media. It is interesting to note that a substantial percentage of the farmers do not have any opportunity to hear Krishi Darshan programme in T.V. and radio and thus, appear to be quite unaware of modern livestock rearing. But in the hilly and remote areas of the state, specially in the northern Sikkim, there is wider scope in livestock development, which could be achieved through a coordinated effort involving various agencies such as Government, the non-governmental organizations, the voluntary agencies and so on with the building up of adequate infrastructures etc. Direct contact and self observation of the fruits of science and technology some time help in acquiring first hand information and up to date knowledge on recent advancement on various fields there by leading to easy receptivity and acceptance to new ideas and introduction of modern innovations. As far as livestock farming is concerned, visits of farmers to the centres of technology leads to the creation of awareness amongst them who would prepare themselves

for adoption of this new technology in the process of diffusion of modern innovation at large.

## **7.2 INTRODUCTION OF CROSSBREED LIVESTOCK**

Crossbreed of livestock has always been preferred for higher yield of milk, meat and wool. The Department of Animal Husbandry and Veterinary Services of the Government of Sikkim have been emphasising on the crossbreeding of the local livestock with exotic cattle sheep, goats of Jamunapari breed, exotic pigs, like Saddle Back, Landrace, Yorkshire etc. and improved strains of poultry birds. In view of the economic significance of the crossbreed animals in the state, there are different types of livestock reared by the farmers. The cattle are important livestock particularly in the upper continental zone and the humid sub-tropical zone in the state. The Department of Animal Husbandry has started frozen semen technology by opening numerous networks of artificial insemination centres in many parts of the state for quickening the process of crossbreeding. Scientific breeding of livestock is a step ahead in the process of modern innovations in the field of livestock management and development worldwide. In view of favourable environmental conditions in the state, there is great scope for breeding different kinds of livestock for higher yield.

## **7.3 IMPROVEMENT IN ANIMAL HEALTH CARE FACILITIES**

Proper animal health care is an important component in maintaining exotic crossbred animals, which are more susceptible to various diseases than the local livestock. In Sikkim, as crossbreed

animals is increasingly becoming popular; outbreak of the different animals' diseases has caused a serious concern for the livestock farmers and the Government as well. As for instance it has been discovered that in north Sikkim with the posting of the Indian army in the extreme border areas, an animal disease known as foot and mouth disease keeps on occurring every year especially near the army slaughter points. The infected sheep and goats are procured by the army and are slaughtered in various slaughtering points in north Sikkim, thereby spreading the diseases far and wide. At present, villagers have been properly motivated to go in for scientific health care offered by the concerned department and this change is coming from within. Vaccination of animals thus has become a common phenomenon in the rural areas of the hilly tract in Sikkim.

Good quality of livestock indicates the good health of livestock. Good health condition of livestock is a good indication of livestock families. Sikkim possesses a wide network of veterinary hospitals, dispensaries and first aid units, which function as windows for rendering services on animal husbandry development and veterinary health. The Government takes various steps for improvement and strengthening of veterinary health services in the state.

### **7.3.1 Disease investigation and monitoring**

Clinical Laboratory facilities with trained technicians are most valuable in the hospitals. Latest diagnostic tools and medicines will greatly help in such investigation work.

### **7.3.2 Preservation of veterinary biological products**

The hilly regions of Sikkim are most suitable for production of biological products in view of conducive climate prevailing in these regions. Many remote areas of Sikkim constantly faced with constraints of transport and communication. So, the centre for the production of veterinary biological products is most valuable. The centre can be utilised for the production of sera, toxoids and specific antigens and other biological products, which are used in treatment, prevention and investigation work.

### **7.3.3 Extension of veterinary health services**

There is a need to strengthen the service personnel in veterinary and Para veterinary services to cope up with the increasing demand for highly technical and scientific services and responsibilities to be carried out in the fields of diseases and investigation production of biological products in relation to public health at large scale.

## **7.4 CONCLUSION**

There is availability of all the miscellaneous items required in the farm from the market. As there is no big farm in and around Gangtok, there are heavy demands for the products like table eggs and chickens. Due to increase in population, the demand of eggs, chicken meat, and milk products has increased. On the other hand, due to increase the number of educated unemployed youths in the state, numbers of livestock farms increases. The poultry and other farmers of livestock are enthusiastic to increase quality and quantity of these products but due to natural calamities, which have no control

under their farms, the farmers cannot be able to fulfill this target. Government is also taking keen interest to uplift the poor farmers, those are engaging in poultry, cattle, sheep and goat rearing.

Under Jawahar Rojgar Yajana, industry development is disbursing loans in amounting to one lakh rupees per farmer under Government norm and conditions. The Government is also giving subsidy amounting to Rs.7,500 per farmer. The Department of Animal Husbandry is giving necessary guidelines and training to the farmers. Side by side, Industry Department is also imparting, training programme in every nook and corner of the state. Due to keen interest of the Government now the public is very much aware of the importance of poultry farming and animal husbandry.

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# **CHAPTER - 8**

# **CONCLUSION AND SUGGESTIONS**

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## CONCLUSION AND SUGGESTIONS

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Sikkim has tremendous prospects of livestock raising in its different parts particularly in cooler hills of the Himalayas. The congenial temperate climate and its temperate vegetation existing in the Himalayas are highly favourable for exotic high producing livestock. Owing the mountain terrain only 15 per cent of the total area is under cultivation where as all most 89 per cent rural population rear cattle, goats, pigs, sheep, poultry and yaks etc in small number and utilized the forest for fodder. The livestock population in Sikkim is widely distributed. In the high altitudes areas yak, sheep and local goats known as "*chengra*" predominated where as in the mid hill and low lying areas, the important breeds of cows are Siri cow and Jersey. Cross breed cows, goats, poultry and pigs are also reared in this region. In Sikkim, the total livestock production is not sufficient for the inhabitants. As a result the Government and Department of Animal Husbandry and Veterinary services have taken many steps for their development. Animal Husbandry and Dairy Development play an important role for upliftment of rural economy in Sikkim. Over all area of the state available for agricultural operation is limited, about 15 per cent of the total geographical area and with the increasing of population, the per capita land availability has been consistently declining. It is therefore, essential that supplementary source of income should be evolved through livestock rearing. Most of the rural people of the state keep different types of

livestock like cattle, buffaloes, pigs, sheep, goats, yaks and poultry. Rural people domesticate cattle mainly for meat and milk production. The local cows are, however poor in milk production. Their average daily milk production range from 1 to 1.5 litres. In recent year, a large number of cross breed jersey cattle have been developed through National Dairy Development Board, Sikkim. During field survey, it is also observed that, many farmers keep cattle as draught animals and for the ploughing in the field. Number of cattle determines the social status and economic condition of the owner. The cattle also provide manure, which promotes the productivity of soil. In the dry belt of Sikkim goat is the major livestock. The mountain slopes of the state are rocky and the soil is deep and permeable. So, the area is highly susceptible to land slide and soil erosion. It is found that majority of households were not awarded about the quantity of fodder they use for livestock. So, the people are compelled to go to near by forest to collect grass and leaves or send their cattle for grazing in the forest. Such overgrazing and overexploitation create ecological disturbances and environmental degradations. Forest is an important source of fodder. So, deforestation is increasing there by effecting natural regeneration. Due to increase of population, pressure on land and livestock is also increasing. This is responsible for the decrease of carrying capacity of land in the state. The effective integration of the farming with animal husbandry at the village level is essential for optimum utilization of farm. In addition to improve the marketing of products, many co-operative societies have been established for over all improvement of livestock management and the breeding programme. In Sikkim, dairy sector plays a critical role in generating cash income especially for the small dairy farmers. With the improvement in marketing and processing system, this sector is

steadily moving towards dairy farming as a means of supplementary income generation and even as commercial enterprise rather than a part of subsistence system. Poultry has emerged as the fastest growing segment in the livestock sector. It offers greater scope for the weaker section of the society especially the small marginal farmers, agricultural labourers, educated unemployment youth, members of SC and ST communities and women folk to input their socio-economic condition and to elevate these segments above the poverty line.

The average livestock population density is low in Sikkim. The states shares about 1 per cent of total livestock of the country. During field survey, it is also observed that, the livestock population is decreasing day by day because of lack of sufficient fodder availability and restriction by the Government on open grazing in the forest. The district wise distribution of livestock indicates that among the livestock, cattle are the largest in number for their multifunctional activities. The cattle are unevenly distributed all over the state. Highest percentage of cattle is shared by the East District (35.26%) followed by the West District (29.17%), the South District (26.04%) and the North District (8.98%). Goat is common and widely domesticated animal in Sikkim. Highest percentage of goats is found in the South District (30.72%) and the lowest is in the North District (10.09%). The East District and the West District both share 29.39% and 29.80% of total goats in the state respectively. It is also observed that about 60% Sikkimese keep pigs. The highest number of pigs is reared in the East District (32.56%) and the lowest number of pigs is found in the North District (11.62 %). The field study also shows that

highest number of yaks is recorded in the North District (49.33%). The highest percentage of poultry is found in the West District (34.02%).

The main source of fodder in the state is unprotected forest, wasteland and fallow land. The state is famous for forest resources. Generally, every livestock eat green fodder. However, the agricultural crops are the major suppliers of fodder in form of crop residue, bran, straw and cakes due to non-availability of green fodder. There are mostly 'passive' avenues of fodder availability. Cultivable and 'active' intensive fodder productions are negligible. Existing land use pattern does not envisage or provide any scope for such active fodder production without which it is hardly possible to raise livestock productivity levels. Out of geographical area, only 22 per cent area is available for fodder production. The major portion of grazing land in the state is under alpine pasture (62.68%), khasmal land garucharan land and cultivable wasteland (1.40%). The highest number of pastureland is recorded in the North District (90.51%) and lowest is recorded in the East District (0.01%). The area under khasmal and garucharan lands is also large in the North District. The fodder availability of the state varies from area to area. It is observed that more than 2.200 kg of fodder are collected from green bushes and jangle. And about 45% of foddors are collected from outside the farms and 28% are collected within the farm. The per month average consumption of dry and green fodder of each animal is 2.5-3 quintals. A livestock needs 60-70 kg green fodder for a day without any other dry fodder.

The main livestock products of the state are milk, meat, bones and hoofs, hides and skins and wool. The dairy development

programme in the state was initiated in the year 1976. As a first measure, two dairy plants were set up, one with a capacity of 10,000 l at Tadong in the East District and the other with capacity of 5,000 l at Karfacter in the South District, but another two dairy plants were built in Mangan and Kabi in the North District in 2001. The Sikkim Milk Union has responsible for the development of milk production. Out of total 170 organised milk societies in Sikkim, only 108 registered societies were functioning in 2001-02. According to Department of A.H. & V.S. per day milk requirement in the state was 7,360 litres. During field survey it is observed that the production of milk which was increased from 11,000 to 37,000 litre in 5<sup>th</sup> – 9<sup>th</sup> plan period. The livelihood of states 90 per cent population mainly depends on dairy farming and other related allied activities. The Sikkim Co-operative Milk Producers Union Ltd. was created in 1980 for handling 7,000 litres milk per day with 103 registered milk societies and 4,500 milk producers in the state. Due to increase of population, there is high demand for meat and eggs for domestic consumption, but the state has no sufficient production of meat and egg. To meet the growing demand, it is imported from the out side of state like Siliguri (W.B). During field observation, it is found that each household in Sikkim consumed 13.52 kg of poultry meat and 117 numbers of eggs annually in the year 2002-03. In 9<sup>th</sup> five year plan, about 1,003 million numbers of eggs were produced. The state has only 1% of the total requirement of poultry meat and balance 99 per cent is brought from Siliguri.

Livestock Development Corporation has responsible for trade and marketing of the surplus products. According to SLDC, which sell about 40 thousand eggs and 300 kg of poultry meat per month. The

marketing of milk is organized through milk cooperatives under the Sikkim Milk Union. Besides, Sikkim Milk Union, many private milk vendors supply milk at the door of the customers. The Sikkim Milk Union and Sikkim Livestock Development Corporation provides proper marketing facilities for milk meat and other livestock products and by products. During 9<sup>th</sup> and 10<sup>th</sup> five year plan, there had been a noticeable improvement in the performance of Sikkim Milk Union and its cooperatives for marketing the products. For better marketing, a separate corporation known as Sikkim Livestock Processing and Development Corporation is established during 8<sup>th</sup> five year plan. It is responsible for sale processing and collection of meat in Sikkim. The state has poor transportation. High transportation cost, inaccessibility etc. are the main factors for poor development in marketing sector. All most all the cooperative societies have been rendering satisfactory services for economic upliftment of poor people both is rural and urban areas in the state. During field observation, it is also found that about 31.25% new cooperative societies were established in 2001-02. Among four districts, the West District has the highest number of societies where as less number of societies is found in the North District. At present, the state has 35 marketing cooperative societies. The East District shares 20, the West District shares 2 and the South District shares 13 marketing and cooperative societies. The East District shares the highest milk cooperative societies in the state.

Animal Husbandry and Dairy development play an important role in the rural economy of the state. The Department of Animal Husbandry and Veterinary services have been responsible to bring about an overall improvement in the breeding programme. The Department has also maintained the breeding farms for genetic

upgradation, fodder development, consolidation of the infrastructure for ensuring effective and timely veterinary services and embryo transfer technology. The State Government has taken many steps in different plan periods for the development of this sector. For diary development a good quality cross breed milch cows have been imported from outside the state. The state has vast scope for development of piggery farms in view of the large demand for meat and its by products for domestic consumption. The State Government has taken different schemes for setting up new piggery farms in rural areas. For cattle development the Department of A.H. & V.S. has a definite cattle breeding policy. As per the policy, the indigenous animals are to be upgraded with cross jersey breeding bulls. AI are used for maintain the exotic inheritance level up to 50-62.5%. So, Government and department of A.S & V.S have taken many steps for their development in different plan periods by sanctioning loan and subsidies.

The state is a highly undulating and mountainous with steep slopes. So, the land is not suitable for livestock farming. The grasslands are located in high altitudes. As a result, the grazing of livestock is very difficult. Migration of the livestock is also an important reason for under development. The housing condition of the livestock is poor. Most of the houses are made of bamboo wall. Stones are generally used to make the floors of the cattle sheds. The state is a landslide prone zone. Due to heavy landslide in the rainy seasons, the pasturelands are degraded. The quality of grazing land is poor in the state. The unsuitable geological nature of the soils and steep hilly terrain make the soils of Sikkim highly prone to erosion and related problems. Livestock health in Sikkim is prone to be adversely

affected due to prevalence of several predisposing situations. In Sikkim, Large section of the livestock species reared in the households are non-descript and hardy. Acute scarcity of feeds and fodders in Sikkim is another important situation, which has a practical bearing on the health status of livestock. The important livestock diseases are haemorrhagic septicemias, anthrax, and food and mouth disease. A parasitic infestation is also important disease by which the cattle, goat and sheep are attacked. During field observation, it is also observed that many livestock have some problems created by virus and bacteria.

The Government of Sikkim processes a wide network of veterinary hospital dispensaries and others, which functions as windows for development in Animal Husbandry. The state is a good demand for food of animals' products such as milk, meat, and eggs and there exists a good scope to utilize other livestock products like skin, hide, wool etc. The Government has also taken different measures for the development of livestock to give financial assistance like loan and subsidy etc. Secondly, the establishment of cooperative society for tendering facilities regarding, procurement transport and marketing etc. To increase the livestock products, many private and non-Governmental organizations have also building up adequate infrastructure like breeding farms and veterinary treatment centres, etc. Communication facilities and transport are also most important measures for animal husbandry and dairy development. In current year, the modern technology like T.V., Radio, etc. are the main medium for supply proper weather report, climatic condition and other natural calamities to the farmers. Scientific breeding of livestock has always been preferred for higher yield of milk, meat and wool. The

Department of Animal Husbandry and Veterinary Services have been emphasising on the cross breeding of the local livestock with exotic cattle, sheep, goats and pigs and improved strains of poultry birds. In view of favourable environment condition in the state, there is a great scope for breeding different kind of livestock for higher yield.

## **SUGGESTIONS**

Sikkim, which is situated remotely and faced with problems of transport and communication, setting up of district level livestock farms will go a long way to meet the requirement of livestock productions to a great extent. The steep slope, difficult terrain and remote far-fetched rural habitations of Sikkim present for mid-able constraints against a viable marketing strategy for intensive livestock production activities. The basic guidelines, which observed for operating an efficient marketing system for livestock products are :

- i) Good transport facilities for livestock production.
- ii) Supply of inputs like feed, seeds, supplements medicines etc. must be coupled with marketing of products to economies the cost of transport.
- iii) The state Livestock Products Marketing Agencies must play the role of buffer between the producer and the consumer so that during situations of varying supplies and demands, these agencies can help in procurement, supply and maintenance of price level.

## **DAIRY DEVELOPMENT AND PRESERVATION**

For the development and preservation of dairy products the Government should take following steps:

- i) To bring more areas under milk producers' co-operative societies and milk collection centres.
- ii) Better processing and hygienic packing for clear milk production to delivering school children, households for the nutrition programme.
- iii) Other measures like- more and more milk collection centres should set up.
- iv) More milk plants have to be set up.
- v) Another development Schemes like processing unit for milk products should be set up.
- vi) One Milk Union has been able to establish a reliable marketing channel for the milk producers in Sikkim.

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# **ANNEXURE**

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## FAMILY SURVEY

**Department of Geography & Applied Geography, North Bengal University**

1. Family Sl. Number –                      Block/Village:                      District:

2. Family statistics:

No of Family members.			Number of Adults		Number of Children	
Total	Male	Female	Male	Female	Male	Female

3. Population Composition:

Caste			Religion			
S.C	S.T	Others	Hindus	Buddhists	Christians	Muslims

4. Residence status:

Permanent \ Temporary, if temporary

Year	Self/Family	Same State	Other State	Same District	Other district	Same country	Other country

5. Marital Status (No.) in the family :

Married	Unmarried	Divorced	Widow	Widower

6. Fertility rates:

Status	Age at marriage	Age at 1st. issue	Int. bet. issues	Age at last issue	No of children
M					
F					

7. Mortality rate:

Reasons	Men	Women	Children
Causes of death			
Age at death			
Place of death			

8. Educational level :

Family	Illiterate	<Primary	Secondary	H. Secondary	>H.Secondary

## 9. Occupations:

Type & No of persons	Part/Full time	Annual income in Rs
Mining		
Industries		
Agriculture		
Business		
Govt. Services		
Labourers		
Private services		
Contractors		
Others		

## 10. Income :

Number of Earning Members		Number of Dependents		
Male	Female	Adult Male	Adult Female	Children M/F

## 11. Area in ha:

Type	< 1 ha	1 - 2 ha	2- 5 ha	5-10 ha	10-20 ha	2—30 ha	>30 ha
Houses							
K, Garden							
Agricul.							
Forests							
Others							

## 12. House Types:

No of Houses	Roof	Floor	Wall	Toilets etc
	Pucca/Kuncha	Pucca/Kuncha	Pucca/Kuncha	Yes/No P/K

## 13. Ownership of land:

Self	Joint	Partly joint	Leased	Partly leased
Area in ha				

## 14. Types of lands ;

Soil	Sandy	Clayey	Sticky	Otherwise
Nature of land	Steep	Moderate	Gentle	Flat
Location	Same village	Other village	Scattered	Agglomerated
Irriga. (Source)	Jhora	Well	Canal	Others
Method of irriga.	Pumping	Diversion	Traditional	Modern
Tilled	Self	Labourer	Traditional	Mechanised

## 15. Sizes of Plots :

Area in ha	No of plots	Total area	Location
<0.5			
0.5-1			
1-2			
2-5			
5-10			
10-20			
>20			

## 16. Major Crops produced:

Crops	Area in ha	Production in kg	yield rate /ha in kg	Irrigated/not
Rice				
Wheat				
Maize				
Vegetables				
Large Cardamom				
Fruits				
Milletts				
Pulses				
Potato				
Mustard				
Ginger				
Others				

## 17. Cropping Pattern:

	Single	Double	Multiple	Mixed
Area in ha				

## 18. Agricultural Inputs used:

Type	Quantity per ha in kg	Cost per kg	Source of Supply
Urea/TSP/Potash			
HYV Seeds			
NPK/Zinc etc			
Machinaries			
Organic fertilisers			
Others			

## 19. Livestock Status:

Type & Total No	Number (L/HYV)	Supply of fodder	Place of Grazing
Cow			
Goat			
Sheep			
Horse			
Yak			
Others			

## 20. Dairy products:

Products	Life	Meat	Milk	Cheese	Hairs
Quantity					
Personal use					
Marketing	Local market	Middlemen	Towns	Outside	Otherwise

## 21. Other facilities

Drinking water	Spring/Well/Tap	Permanent/Temporary	Self/Government
Toilets	Common/Private	Pucca/Kucca	..
Bathroom	Common/Private	Pucca/Kucca	..
Kitchen	Separate/Combined	Pucca/Kucca	..
Electricity	Regular/Occasional	Free/Pay	..
			..

## 22. Expenditure Pattern:

Type	Amount per month	Sources
Food		
Clothes		
Agriculture		
Others		

## 23. Loans Used to take

Purpose	NGO /Govt./Private	Amount	Frequency	Nature of payment
House Constrn.				
Household Exp.				
Agriculture				
Others				

## 24. Type of fuels used:

Items	Kerosene	LPG	Fire wood & Collection				
			Self	Purchased	Labourer	Own plot	Govt plot
Volume							
Dist.in km			<1	1-1.5	1.5-2.0	2.0-2.5	>2.5
Prices							

## 25. Nature of disasters:

Nature	Frequency per year	Damages in Rs	Mitigation	Self/Govt.
Flood				
Landslides				
Drought				
Environmental				
Storms etc				
Soil erosion				
Fog/Mist etc				
Others				

## 26. Industries:

	1	2	3	4
Cottage				
Agro-based				
Beverage				
Liquor				
Tanning				
Medium scale				
Fruit based				
Dairy based				
Others				

## 27. Others if any problems:

## VILLAGE STATISTICS

Department of Geography & Applied Geography, North Bengal University

### 1. Village Profile:

Village	Rev. Block	C.D.Block	Nearest Town	Distance	Households

### 2 Area and Population:

Area in km <sup>2</sup>	Population	Male	Female	Density/km <sup>2</sup>	Growth 91-01

### 3. Population Composition:

Caste			Religion			
S.C	S.T	Others	Hindu	Buddhists	Christian	Muslims

### 4. Type of farmers:

Small	Marginal	Medium	Large	Very large

### 5. Occupations:

Cultivators	Agl.Labour	Mining etc	Industries	T& Com.	Const.	Others
M						
F						
T						

### 6. Land uses in ha

Area under cultivation			
Area under non-agri			
Cultivable waste			
Trees & Grasses			
Forests			
Permanent pasture			
Current fallow			
Others			
Total			
Net Irri. Area (Rabi)			
Net Irri area (Kharif)			
Non-irrigated Area			

### 7. Types of Vegetation: in ha

Shrubs	Scrubs	Dense Forest	Open Forest	Reserved Forest	Protected Forest

## 8. Major Crops;

Crops	Area in ha	Production in kg	Yield in kg/ha
Rice			
Maize			
Fruits			
Vegetables			
Ginger			
Large Cardamom			
Mustards/Oil seeds			
Pulses			
Millets			
Others			

## 9. Cropping Pattern :

Rabi	Kharif	Single	Double	Multiple	Mixed

## 10. Mode of cultivation:

Traditional	Improved	Electricity	Ploughing	Irrigation

## 11. Nature of disasters:

Floods	Cyclones	Droughts	Soil erosion	Fog/Mist	Landslides	Others

## 12. Causes of soil erosion/Landslides:

Agriculture	Settlement	Population	Deforestation	Modernization

## 13. Disaster mitigation

Items	1	2	3	4	5	6
Landslide						
Soil erosion						
Pollution						
Floods						
Droughts						
Diseases						
Others						

## 14. Irrigation:

Crops irrigated	Sources of irrigation	Frequency of irrigation	Time of irrigation
Rice			
Vegetables			
Large Cardamom			
Wheat			
Maize			
Pulses			
Potato			
Others			

## 15. Pesticide used:

Items	Amount in kg/ha	Cost per kg	Source supply
Pesticide			
Insecticide			
Traditional medicine			
Fungicide			
Others			

## 16. Amenities

Type	Number	Distance in Km	Students /Pop	Teachers/Pop
Primary School				
Secondary ..				
Snr Secondary ..				
Health services				
Post/Telegraph				
Market				
Bank/Cr. Soc.				
Bus services				
Electricity				
Drinking Water				
Block Office				
VLW Services				
Sanitary				
Sewage				
Police station				

## 17. Livestock:

Animal	Number	Local/HYV	Grazing places
Cow			
Sheep			
Goat			
Yak			
Horse			
Bull			
Pig			
Others			

## 18. Environmental Degradation:

Deforestation	Population	Fertiliser	Pesticides	Vehicles	Water

## 19 Industries:

Name	Number	Private/Govt.	No of workers	Production
Agricultural				
Cottage				
Carpet making				
Small scale				
Medium scale				
Others				

## 21. Major resources:

Items	1	2	3	4	5	6	7
Agricul.							
Forest							
Industrial							
Water							
Others							

## 22. Management of Resources:

Items	1	2	3	4	5	6	7
Agricul.							
Forests							
Industrial							
Water							
Others							

## 23. Developmental plans

Items	1	2	3	4	5	6
Agriculture						
Industrial						
Economic						
Infrastructure						
Family Plan.						
Others						

## 24. Amount of Sanction and Achievements During last plan periods

Plan Period	Agriculture	Industries	Health	Environ.	Amenities	Others

## 25. Major Problems if

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