



## ***ECONOMICS of***

## ***Small Ruminant, Pigs and Backyard Poultry Production in Orissa***

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Backyard Poultry Production in Orissa**

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## **Chapter I**

### **Demographic and Socio-economic Profile of Orissa**





# Chapter I

## Demographic and Socio-economic Profile of Orissa

### 1.1 Background of the state of Orissa

Orissa, the tenth largest state in India, is located on the eastern seaboard of the peninsular India on the Bay of Bengal. The state is surrounded by West Bengal and Jharkhand in the north, Chattisgarh in the west and Andhra Pradesh in the south. The state has a geographical area of 1.56 lakh Km<sup>2</sup>. The state has a population of 3.67 crore in 2001. With a population density of 237 persons per Km<sup>2</sup>, the state is the third among the states with low density in the country, with Rajasthan and Madhya Pradesh occupying the first and second positions. The population of the state is predominantly rural with only 15.0 per cent living in the urban areas (Figure 1.1).

The population of the state grew at 15.94 per cent in the 1990s as against the national average of 21.34 per cent. This low population growth rate is not positive feature since it is due to remaining in the first stage of demographic transition. Only two states viz., Kerala and Tamil Nadu experienced a lower growth rate than Orissa. But the nature of demographic transition taking place in Orissa is different from the one taking place in the other two states. While Tamil Nadu and Kerala entered the third stage of demographic transition, the state is still in the first stage in which population grows at low rate due to high birth as well as death rates. While birth rate is declining slowly, death rate remained high leading to low population growth rate (Government of Orissa, 2004).

Sex ratio is high in the state, which has to be attributed to high proportion of tribal population. The state occupies third position in high sex ratio (972 females per 1000 males) among major states. Again Kerala and Tamil Nadu are ahead of Orissa.

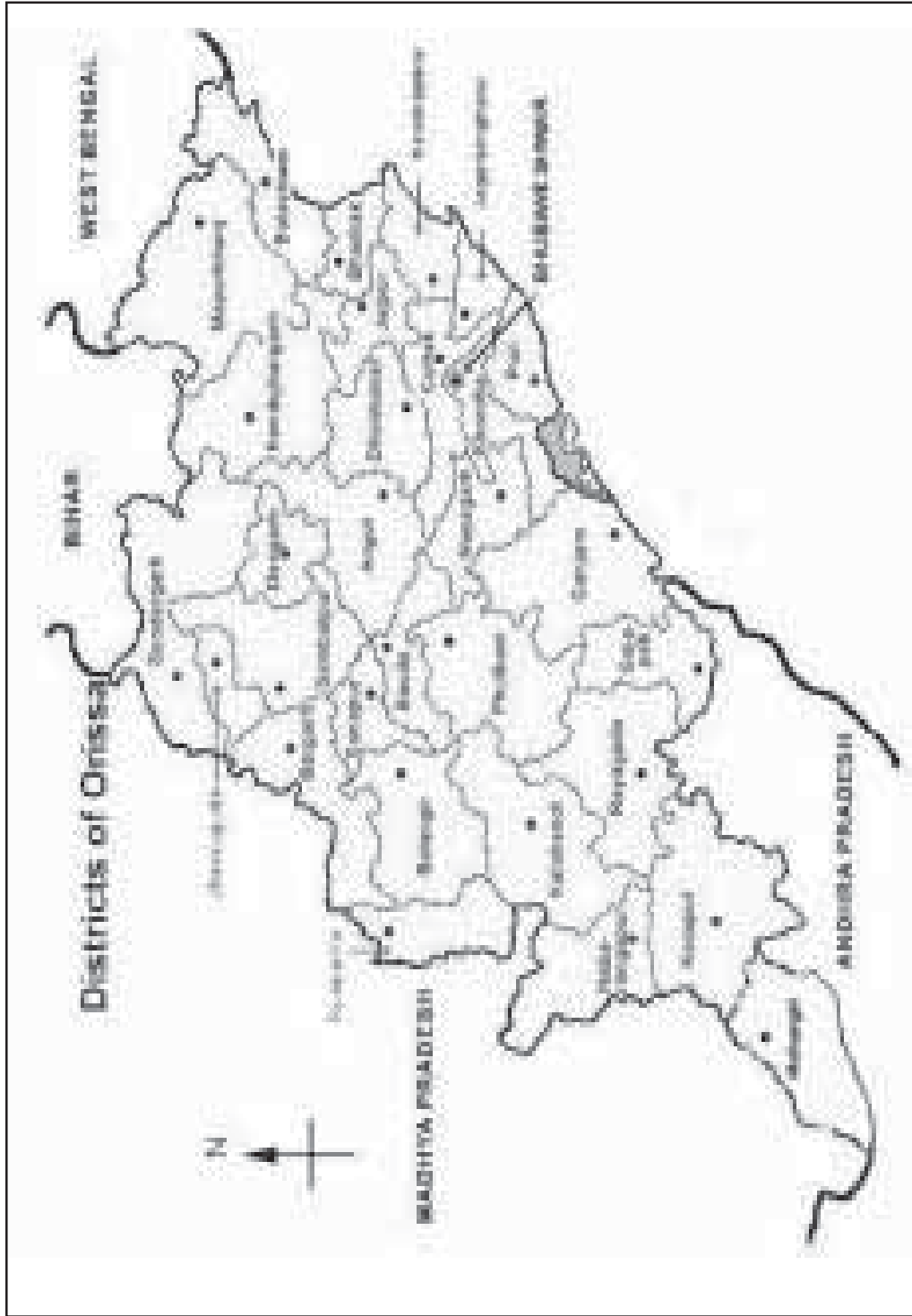
The state has a moderate literacy rate, but its relative position is deteriorating because of the slow growth of literacy in the state as compared to the growth in the other low literacy states. The literacy rate in 2001 was 53.9 per cent. Presently, only four major states viz., Bihar, Uttar Pradesh, Rajasthan and Andhra Pradesh have a lower literacy rate than Orissa.

### 1.2 Social Groups

Orissa has a very high proportion of Scheduled Tribes (STs) and Scheduled Castes (SCs). They, together, account for 38.6 per cent of the total population of the state. While the proportion of Scheduled Tribes is only 8.1 per cent at the national level, their proportion in the state is as high as 22.1 per cent. Orissa and Madhya Pradesh are the two states with a high concentration of Scheduled Tribes. The proportion of Scheduled Castes is 16.5 per cent and it is very close to the national average. The state is known for its communal peace. There is no instance of any major communal riot or caste conflict since 1975 (Government of Orissa, 2004).

### 1.3 Work Participation Rate

Wide gap exists between the nation and the state in the female participation rate in rural areas. While urban female participation rate is higher in the state than at the national level, rural rate is lower than at the national level and this has resulted in a lower overall work participation rate (Table 1.1). The participation rate is 27.1 per cent in Orissa as against 31.0 per cent at the national level in 2001. Consequently, while 42.0 per cent of the people in the country are workers, only 40.3 per cent of the rural inhabitants in Orissa are so. It is significant



to note that the gap between the nation and the state in female work participation rate arose only after 1981. While nation experienced rapid increase in the female work participation rate in the eighties, the state experienced a decline. From this, it is reasonable to conclude that the lower participation rate is only due to lack of employment opportunities for females in the rural areas.

**Table 1.1: Work participation rates by Sex and Residence**

Category	1981		1991		2001	
	Orissa	India	Orissa	India	Orissa	India
<b>Rural</b>						
Males	54.7	53.8	56.7	52.5	53.4	52.4
Females	22.6	23.2	21.1	26.7	27.1	31.0
Persons	38.7	38.9	34.3	40.0	40.3	42.0
<b>Rural + Urban</b>						
Males	53.8	52.7	55.9	51.6	52.8	51.9
Females	20.8	19.8	19.8	22.3	24.6	25.7
Persons	37.5	36.8	38.0	37.5	38.9	39.3

Source: Censuses of corresponding years

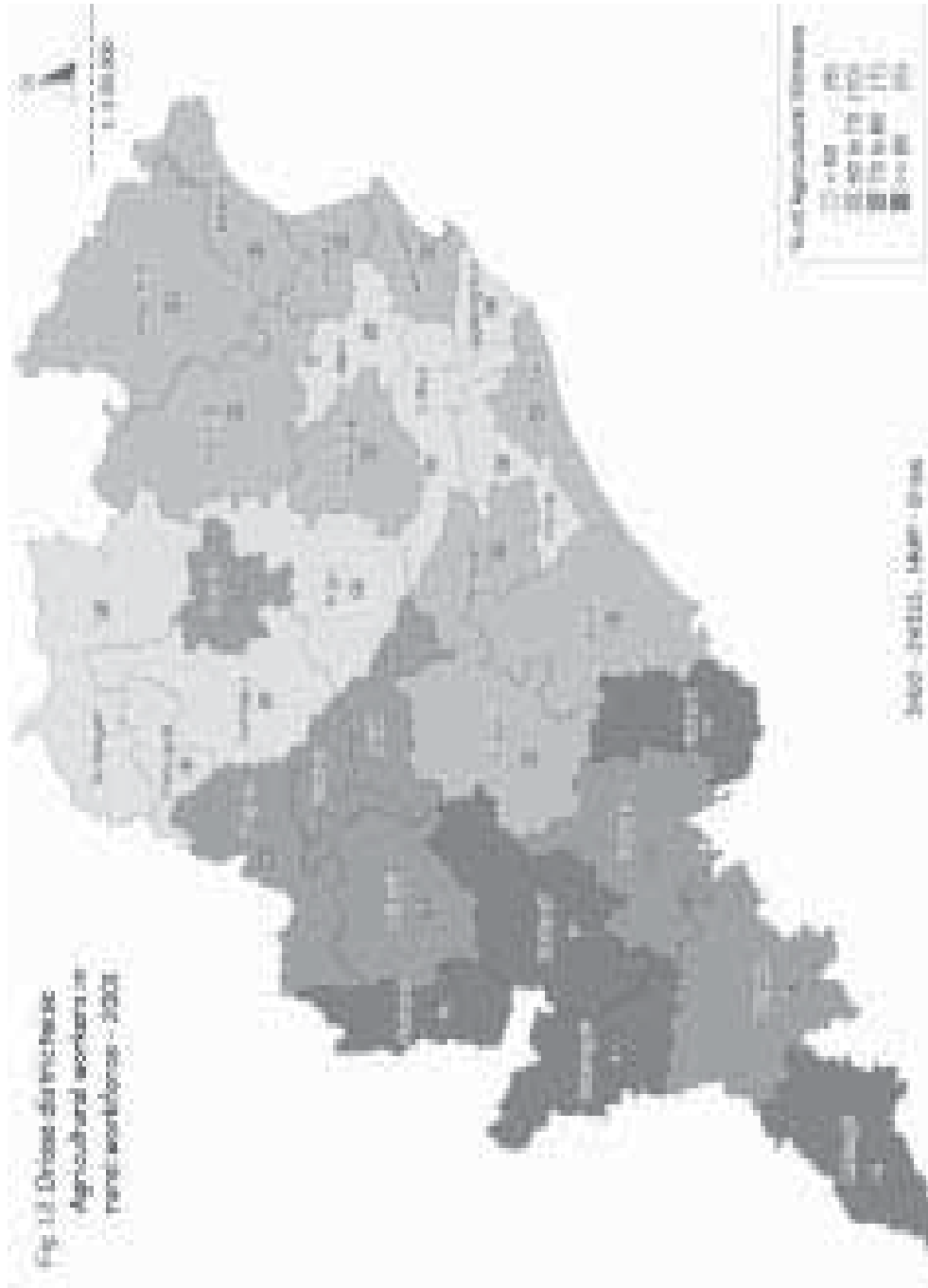
Orissa has a predominance of agricultural workforce because of low urbanization rate. The proportion of agricultural workers in total workers is higher in the state than at the national level (Table 1.2). While 58.4 per cent of the workers are in agriculture at the national level, the proportion is as high as 64.7 per cent at the state level. This is only due to low urbanization in the state. If the rural work force is considered, the share of agriculture in total workforce is less than at the national level.

The state experienced a sharper decline in the proportion of agricultural workers during the nineties than the nation. While the nation experienced a decline of eight percentage points in the percentage of agricultural workers in total workers, the state experienced a decline of ten percentage points. This decline is not a healthy sign as it appears to be the result of push factor resulting from agricultural stagnation in the nineties. The eighties witnessed almost constancy in the proportion of agricultural workers, indicating that the agricultural sector absorbed the growing workforce proportionately because of the high growth during the period. Moreover, there are significant variations in the proportion of agricultural workers in the rural areas (Figure 1.2)

**Table 1.2: Percentage of Agricultural Workers in Total Workers**

Year	Rural		Rural + Urban	
	Orissa	India	Orissa	India
1981	83.0	81.9	76.6	68.4
1991	82.3	81.3	75.3	67.2
2001	72.3	73.3	64.7	58.4

Source: Censuses of corresponding years





## 1.4 Rate and Structure of Economic Growth

The economy of Orissa always lagged behind the nation in the rate of economic growth, but the gap was an all time high in the nineties. The gap widened because of the dismal performance of the state in the 1990s with a growth rate of 3.07 per cent per annum, while the nation achieved a high growth rate of 5.7 per cent per annum (Table 1.3). Further, the state experienced steep deceleration in growth in the nineties, while the nation could achieve high and accelerated growth.

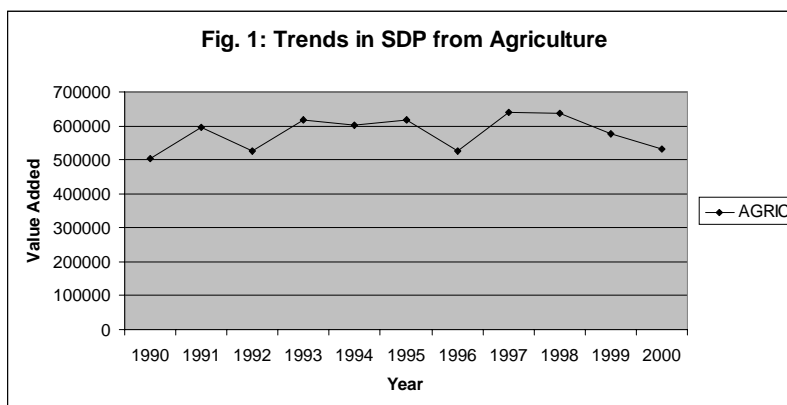
**Table 1.3: Compound Growth Rates of State Domestic Product by Sectors**

Sectors	1970-71 to 1979-80	1980-81 to 1989-90	1990-91 to 1999-2000
Agriculture	1.07	3.08**	0.61
Manufacturing	7.06***	8.65***	-9.11***
Primary	1.20	2.98**	2.11***
Secondary	6.67***	7.06***	-3.33***
Tertiary	3.39***	6.63***	6.72***
<b>NSDP - Orissa</b>	<b>2.41**</b>	<b>4.24***</b>	<b>3.07***</b>
<b>NDP - ALL INDIA</b>	<b>3.24***</b>	<b>5.17***</b>	<b>5.70***</b>

*Growth rates are based on semi-logarithmic trend equations.*

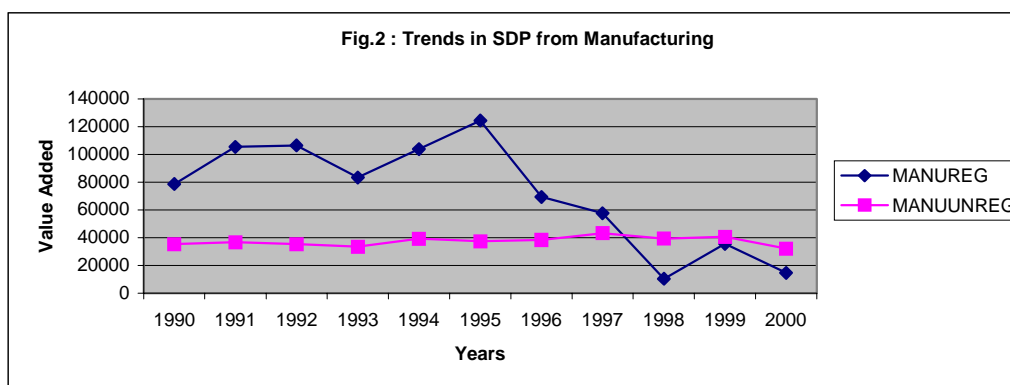
\*\*\* indicates significance at 1 percent level. \*\* indicates significance at 5 percent level

The low growth as well as deceleration in the growth rate of NSDP of Orissa in the nineties was due to the dismal performance of both agriculture and manufacturing sectors. The growth rate of agriculture was only 0.61 per cent per annum and it is also not statistically significant indicating that it was only random fluctuations in output rather than any trend during the period (Fig.1). Sawant (1997) shows that state domestic product from agriculture in Orissa grew at 2.57 percent during 1968-69 to 1981-82 and at 3.4 per cent during 1981-82 and 1991-92. The state received a severe setback between 1992 and 1995. During the period 1981-82 to 1994-95 output of pulses declined at a high rate of 3.61 percent per annum, the growth rate of pulses was negative and the growth rate of cereal output was 3.05 per cent per annum. Output of oilseeds increased at a high rate of 4.24 percent per annum.



The performance of the manufacturing sector is not better than that of agriculture during the nineties. Value added in manufacturing sector declined at a high rate of 9.1 per cent during the period and it was accounted for mainly by registered manufacturing. While the value added in the unregistered manufacturing remained constant, value added in the registered

manufacturing fell to less than one-fourth of its level in 1990 and less than one-sixth of its level in 1996 by the year 2000 (Fig. 2). According to the investment climate report, an average firm in Orissa is less productive than an average Indian firm, with an average manufacturing worker in the state earning 24 percent less than the average worker elsewhere in India (World Bank, 2005, p iv). More than half of the respondents identified regulation and corruption as major or severe bottlenecks to business operations or expansion. Poor infrastructure and problems of access to finance are next in order of importance as impediments to business operation and growth.



The relative position of the state in relation to all India and other states declined steeply because of the steep deceleration in growth in the state while most of the other states and the nation were showing acceleration. To see this, triennium averages of NSDP have been computed to even out the short-term fluctuations (Table 1.4). The per capita income of the state, which was 71.7 per cent of the national average during the triennium ending 1981-82, declined to 62.1 per cent by the triennium ending 1991-92 and 52.0 per cent by the triennium ending 1999-00. This decline by ten percentage points in each decade is a serious matter especially when the population growth is very low. The decline in the relative position is steeper if we consider Rajasthan. The state had 89.6 per cent of the per capita income of Rajasthan in 1981-82. But the ratio declined steeply to 69.1 per cent in 1991-92 and to 61.5 per cent in 1999-00. Thus, the distance between Orissa and Rajasthan increased by about 30 percentage points in two decades.

**Table 1.4: Per Capita NSDP of Orissa as Percent to Selected States and India**

Year	Relative to Punjab	Relative to Rajasthan	Relative to all-India
1981-1982	44.2	89.6	71.7
1991-1992	37.6	69.1	62.1
1999-2000	35.0	61.5	52.0

*Three-year averages of NSDP at factor cost at 1993-94 prices are used*

*NSDP per worker is only 54.3 per cent of all-India average*

### 1.5 Trends in the Incidence of Poverty

Orissa is one of the high poverty states in India. While the incidence of poverty, as per official estimates, was 26.1 per cent at the national level, it was as high as 47.2 per cent in Orissa in 1999-00. Besides, the decline in the incidence of poverty between 1993-94 and 1999-00 in the state was negligible, even as the decline at the national level was substantial (Table 1.5).

**Table 1.5: Incidence of Poverty in Orissa and India**

Year	Orissa	India
1983	65.3	44.5
1987-88	55.6	38.9
1993-94	48.6	36.0
1999-00	47.2	26.1

**1.6 Structure of Agriculture**

The high incidence of poverty in the state can be explained in terms of the structure of agriculture, which is understood in terms of land and water use, cropping pattern and fertilizer use.

The land use pattern in the state is more efficient than at the national level. The state has higher proportion of forest area than at the national level, but the proportion of net area sown is also relatively higher. Both forest area and net area sown account for about 37.0 per cent of the geographical area (Table 1.6). While the proportion of forest area is higher by 15 percentage points, the proportion of net area sown is lower by only nine percentage points. This is because the state has a lower proportion of fallow land and land not available for cultivation than in the country. Thus, land use pattern has to be considered as more efficient in Orissa than at the national level.

**Table 1.6: Land Use Pattern in Orissa and India 2000-01**

(Percentages)

Land Category	Orissa	India
Land under forests	37.33	22.66
Land not available for cultivation	11.83	13.98
Other uncultivated land excluding fallows	8.46	9.12
Fallow land	4.95	8.16
Net sown area	37.43	46.07
<b>Total land</b>	<b>100.00</b> <b>(155.71)</b>	<b>100.00</b> <b>(3062.50)</b>

*Figures in brackets are lakh hectares*

*Source: CMIE, Agriculture*

Orissa has a less unequal distribution of agricultural land than the nation. This can be understood in three ways. Firstly, the proportion of marginal holdings is lower in the state than at the national level. Secondly, the average size of the operated area among the marginal holdings is higher than at the national level. Thirdly, the medium and large holdings have a lower share in number as well as operated area than at the national level. For instance, medium and large holdings have a share of 40.1 per cent in the operated area and 7.35 per cent in holdings at the national level, while the corresponding shares are 21.5 per cent and 4.31 per cent in the state (Table 1.7). All these three factors indicate that the distribution of land is less unequal in Orissa than at the national level.

**Table 1.7: Distribution of Landholdings and Operated Area by Size of Holding**

Size of holdings	Orissa		India	
	Percent in holdings	Percent in operated area	Percent in holdings	Percent in operated area
Marginal	54.08	20.68	61.58	17.21
Small	27.89	29.59	18.73	18.81
Semi-medium	13.72	28.21	12.34	23.85
Medium	3.93	16.80	6.14	25.34
Large	0.38	4.72	1.21	14.79
<b>All Groups</b>	<b>100.0</b> <b>(39.66)</b>	<b>100.0</b> <b>(51.44)</b>	<b>100.0</b> <b>(1155.80)</b>	<b>100.0</b> <b>(1633.57)</b>

Data relates to 1995-96. Figures in brackets are number of holdings in lakhs and operated area in lakh hectares

The cropping pattern in the state is dominated by rice, which has a share of 56.28 per cent of Gross Cropped Area (GCA). The share of rice at the national level is only 23.7 per cent. Pulses and vegetables are the other major crops each accounting for about eight per cent of the cropped area (Table 1.8). While pulses account for a higher proportion at the national level (10.7 per cent), the share of vegetables is much higher than at the national level (only 3.3 per cent). The variations across districts in the proportion of area under rice and pulses are shown in Figures 1.3 and 1.4.

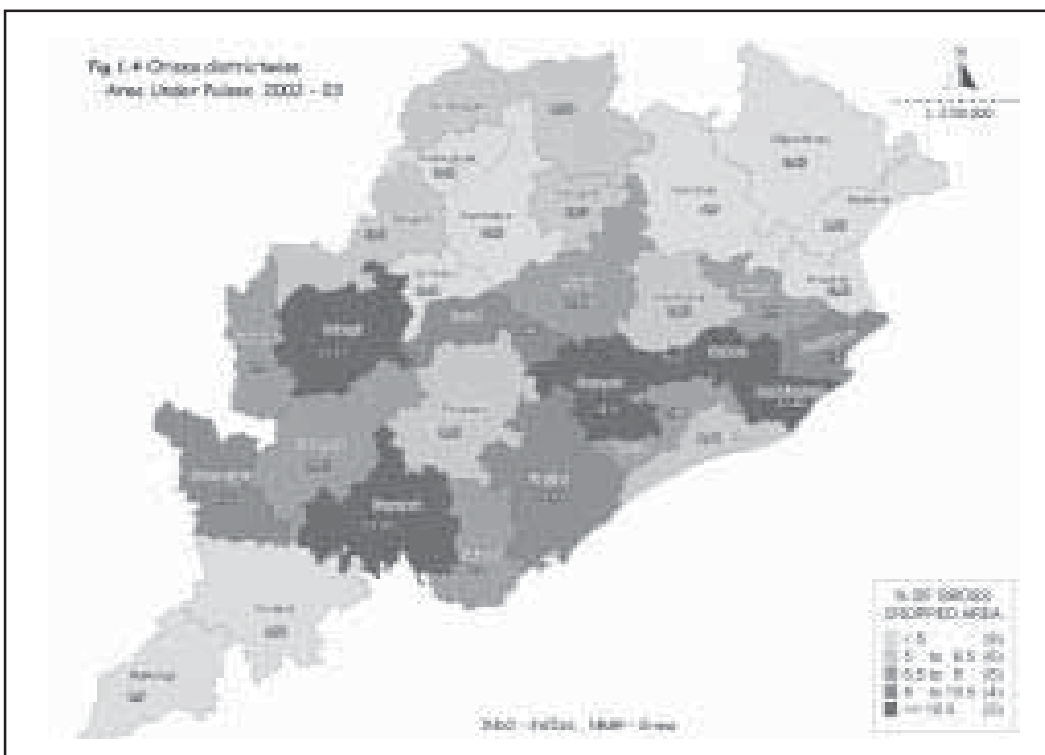
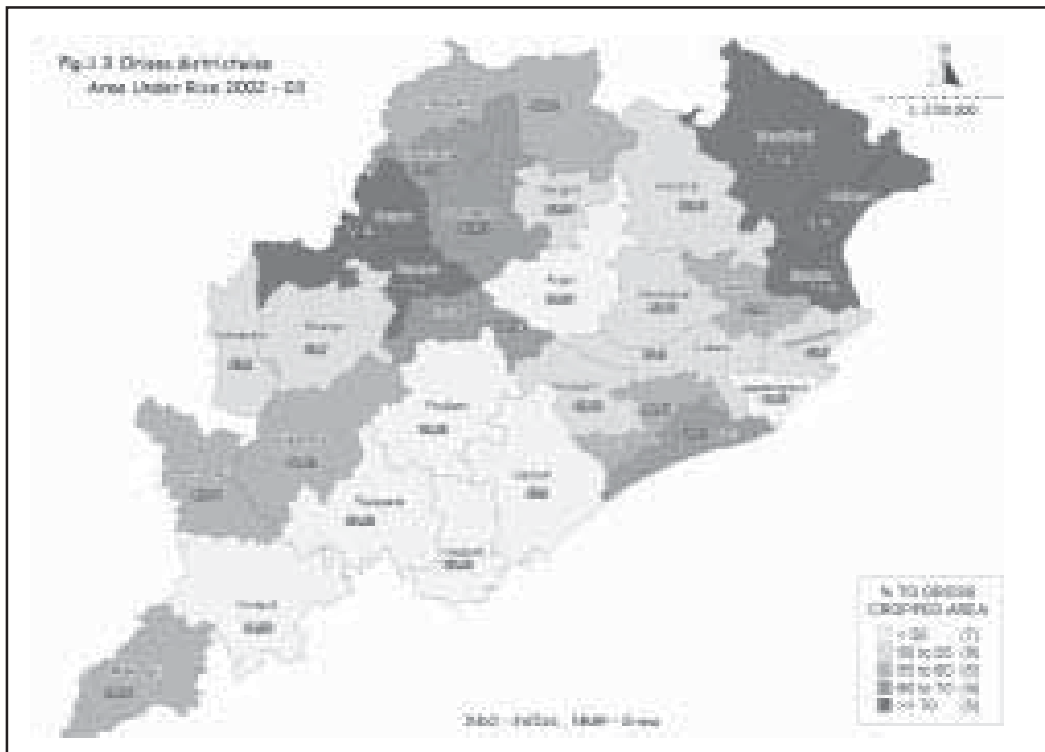
**Table 1.8: Area Under Selected Crops: 2000-01**

Crop	(Percentages)	
	Orissa (%)	India (%)
Rice	56.28	23.72
Wheat	0.11	13.76
Maize	0.69	3.53
Ragi	1.07	0.94
Bajra	0.06	5.26
Jowar	0.17	5.27
<b>Cereals*</b>	<b>58.38</b>	<b>52.48</b>
Pulses	7.67	10.69
<b>Foodgrains</b>	<b>66.05</b>	<b>63.17</b>
Ground Nut	0.92	3.60
Chillies	0.88	0.45
Vegetables	8.92	3.34
Fruits	2.73	2.08
Others	20.05	27.36
<b>Total</b>	<b>100.0</b> <b>(78.78)</b>	<b>100.0</b> <b>(1870.09)</b>

Note: Figures in the parentheses are area in lakh hectares

\*Excluding barley

Agriculture in the state is based on traditional technology in the sense that use of chemical fertilizer and tractors is very low. This is partly due to very high use of manure. Consumption of chemical fertilizer per hectare is only 38 kg per hectare, which is less than half of the national average. However, there is improvement in the nineties (Table 1.9)



**Table 1.9: Consumption of Fertilizers (NPK)****(Kg per hect)**

Year	Orissa	India
1990-91	20.08	67.55
2000-01	37.89	86.34

Irrigation sector needs good shape in the state. Net irrigated area declined steeply in the nineties. While the proportion of net irrigated area in net area sown increased from 35.2 to 40.0 per cent at the national level, it declined steeply from 32.8 to 22.9 per cent between 1992-93 and 2002-03 in the state (Table 1.10).

**Table 1.10: Percentage of Irrigated Area in Net Area Sown**

Year	Orissa	India
1992-93	32.84	35.16
2002-03	22.89	40.01

It is the area under wells and tanks that declined steeply during the decade. Area under wells declined from 8.34 lakh hectares to 1.34 lakh hectares and area under tanks declined from 2.98 lakh hectares to 1.00 lakh hectares (Table 1.11). At the national level, the area under canals and tanks declined significantly, whereas area under wells increased. There is a need to examine the condition of wells in the state and identify suitable measures to rehabilitate them.

**Table 1.11: Distribution of Net Irrigated Area by Source****(Lakh hect.)**

Source	Orissa		India	
	1992-93	2002-03	1992-93	2002-03
Canals	9.38	8.82	170.84	149.82
Tanks	2.98	1.00	32.41	19.23
Wells	8.34	1.34	265.38	336.39
Other Sources	-	1.84	32.37	25.87
<b>All Sources</b>	<b>20.70</b>	<b>13.00</b>	<b>501.01</b>	<b>531.31</b>

In the absence of possibility for increasing area under cultivation, the growth of the sector depends on the improvement in yield. While the yields at the national level increased at a rapid rate, the yields in Orissa moved at a slow pace. The yield of rice, the most important crop in the state, increased from 0.88 tonnes in the TE 1972-73 to 1.29 tonnes in the TE 1992-93 (Table 1.12). But it declined to 1.14 tonnes by the TE 2002-03. As a result, the relative yield of rice in the state in relation to the national average fell to 58.5 per cent from 78.8 per cent. This is because a significant proportion of rice area is cultivated under rain-fed conditions. Yield of ragi declined from 0.92 tonnes to 0.54 tonnes during the three decades, leading to a decline in the relative yield from 105 per cent in the 1972-73 to 40.5 per cent. The yield of pulses, which grew at a more rapid rate than the national average till 1992-93, also declined in the subsequent period and the relative yield fell to 75.5 per cent of the national average. The relative yield of chillies also declined steeply during the period.

**Table 1.12: Average Yield and Ratio of Yield in Orissa to All India for Major Crops  
(Tonnes per hect)**

Crop	1970-71 to 1972-73		1980-81 to 1982-83		1990-91 to 1992-93		2000-01 to 2002-03	
	Orissa	Ratio(%)	Orissa	Ratio(%)	Orissa	Ratio(%)	Orissa	Ratio(%)
Rice	0.88	78.8	0.90	69.5	1.29	74.1	1.14	58.5
Ragi	0.92	105.3	0.81	80.2	0.83	69.3	0.54	40.5
Groundnut	1.35	180.4	1.34	163.6	1.35	146.0	0.88	94.6
Pulses	0.51	101.7	0.66	100.0	0.75	110.2	0.56	75.5
Chillies	0.70	108.5	0.77	120.5	0.80	95.5	0.84	75.4

The growth rates of yield clearly indicate the deterioration in the yields of several crops in the nineties. The growth rates of yields are negative for all crops during the nineties (Table 1.13). These crops have shown positive growth rate in the eighties, but these growth rates are found to be statistically insignificant. Thus, even in the eighties, the growth rates of yield were unstable. Rice yields across districts are shown in Figure 1.5.

**Table 1.13: Annual Exponential Growth Rates of Yield of Selected Crops**

Crop	1970-71 to 1979-80	1980-81 to 1989-90	1990-91 to 2003-04
Rice	-0.1	3.5	-1.2
Ragi	-5.0**	1.8	-2.4**
Groundnut	-3.3	-0.8	-2.4**
Foodgrains	-1.6	2.3	-1.4
Chillies	-2.5*	0.1	0.5*

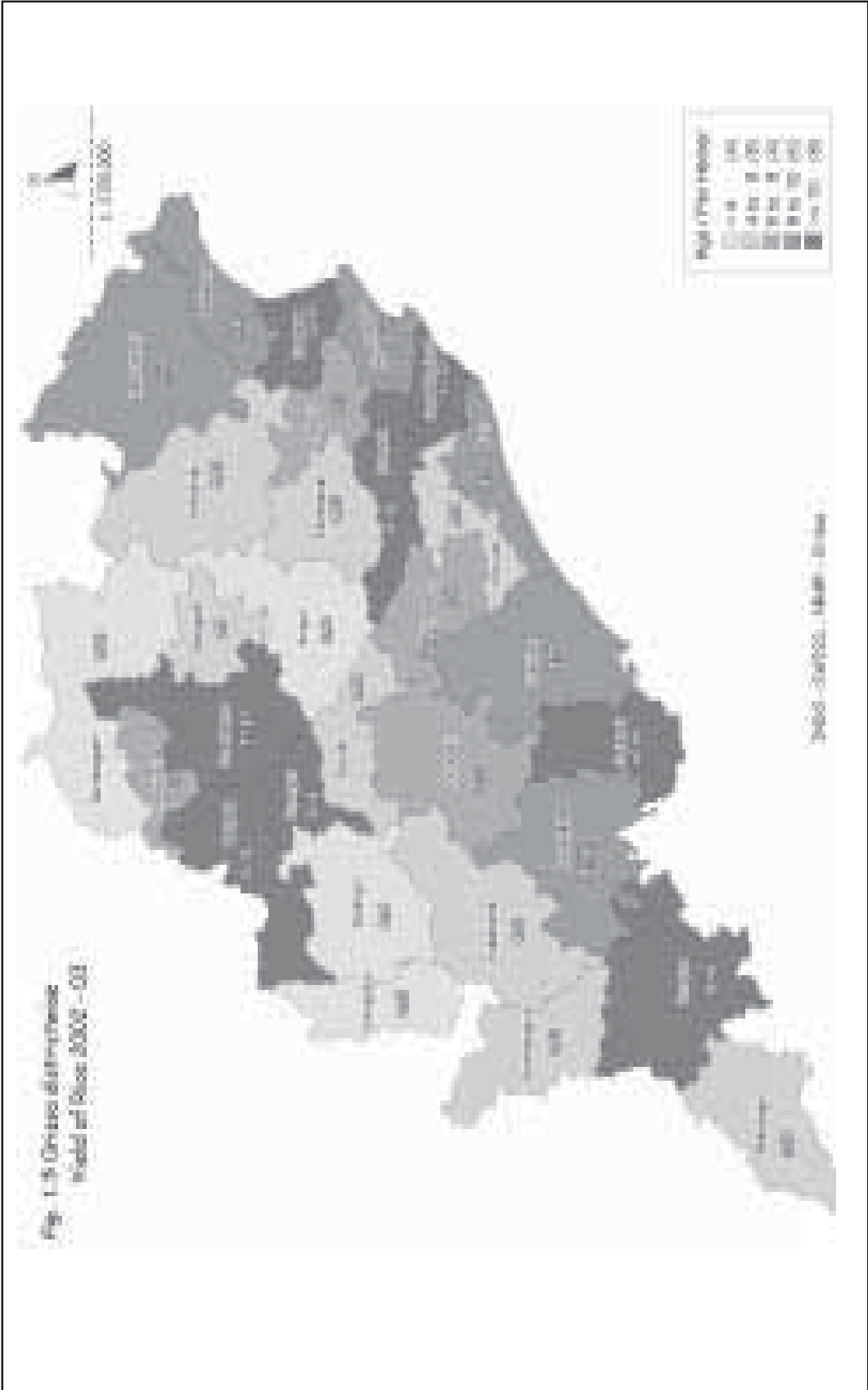
\*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level

Growth rates of area were also negative for all the crops except in respect of cotton in the nineties (Table 1.14). Only in the case of rice the rate of decline is negligible. Area under all the other crops declined at a high rate. For instance, area under all millets declined at about seven per cent per annum. Area under groundnut declined at 10.9 per cent per annum. Area under cotton declined at a high rate of 20.4 per cent per annum. It is clear from the growth rates of yield and area that the agricultural economy of the state is facing serious crisis since the nineties.

**Table 1.14: Annual Exponential Growth Rates of Area**

Crop	1970-71 to 1979-80	1980-81 to 1989-90	1990-91 to 2003-04
Rice	-0.9**	0.4*	-0.1
Jowar	6.0**	-2.4**	-7.7***
Bajra	10.5***	-2.3***	-6.1***
Maize	7.9***	-0.2	-7.0***
Ragi	7.8***	-3.0***	-6.5**
Wheat	13.1**	-7.1***	-8.5*
Groundnut	6.9***	8.4***	-10.9***
Small Millets	3.9***	-12.3***	-7.1***
Foodgrains	1.4***	0.2	-2.1***
Chillies	10.0***	3.8*	-1.9
Castor	5.3***	-4.1***	-4.8***
Cotton	40.3***	2.7	20.4***

\*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level





Because of the decline in the growth rates of area and yield, production of all the crops declined at a high rate (Table 1.15). Ragi and groundnut showed highest rate of decline of 9.9 per cent and 13.4 per cent respectively. Food grain production declined at an annual rate of 3.46 per cent per annum. Similarly, all the crops showed negative growth in the production during the nineties. Though the growth rates were positive in the eighties for all the crops except ragi, they were statistically insignificant except in the case of groundnut. Parhi, Pati and Parida (1997) examined the supply response of groundnut to price changes in Orissa. They have studied four districts viz., Cuttack, Dhenkanal, Ganjam and Sambalpur, which contributed 73 per cent of production of groundnut in Orissa using the data for 1982-83 to 1991-92. Area response functions are estimated using both linear and log linear models. Price elasticity of area is ranging between 0.63 in Cuttack and 0.89 in Ganjam. Though the coefficient of fertilizer price is not statistically significant, the inclusion of this variable improved the price elasticity of acreage response.

**Table 1.15: Annual Exponential Growth Rates of Production**

Crop	1970-71 to 1979-80	1980-81 to 1989-90	1990-91 to 2003-04
Rice	-1.4	3.90	-1.26
Ragi	2.7	-1.2	-9.9**
Groundnut	3.7*	7.6***	-13.4***
Foodgrains	-0.17	2.52	-3.46**
Chillies	7.49***	3.86	-1.42

The above analysis clearly shows that Orissa is lagging behind and the economic distance between the Orissa and other states has been increasing over time. Further, the performance of the economy was very poor in the nineties. Both agriculture and manufacturing sectors showed poor performance during the period.

### 1.7 Agro-climatic Regions

The state was originally divided into 13 districts, but with the reorganization in 1992, the number of districts increased to 30. Often the state is classified on the basis of topography into four regions, viz., (1) The Northern Plateau (consisting of the undivided Keonjhar, Mayurbhanj and Sundargarh districts), (2) The Central Table Land (with the undivided Balangir, Dhenkanal, and Sambalpur districts), (3) The Eastern Ghats (comprising the undivided Kalhandi, Kandhamal and Koraput) and (4) The Coastal Plains (consisting of the undivided districts of Balasore, Cuttack, Gunjam, and Puri). The Coastal Plains region is endowed with a number of river deltas.

The National Sample Survey Organisation (NSSO) classifies the state into three regions viz., Coastal, Southern and Northern regions. The Coastal region is the same as in the above classification. The Southern region is the same as the Eastern Ghats except that Balangir of the Central region is included in this region. The Northern region of NSSO consists of the Northern and Central regions of Agro-climatic classification excluding Balangir. We have adopted a classification similar to the classification of NSSO, but considered KBK region in the place of Southern region. As a result Kandhamal is included in the Northern region. Thus, we designate the three regions as Coastal, Northern and KBK. A summary classification of the districts is shown in Table 1.16.

**Table 1.16: Classification of Erstwhile Districts into Agro-climatic Regions**

Type of Classification	Coastal	Eastern Ghats /Southern/ KBK	Northern	Central
Agro-climatic	Balasure Cuttack Ganjam, Puri	Kalhandi Kandhamal Koraput	Keonjhar Mayurbhanj Sundargarh	Balangir Dhenkanal Sambalpur
National Sample Survey	Balasure Cuttack Ganjam, Puri	Kalhandi Kandhamal Koraput Balangir	Keonjhar, Mayurbhanj Sundargarh, Dhenkanal Sambalpur	
Present Study	Balasure Cuttack Ganjam, Puri	Kalhandi Koraput Balangir	Keonjhar, Mayurbhanj Sundargarh, Dhenkanal Sambalpur, Kandhamal	

**1.8 Inter-district Variations in Demographic and Social Characteristics**

The KBK region is the most backward in the state with the highest proportion of Scheduled Tribes, lowest density of population, lowest rate of urbanization and lowest literacy rate. The Northern region occupies middle position in all these variables. The Coastal region is most developed. In the Northern region, Mayurbhanj and Kandhamal are highly backward. In the KBK region, Sonapur and Balangir are distinct with low proportion of scheduled tribes and high literacy rate. Density of population is also high in these two districts (Figures 1.6 to 1.10).

**Table 1.17: Demographic Characteristics of Orissa across Districts**

District	ST (%)	SC (%)	Density/KM2	Sex ratio	Urban%	% of literates
Gajapati	50.8	7.5	119.96	1031	10.2	33.9
Ganjam	2.9	18.6	385.16	998	17.6	51.6
Puri	0.3	18.2	431.93	968	13.6	68.2
Khurdha	5.2	13.5	667.40	902	42.9	69.8
Nayagarh	5.9	14.0	222.24	938	4.3	61.3
Jagatsinghpur	0.8	21.1	634.07	963	9.9	69.8
Cuttack	3.6	19.1	595.40	938	27.4	67.3
Kendrapara	0.5	20.5	492.44	1014	5.7	66.5
Jajpur	7.8	23.0	560.31	972	4.5	61.8
Bhadrak	1.9	21.5	532.43	974	10.6	63.2
Baleshwar	11.2	18.8	531.93	953	10.9	60.2
<b>Coastal</b>	<b>5.6</b>	<b>18.5</b>	<b>438.35</b>	<b>964</b>	<b>16.5</b>	<b>62.0</b>
Mayurbhanj	56.6	7.7	213.42	980	7.0	43.4
Sundargarh	50.2	8.6	188.50	957	34.4	55.5
Kendujhar	44.5	11.6	188.12	977	13.6	50.0
Jharsuguda	31.3	17.1	244.94	946	36.5	61.4
Baragarh	19.4	19.4	230.66	976	7.7	55.7
Sambalpur	34.5	17.0	140.55	969	27.1	58.2
Debagarh	33.6	15.4	93.23	980	7.3	51.0
Dhenkanal	12.8	18.5	239.64	961	8.7	59.9
Angul	11.7	17.2	178.82	941	13.9	58.9
Baudh	12.5	21.9	120.52	984	4.8	48.3
Kandhamal	52.0	16.9	80.81	1008	6.8	43.2
<b>Northern</b>	<b>36.6</b>	<b>13.8</b>	<b>175.43</b>	<b>969</b>	<b>15.7</b>	<b>52.7</b>

District	ST (%)	SC (%)	Density/KM2	Sex ratio	Urban%	% of literates
Malkangiri	57.4	21.4	87.07	997	6.9	25.1
Koraput	49.6	13.0	134.06	999	16.8	29.6
Rayagada	55.8	13.9	117.50	1028	13.9	29.8
Nabarangapur	55.0	14.1	193.87	991	5.8	27.7
Kalahandi	28.6	17.7	168.62	1001	7.5	38.4
Nuapada	34.7	13.6	137.77	1007	5.7	35.3
Bolangir	20.6	16.9	203.38	984	11.5	47.7
Sonapur	9.8	23.6	231.85	966	7.4	53.3
<b>KBK</b>	<b>38.4</b>	<b>16.3</b>	<b>152.94</b>	<b>997</b>	<b>10.1</b>	<b>36.2</b>
<b>State</b>	<b>22.1</b>	<b>16.5</b>	<b>236.37</b>	<b>972</b>	<b>15.0</b>	<b>53.9</b>

Source: 2001 Census

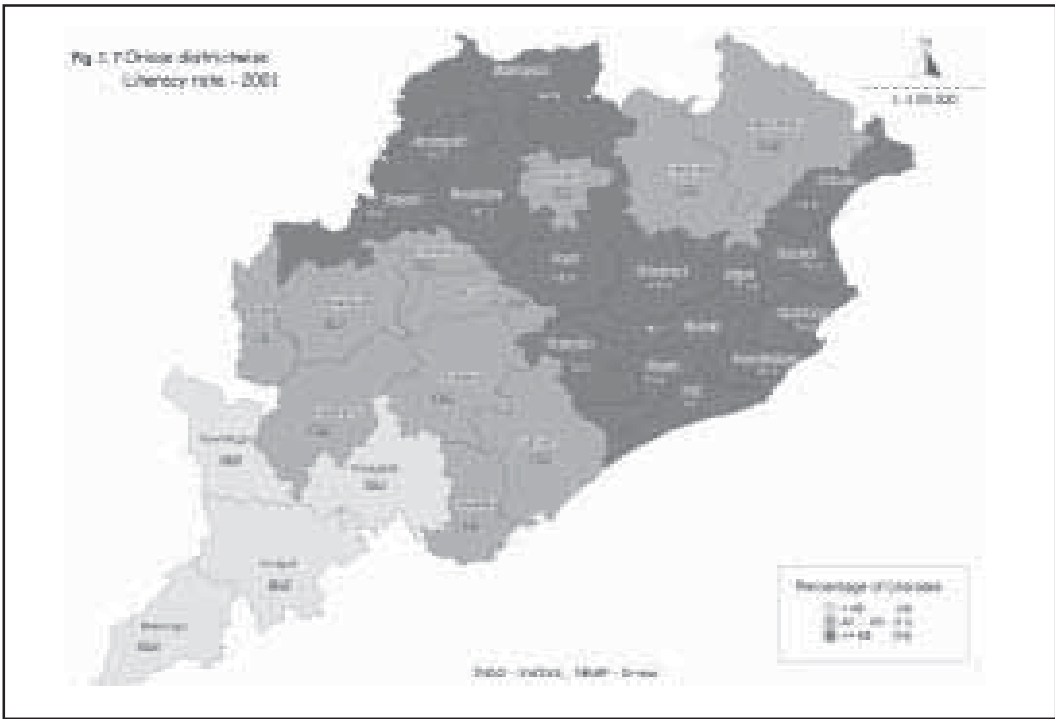
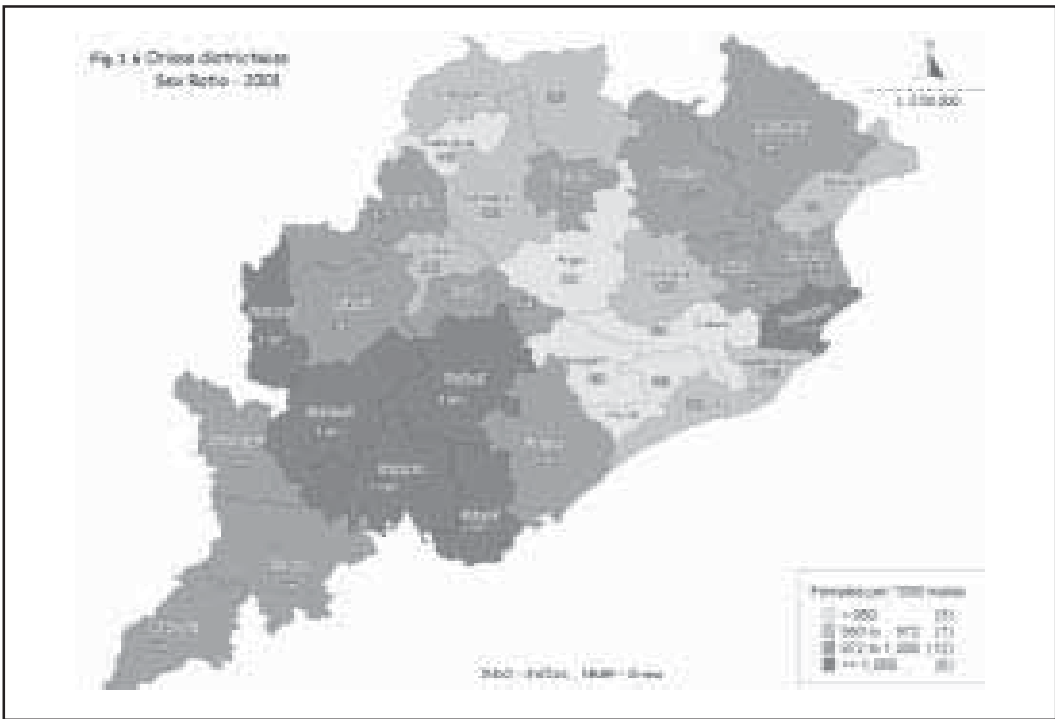
### 1.9 Inter-district Variations in Poverty

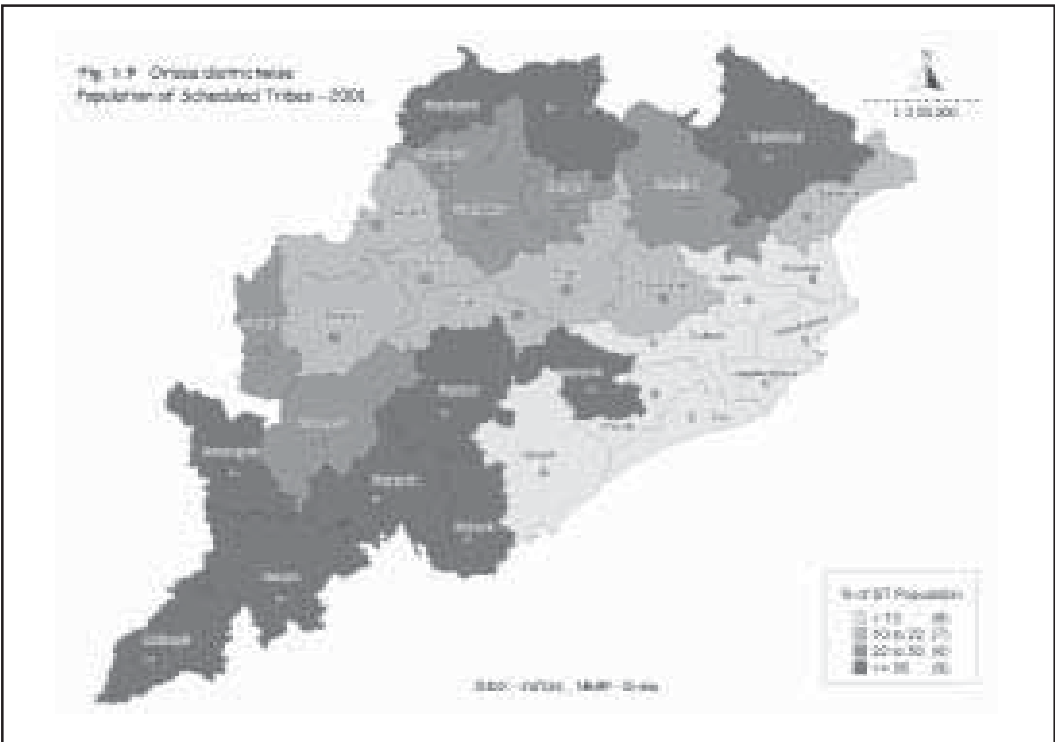
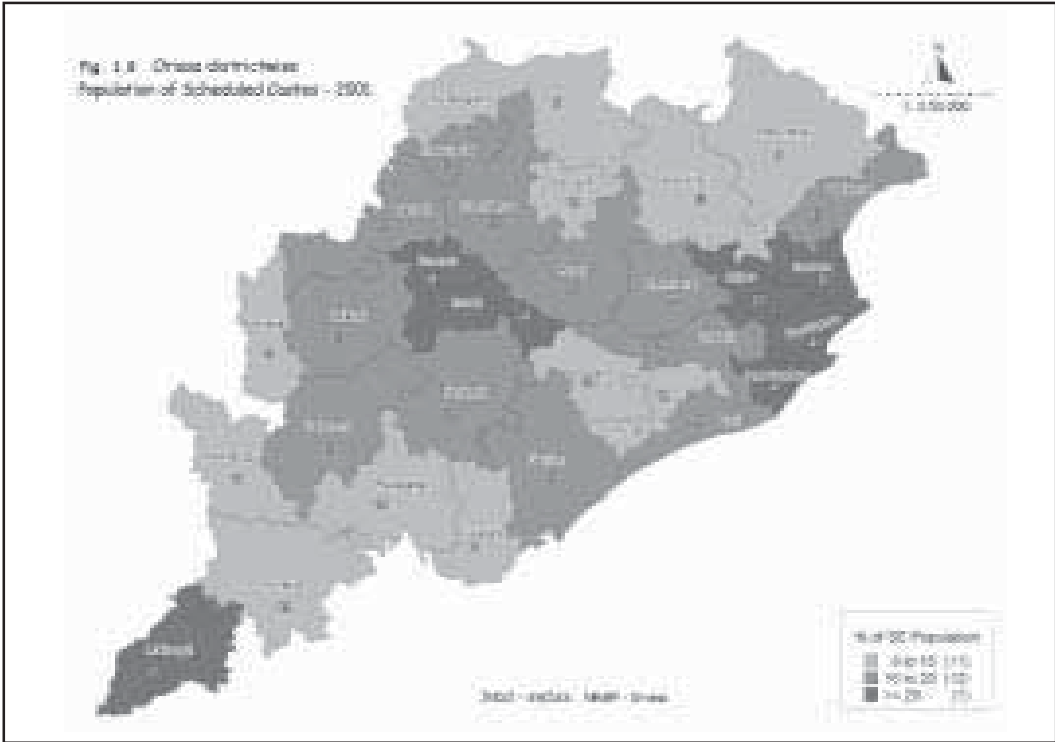
The high incidence of poverty in the state is due to KBK region, where the incidence is as high as 72.4 per cent. It is striking to find that the gap in the incidence is 20 percentage points between the Coastal and the Northern regions and 20 percentage points between the Northern and the KBK region. In the Coastal region, Puri and Balasore districts have high incidence of above 40 per cent. In the Northern region, Mayurbhanj, Kandhmal and Keonjhar have high incidence of more than 60 per cent. In the KBK region, Koraput and Kalhandi have high incidence of about 80 per cent. Thus, variations in the incidence are quite high both across regions and within regions. While poverty declined in the Coastal region in the nineties, it increased in the other two regions.

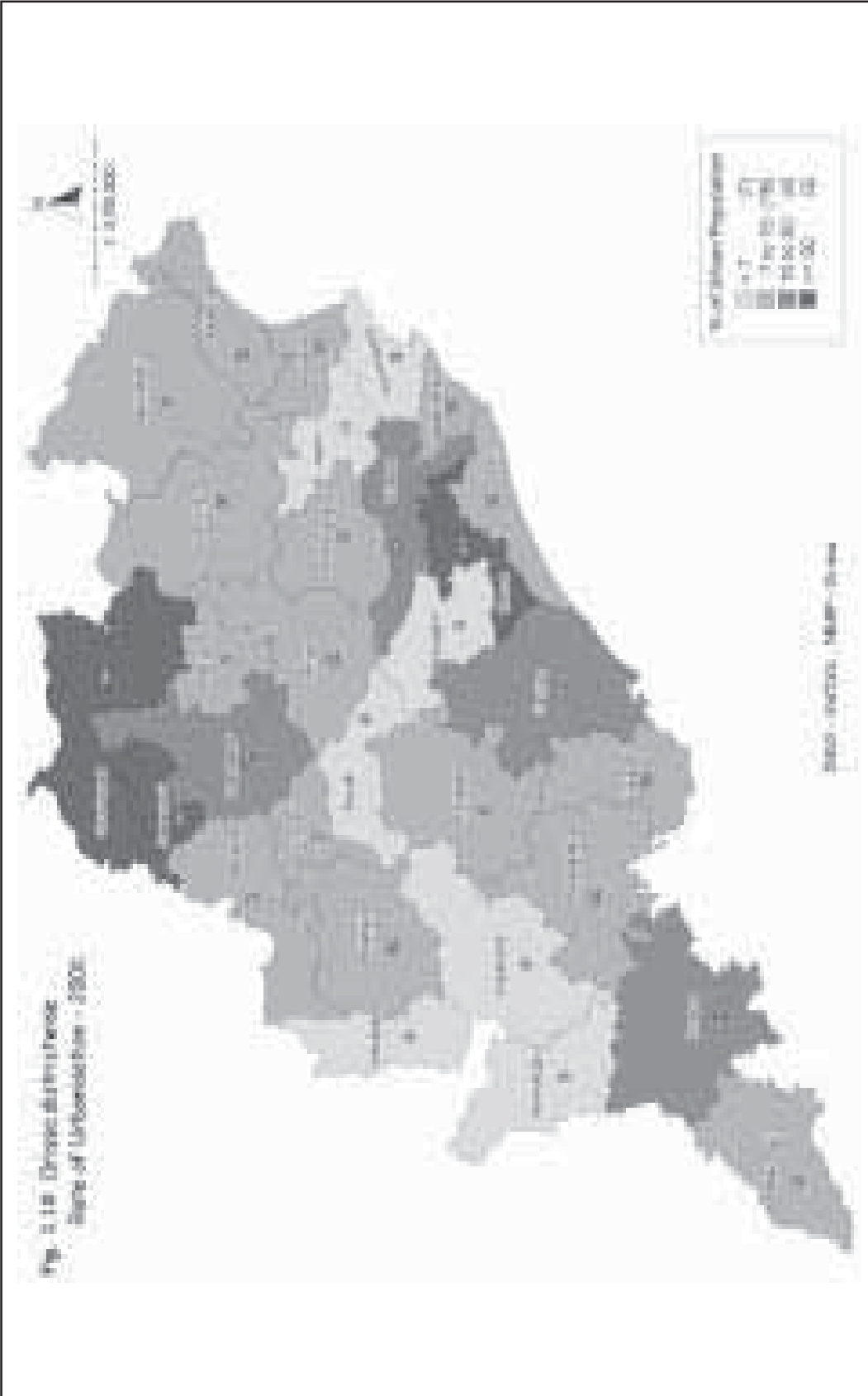
**Table 1.18: Incidence of Poverty across Districts in Orissa**

District	1983	1987-88	1993-94	1999-00
Ganjam	56.3	45.2	29.6	18.2
Puri	49.5	55.0	67.7	45.2
Cuttack	56.7	43.7	49.0	28.0
Balasore	72.2	50.9	33.4	41.4
Coastal	57.8	48.1	46.5	32.7
Mayurbhanj	83.5	64.4	48.2	68.4
Sundargarh	78.3	53.6	45.2	36.5
Keonjhar	78.3	65.7	63.0	61.9
Sambalpur	58.4	54.5	37.8	42.0
Dhenkanal	81.5	54.4	34.7	47.5
Kadhmal	74.6	71.9	75.6	75.4
Northern	74.4	59.2	46.9	52.6
Koraput	78.2	76.5	57.8	78.7
Balangir	79.8	57.9	42.4	48.8
Kalhandi	85.9	85.0	68.2	83.8
<b>KBK</b>	<b>80.6</b>	<b>73.9</b>	<b>56.5</b>	<b>72.4</b>
<b>Orissa</b>	<b>65.3</b>	<b>55.6</b>	<b>48.6</b>	<b>47.2</b>

Source: Government of Orissa (2004). Incidence in each region is estimated using population weights of 2001. The districts are as defined before reorganization.







### **1.10 The Context of the Present Study**

From what we have mentioned above, it is clear that the state is lying behind in many respects. The per capita NSDP of the state is only one-half of the national average. The main stay of the workers of the state, the agricultural sector, is experiencing little or no growth, and what is worrisome is that the prospects for rapid growth in the sector are dim for the reason that the possibilities for expanding the area under cultivation are meager. The scope for increasing the yield also seem equally dim as well, what with only one-fifth of the area under irrigation and the use of fertilizer at about 40 per cent of all-India level. The yield of the main staple food of the state, rice, at about 60 per cent of all-India, is also very low. What is more, the KBK region of the state, comprising Kalhandi, Koraput and Balangir districts, is very backward even by the average standards in Orissa.

Under the circumstances, one way to improve the living conditions of the rural poor in Orissa, is to motivate them for occupational diversification. In areas of hard climatic conditions and uncertain agriculture, rural diversification is important for stabilizing household incomes and small animal production is an important method of rural diversification. It is an important activity in the hilly and drought prone areas. Small animal production activity apparently is associated with many advantages. It can be a source of liquid income to those engaged in the activity, it can be carried out with little working capital, it is much less risky than cultivation, it does not make heavy demands on the labour time and skill of those engaged in it etc.

Are the apparent benefits that flow from the activity are indeed real? In order to promote the activity on a scale that can bring tangible benefits to the state economy it is necessary to examine whether the apparent benefits are real or not. A study that looks at the costs and returns of small animal production in Orissa thus assumes significance. It is necessary that such a study focuses on the present level of returns from small animal production as also the scope for increasing the returns from the present level. The present study is directed to understand the economics of rearing sheep and goat, besides those of backyard poultry, and pig.

### **1.11 Purpose of the Study**

The study aims at examining the costs and returns from livestock production in Orissa under various agro-climatic conditions and production systems. The study has focused on sheep, goat, pig and backyard poultry. The study had used secondary data from livestock censuses and national sample surveys on consumer expenditure to analyze the trends in production and consumption.

#### **The specific objectives of the study on small ruminant production are:**

1. To identify the factors influencing the density of small ruminants
2. To study the patterns of consumption of meat
3. To estimate the costs and returns in small ruminant production under backyard and flock systems and find their relative importance in household income.
4. To examine the risk and uncertainty arising out of animal diseases and mortality.

#### **The specific objectives in poultry production are:**

1. To examine the role of poultry sector in rural Orissa
2. To study the consumption pattern of egg and chicken.
3. To estimate the cost and returns in poultry production under backyard system and find its relative importance in household income.
4. To examine the risk and uncertainty arising out of diseases and mortality.

### 1.12 Sample Size and Methodology

In order to achieve the above objectives, livestock census data at district level is used. The analysis of consumption patterns is based on the National Sample Survey data of the 55th round on consumer expenditure. In order to study the costs and returns and identify the constraints, a sample survey is conducted in eight districts in the state. A sample of 197 small ruminant holdings, 160 poultry holdings and 40 pig holdings are covered in the sample survey. The households are selected randomly from two or three villages in each district. The list of districts and the number of villages covered are shown below:

District	No. of villages	Small Ruminants	Flock System	Poultry	Pig
Koraput	23	29	-	42	9
Malkangiri	14	12	-	40	13
Nawarangapur	10	28	-	40	4
Ganjam	7	1	4	3	0
Gajapati	4	0	21	2	0
Khurda	4	8	-	0	0
Jagatsinghpur	10	55	-	0	0
Bolangir	11	35	2	15	6
Mayurbhanj	21	29	-	28	7
<b>Total</b>	<b>104</b>	<b>197</b>	<b>-</b>	<b>170</b>	<b>40</b>

### 1.13 Scheme of Presentation

The study is organized in six chapters. The demographic and socio-economic profile of Orissa is presented in Chapter I. The absence of demographic transition, the backwardness of agriculture and poor achievement in poverty decline during the last three decades are brought out in this chapter. Chapter II focuses on the trends in the livestock sector of Orissa and establishes that the decade of nineties is not encouraging even for the livestock sector. Inequalities in the veterinary services across regions are also brought out in this chapter. Chapter III examines the economics of small ruminant production with a distinction between individual family system and flock system. The analysis also focuses on production features and mortality of small ruminants in both the systems. Chapter IV examines the economics of poultry production and Chapter V discusses the economics of pig production. Both these chapters follow, more or less, the same structure of analysis and bring out the fact that income from these sectors is important for these households and these households are poor. Chapter VI is devoted to the salient features of the three sub-sectors in livestock viz., small ruminants, pig and backyard poultry and identifies the constraints operating and policy interventions needed.



## **Chapter II**

### **Livestock Economy of Orissa**





# Chapter II

## Livestock Economy of Orissa

### 2.1 Introduction

Livestock sector consists of bovines, small ruminants and piggery. Poultry is different from these categories. Livestock and poultry are gaining importance in recent times because income elasticity of demand is high for these products. The sector contributes more than 20 per cent to the net domestic product from agriculture. The bovine sector has a dual role of producing milk and supplying draught animal power to agriculture. In resource poor regions, where bovine sector faces severe constraints, small ruminant production becomes important as these animals can survive even in harsh climates.

Since agriculture has experienced severe deceleration in growth in the nineties, livestock production turns out to be an important for rural livelihood. This chapter examines the nature and growth of livestock sector in Orissa. Section I deals with the trends in the livestock population since 1956 and the relative importance of various types of livestock in different agro-climatic conditions. Section II examines the levels of consumption of livestock products in the state. Section III examines the inter-district variations in the structure of livestock sector and adequacy of livestock services across districts.

### 2.2 Trends in Livestock Population

Orissa is rich in livestock resources. The state, which has 3.6 per cent of the country's population, has 4.8 per cent of country's livestock. But the population of livestock is not beyond its carrying capacity. Its share in geographical area is same as its share in livestock.

The state has a livestock population of 23.3 million of which 15.2 million are bovines, 7.5 million are small ruminants and 0.6 million are pigs (Table 2.1). Thus in the total livestock population, about two-third are bovines and one-third are small ruminants. Further, three out of four small ruminants are goats.

The livestock population of Orissa grew at a high rate of 2.36 per cent till 1982. The growth rate declined to 1.19 per cent in the eighties. But the nineties witnessed decline in the livestock population at an annual rate of 0.37 per cent per annum. Small ruminants and pigs contributed for the high growth till 1982. Small ruminants grew at 3.5 per cent and pigs at 4.5 per cent per annum. Among small ruminants, goats grew at a higher rate than sheep. The growth rate of goats was 4.2 per cent while that of sheep was 2.25 per cent per annum. Thus, small ruminant and pig production increased till 1982. On the other hand, bovine population increased only at 1.7 per cent per annum.

Small ruminants, especially sheep, were responsible for the steep deceleration in the growth of livestock population between 1982 and 1992. The population of sheep declined at an annual rate of 0.65 per cent per annum and the growth rate of goat population increased at 0.94 per annum. As a result, the population of small ruminants increased at a low rate of 0.5 per cent per annum. The growth rate of bovines and pigs declined only slightly.

The 1990s is a non-performance period for livestock sector of Orissa. The livestock population declined at an annual rate of 0.37 per cent per annum. During this period both bovine population and sheep population declined and goat and pig population increased at a slow rate. But the state is lagging behind in milk production. The decline in the livestock population in the nineties is due to the decline in bovines, which account for about two-thirds of the total livestock population.

**Table 2.1: Trends in Livestock and Poultry Population**

('000s)

Year	Bovine	Sheep	Goat	Small Rum.	Pig	Livestock	Poultry
<b>Number (000)</b>							
1956	9108	1117	1695	2812	129	12128	4991
1961	10885	994	2382	3376	217	14536	6540
1966	11898	1182	3082	4264	180	16122	7698
1972	12885	1369	2884	4253	387	17565	8492
1977	13471	1432	3416	4848	295	18626	9490
1982	14263	1990	4931	6921	410	22232	10555
1987	15186	1841	4804	6645	590	22986	12601
1992	16418	1865	5412	7277	572	25020	16008
2001	15198	1765	5772	7537	601	23336	18434
<b>Annual Compound Growth Rates</b>							
1956-82	1.74	2.25	4.19	3.52	4.55	2.36	2.92
1982-92	1.42	-0.65	0.94	0.50	3.39	1.19	4.25
1992-01	-0.41	-0.29	0.34	0.18	0.26	-0.37	0.75
1982-01	0.33	-0.63	0.83	0.45	2.03	0.26	2.98

Sources: Livestock Censuses

The state is lying behind in dairying. With a share of 5.3 per cent in bovine population, the state contributes only 1.0 per cent to milk production in the country and its share remained constant between 1980-81 and 1997-98 (Government of India, 1999). Further, while the population of work animals increased by 3.7 per cent in the nineties, the population of milch animals declined by 3.2 per cent. The decline in the number is not a problem if there had been an increase in productivity. But only 9.5 per cent of the female bovines are cross bred or improved by 2001. So much so the average productivity of bovines was low. Many parts of the country experienced shift from cow to buffalo in milk production. But in Orissa, the shift is from buffalo to cow. While the growth rate of both declined during the nineties, the rate of decline of buffaloes is faster than that of cows, 2.8 per cent in cows and 6.4 per cent in buffaloes. The agro-climatic factors are more suitable for cow than for buffalo. This is clearly indicated by the higher rate of cross breeding of cows as compared to grading up of buffaloes. While 10.0 per cent of the cows are crossbred, only 3.8 per cent of the buffaloes are graded.

**Table 2.2: Growth of Cattle and Buffaloes during the Nineties**

(Lakhs)

Category	1991	2001	Increase(%)	Share in Female Bovines	
				1991	2001
Cows	67.27	65.37	-2.8	90.8	91.1
She-buffaloes	6.84	6.40	-6.4	9.2	8.9
Total female	74.11	71.76	-3.2	100.0	100.0
Work animals	68.50	71.00	3.7	-	-

Source: Statistical Abstract of Orissa 2005

Poultry sector showed a higher growth rate than bovine and small ruminant sectors. The sector has grown at a high rate till the end of eighties and only in the nineties the growth rate decelerated steeply. The growth rate declined from 4.25 per cent per annum in the eighties to 0.75 per cent in the nineties. The growth rate in the eighties and nineties is 3.0 per cent per annum, which is higher than the population growth rate.

The estimates of meat production are at variance with the data on growth in the animal population. While the livestock census is showing low and decelerated growth rate of small ruminant population, the estimates of mutton show high and accelerated growth in the last two decades. The production of mutton increased from 11132 tonnes in 1980-81 to 15808 tonnes in 1990-91 and then to a high level of 40823 tonnes by 2002-03 (Table 2.3). The annual growth rate accelerated from 3.9 per cent in the eighties to 7.7 per cent in the nineties. But as we have seen, the population of the small ruminants grew at only 0.50 per cent in the eighties and 0.18 per cent in the nineties. Thus, there is a need to strengthen the statistical system pertaining to livestock production.

**Table 2.3: Meat Production in Orissa**

(In metric tonnes)

Year	Sheep	Goat	Small Ruminant	Pig	Total	Per capita (kgs)	
						Small Animals	Small Ruminants
<b>Annual Production in Metric Tonnes</b>							
1980-81	4750	6382	11132	80	16843	0.43	0.42
1990-91	6960	8848	15808	1253	26053	0.54	0.50
2002-03	10152	30671	40823	3902	44725	1.00	0.91
<b>Annual Compound Growth Rates (%)</b>							
1980-91	6.4	2.4	3.9	35.2	3.9	-	-
1991-03	1.7	10.9	7.7	7.8	7.8	-	-

Sources: 1. Statistical Outline of Orissa 1997;  
2. Statistical Hand Book 1994, DAH, Orissa.

Estimates of availability of meat, fish and eggs for 2003-04 are shown in Table 2.4. Per capita availability of fish is very high at 8.1 kg and it is seven times higher than that of meat. Per capita availability of eggs is 25 per annum. Per capita availability of milk is 26.6 litres per annum (74 grams per day). This is only 30 per cent of the norm.

**Table 2.4: Production and Availability of Livestock Products 2003-04**

Item	Total Availability ('000 Metric tonnes )	Per capita availability (Kg./No./Gms)
Fish	282	8.1
Meat	44	1.2
Egg (Million No)	9310	25
Milk	995	26.6

Per capita availability of eggs in number and milk in grams

### 2.3 Consumption of Livestock Products

National sample survey data on consumer expenditure provides information on household consumption. These estimates cannot be compared with the data on availability for two reasons. Firstly, consumption in hotels is not captured here. Secondly, only direct consumption is available and the products made of these products are not considered. This will give underestimation of consumption of eggs because egg is used in many food items like bread. However, differences between the state and national level consumption can be captured using this data. The data pertaining to the 55th round shows that per capita consumption of livestock products is significantly lower than the national average (Table 2.5). The results clearly indicate that per capita consumption of egg, chicken and mutton are significantly lower in the state than at the national level and this lower position is mostly due to low rural consumption. Per capita consumption of eggs is only 8.2 per annum as against 16.0 at the national level. While the difference between the state and national levels in urban consumption is quite small (20.4 in the state against 24.7 in the country) the difference in rural consumption is very large (5.8 in the state and 13.1 at the national level). Based on production and imports it is estimated that the availability of eggs per capita is 26 per annum in the state as against 37 at the national level 1997-98 (Kurup, 2003 p72). Similar is the case with consumption of mutton. However, consumption of chicken is lower both in the rural and urban areas of the state as compared to the corresponding areas at the national level. The state occupies a higher position than the nation in the consumption of fish in both rural and urban areas.

**Table 2.5: Per Capita Annual Consumption (Kg) of Livestock Products : 1999-00**

Item	Rural		Urban		Rural + Urban	
	Orissa	India	Orissa	India	Orissa	India
Egg (nos)	5.80	13.07	20.35	24.72	8.22	16.00
Chicken	0.30	0.43	0.42	0.78	0.35	0.51
Mutton	0.30	0.78	1.16	1.17	0.46	0.88
Fish	3.70	2.54	4.19	2.61	3.75	2.56
Pork	0.0	0.07	0.01	0.05	0.04	0.06
Beef	0.20	0.46	0.68	0.93	0.24	0.58

Source: NSSO 55<sup>th</sup> Round

Per capita consumption of livestock products may be low either because of low income or because of vegetarianism. Vegetarianism can be understood by the proportion of population reporting consumption of livestock products. The results indicate that the proportion of people consuming egg, chicken and mutton is lower in Orissa than at the national level. This is due to lower proportion of people consuming these items in rural areas. In urban areas the proportions of consumers of egg and mutton are higher in Orissa than at the national level. Regarding chicken there is not much difference between rural and urban areas. This is due to the nature of development of the poultry sector in the state. Poultry sector in the state is mostly confined to backyard poultry. Commercial poultry exists on a significant scale only in Ganjam and Khurda districts and on a small scale in Mayurbhanj and Bolangir districts. Backyard poultry is focusing on production of chicken rather than egg. That is why availability of eggs in rural areas is low. Eggs produced in the commercial layer units serve the urban areas of Orissa.

**Table 2.6: Percentage of People Consuming Livestock Products: 1999-00**

Item	Rural		Urban		Rural + Urban	
	Orissa	India	Orissa	India	Orissa	India
Egg	20.12	28.83	41.07	39.89	23.55	31.61
Chicken	11.94	13.76	12.39	21.22	12.02	15.64
Mutton	14.09	21.23	32.72	30.38	17.15	23.54
Fish	73.25	33.86	77.93	29.37	74.01	32.74
Pork	1.79	1.65	0.20	0.90	1.53	1.47
Beef	1.03	7.40	4.68	10.30	1.63	8.13

Source: NSSO 55<sup>th</sup> Round

## 2.4 Inter-district variations in the structure of livestock sector

The number of small ruminants per 100 persons indicates the dependence of the people on the activity. At the state level, there exist 20 small ruminants per 100 persons. The Coastal region has the lowest density of 14 small ruminants per 100 persons. The Northern and the KBK regions have about 25 small ruminants per 100 persons. The Coastal Gajapati region has an exceptionally high density of more than 26 small ruminants per 100 persons. Jajpur and Balasore are the other districts with high density. Khurda district has the lowest density of eight small ruminants per 100 persons. In the Northern region Boudh has the highest density of 47 small ruminants per 100 persons. Keonjhar and Mayurbhanj are the other districts with high density of about 35 small ruminants per 100 persons. Malkangiri and Balangir have very high density in the KBK region - the former has a density of 38 small ruminants per 100 persons and the latter 29 per 100 persons (Figures 2.1 and 2.4).

Since the small ruminant activity is carried out under extensive system, land is also important for carrying out the activity. The density of small ruminants per 100 hectares of geographical area is found to be 48 and it is highest in the Coastal region (62) and lowest in the KBK region with density of 39 animals. The Northern region occupies the middle position with a density of 47 animals.

The population of pigs is 1.6 per 100 persons in the state and the density is lowest in the Coastal region at 0.5 pigs. However, Gajapathi district in the region has a density of 3.2 pigs per 100 persons. Northern region has a density of 2.5 pigs and the KBK region has a density of 2.9 pigs per 100 persons (Figures 2.5 and 2.6).

In order to identify the variables that are associated with small ruminant density, correlation coefficients have been computed. The density of small ruminants increases with literacy and density of bovine population and declines with the proportion of forest area, the percentage of scheduled tribe population. These results show that it is not the illiterates that take up this activity. The activity is not more in the tribal areas. It is thought that the lower the rainfall, the higher will be the density since agriculture is backward in these areas. Similarly, the extent of uncultivated land is expected to have a positive influence on the density of small ruminants. The correlation with rainfall is contrary to our expectation and the correlation with uncultivated land is as per the hypothesis. However, these two correlations are not statistically significant. Bovine density also shows the same type of associations. But its correlation with rainfall is positive and statistically significant.

**Table 2.7: Correlations: Small Ruminants Density and Other Variables**

Variables	Small Ruminants per 1000 hectares	Bovines per 1000 hectares
SR per 1000 hec.	1.000	0.781
Bovine density	0.781	1.000
Population density	0.223	0.396
Scheduled Tribes %	-0.505	-0.662
Forest Area (%)	-0.532	-0.671
Literacy (%)	0.529	0.612
NCP-Forest	0.201	0.281
Rainfall (mm)	0.189	0.341
Urbanization %	-0.107	0.037

Density of small ruminants per 100 persons indicates the importance of this activity in the district. This density has positive association with the percentage of forest area and the proportion of scheduled tribes and negative association with rate of urbanization and literacy rate. This is an indication that the activity is more important for weaker sections and backward areas.

**Table 2.8: Correlations: Small Ruminants Density Variables**

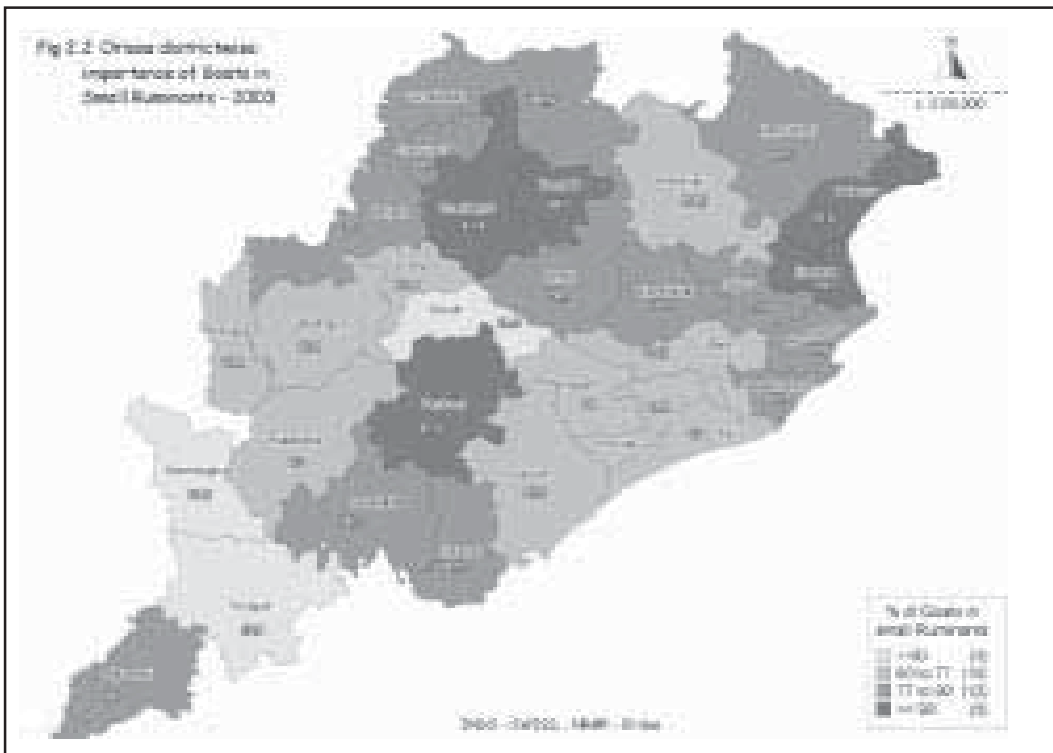
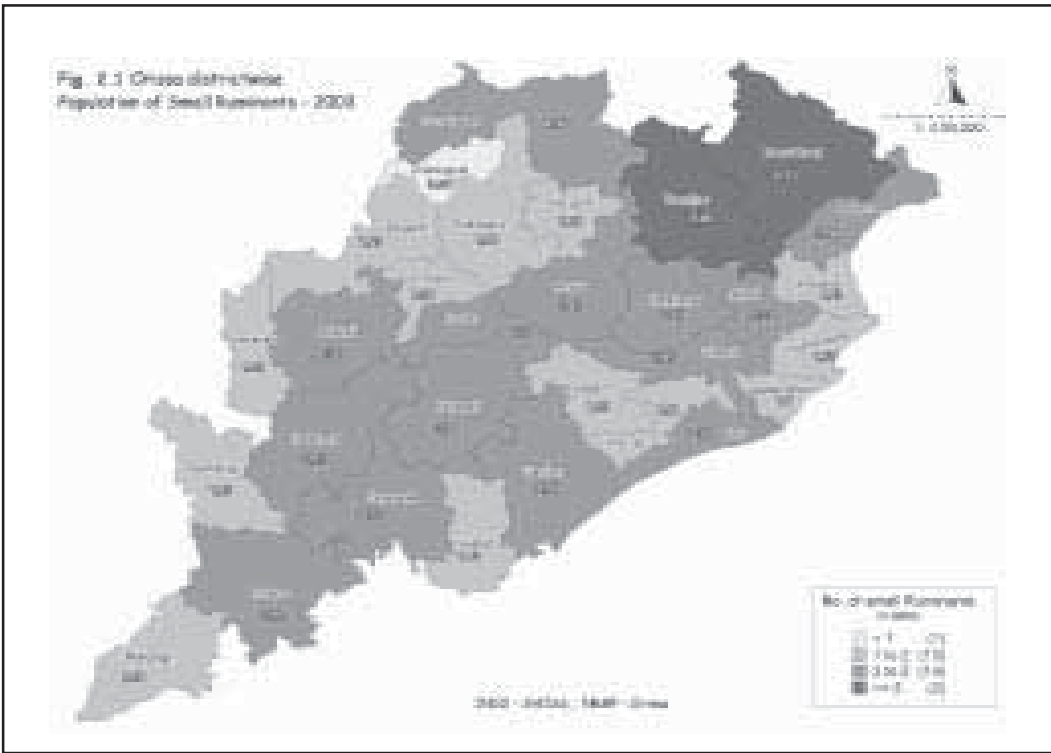
Variables	SR per 100 persons	Bov per 100 persons
Small Ruminants per 100 people	1.000	
Bov per 100 persons	0.629	1.000
% of ST	0.484	0.174
% of Forest Area	0.522	0.407
Literacy %	-0.462	-0.404
NCP-Forest	-0.238	-0.295
Rainfall	-0.138	0.172
% of Urban	-0.389	-0.706

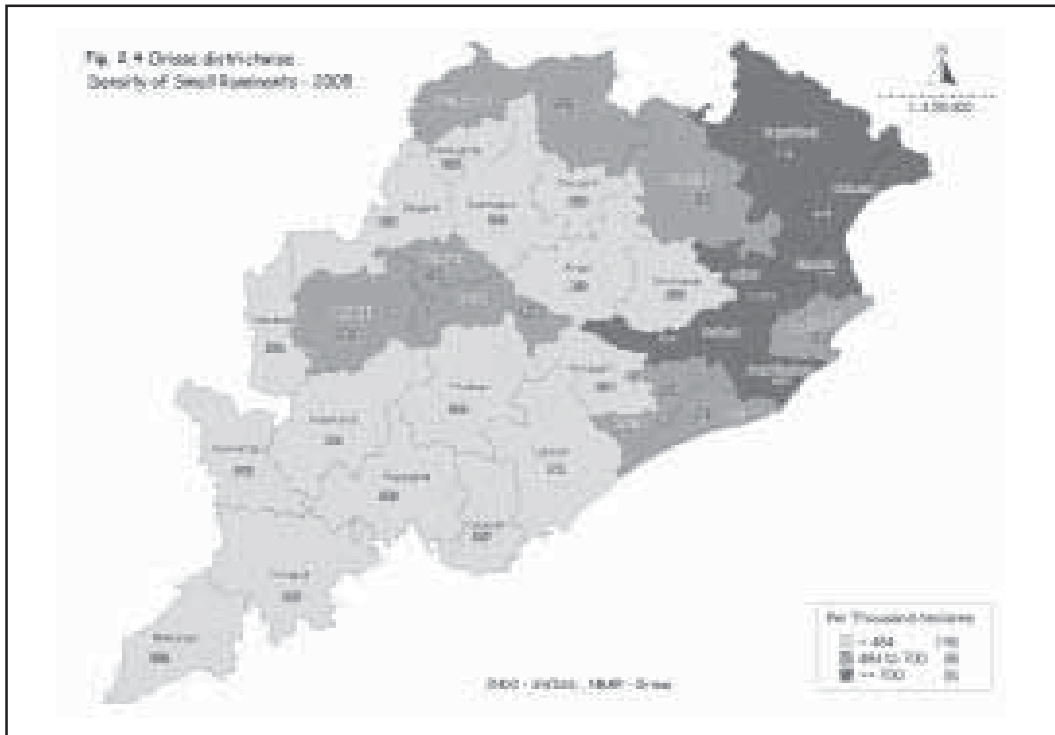
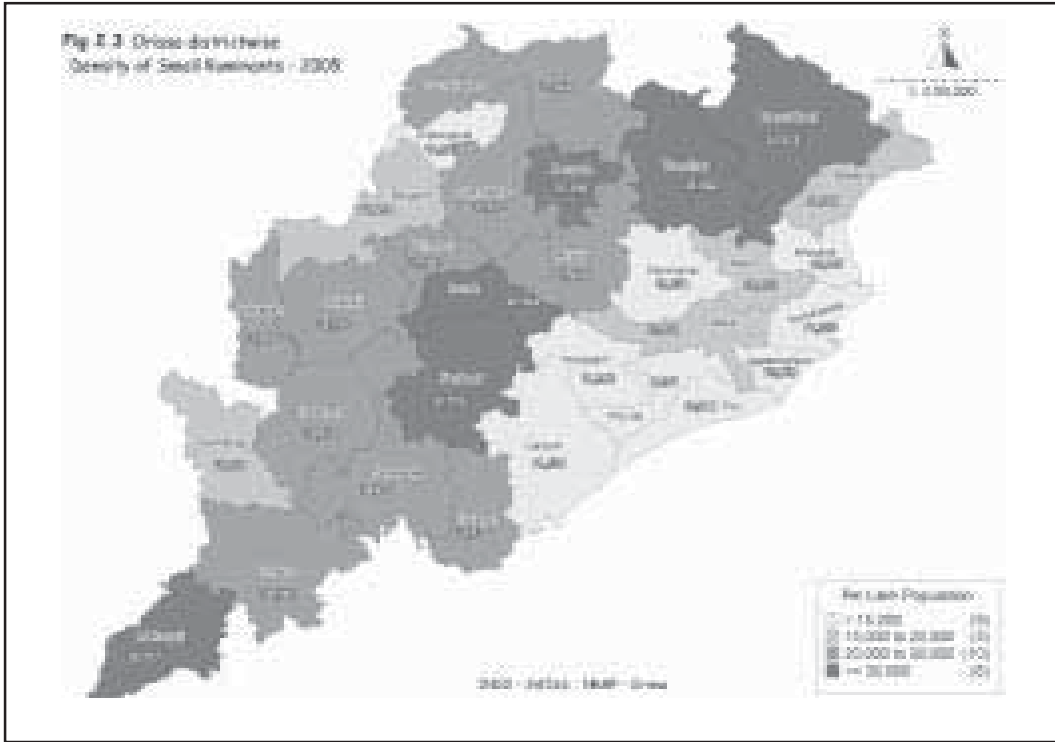
## 2.5 Livestock Service Delivery System

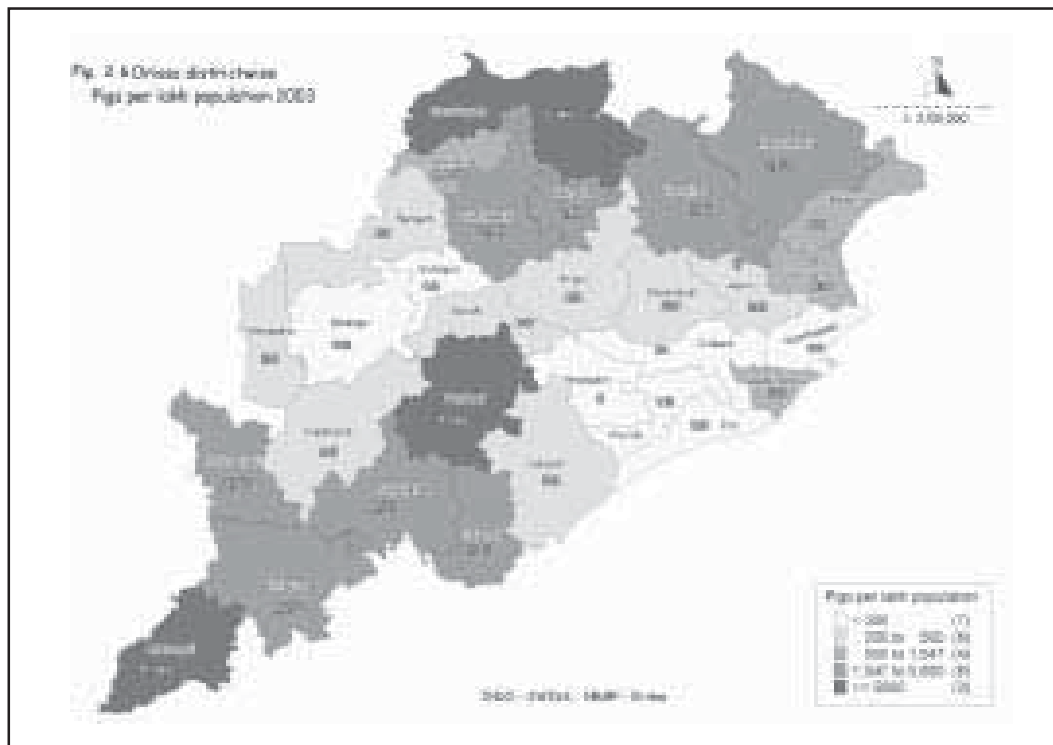
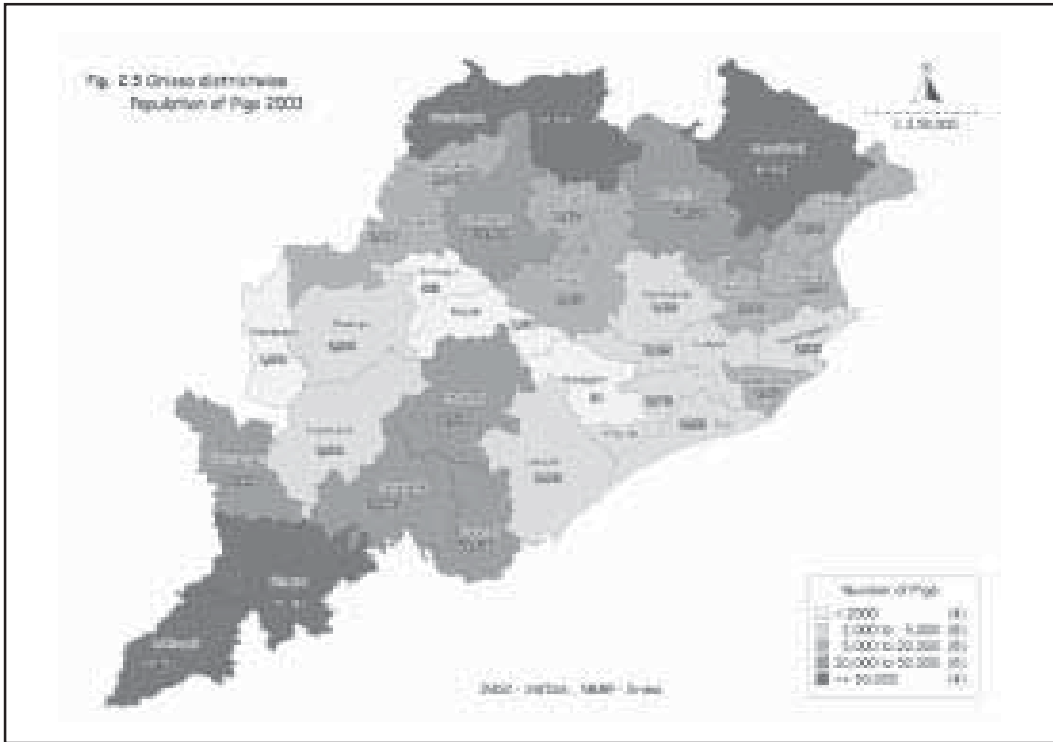
The services of the animal husbandry are available through 3479 veterinary institutions (540 veterinary hospitals and 2939 livestock aid centers). Each institution, on the average, is serving an area of 50 Km. and 12,500 animals. The spread of the institutions is not uniform across the regions. The Coastal region has more veterinary facilities than the other two regions. Each institution in the Coastal Region serves only 25 Km. and 10,000 animals. The other two regions have a service area of 50 Km. each. The service population is also high in these two regions. The Northern region has the highest animal population of 14,000 per institution and the KBK region has 12,500 animals per institution.

Inequalities across regions are more severe in the availability of veterinary personnel than in the availability of veterinary institutions. Each veterinarian serves an area of 33.3 Km. and population of 1100 animals in the Coastal region as against 50 Km and 1400 animals in the Northern region. The KBK region has the lowest availability of veterinary personnel. Each veterinarian in this region is serving an area of 100 Km and 1700 animals. Thus, the KBK region occupies the lowest position and the Coastal region the highest position (Figures 2.7 and 2.8)









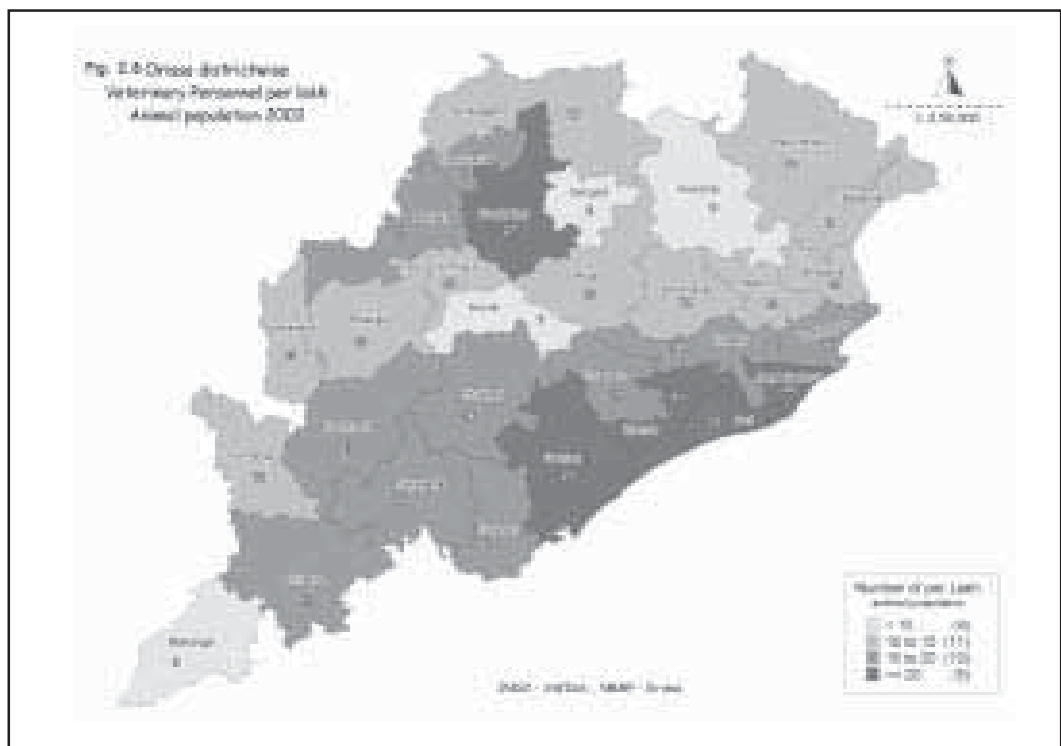
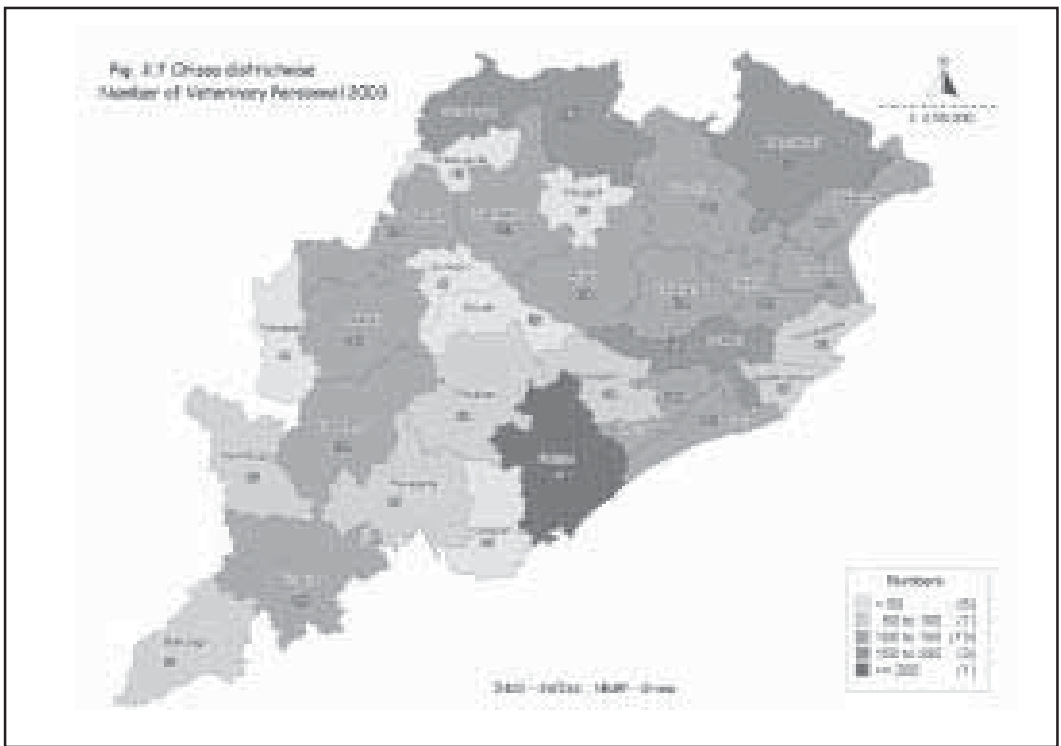
There is a positive association between milk production and the availability of veterinary services indicating that veterinary facilities have a bias towards dairy sector. The Coastal region produces 500 tons of milk whereas the KBK region produces only 160 tons per annum. Milk production in the Northern region is 275 tons (Figure 2.9).

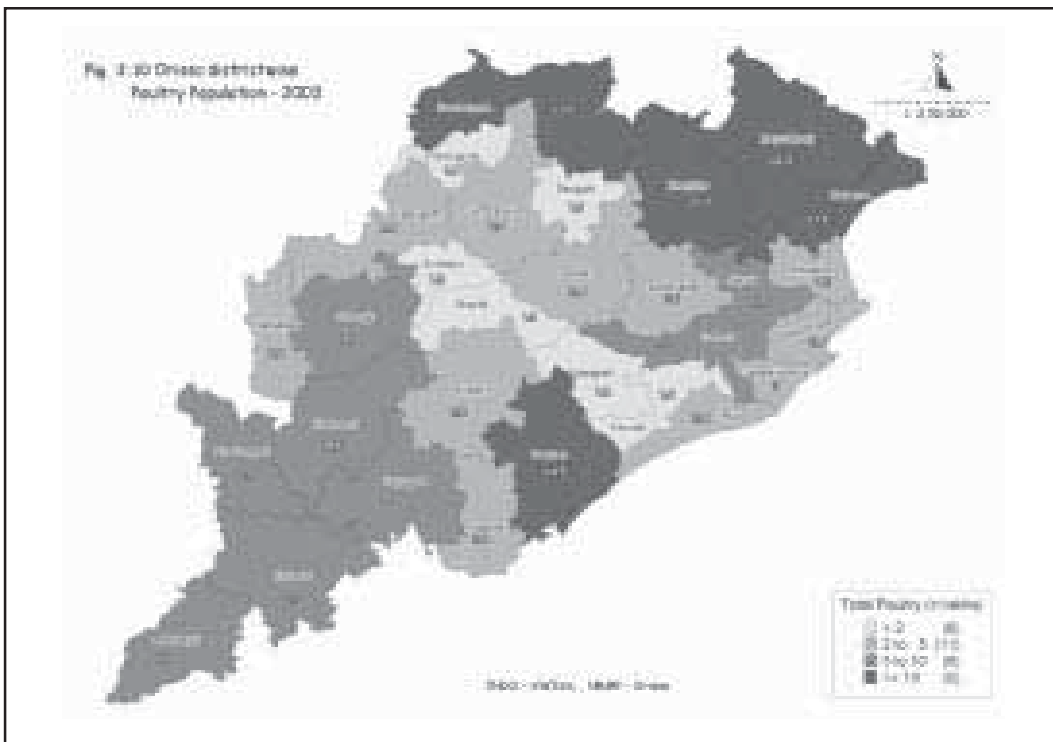
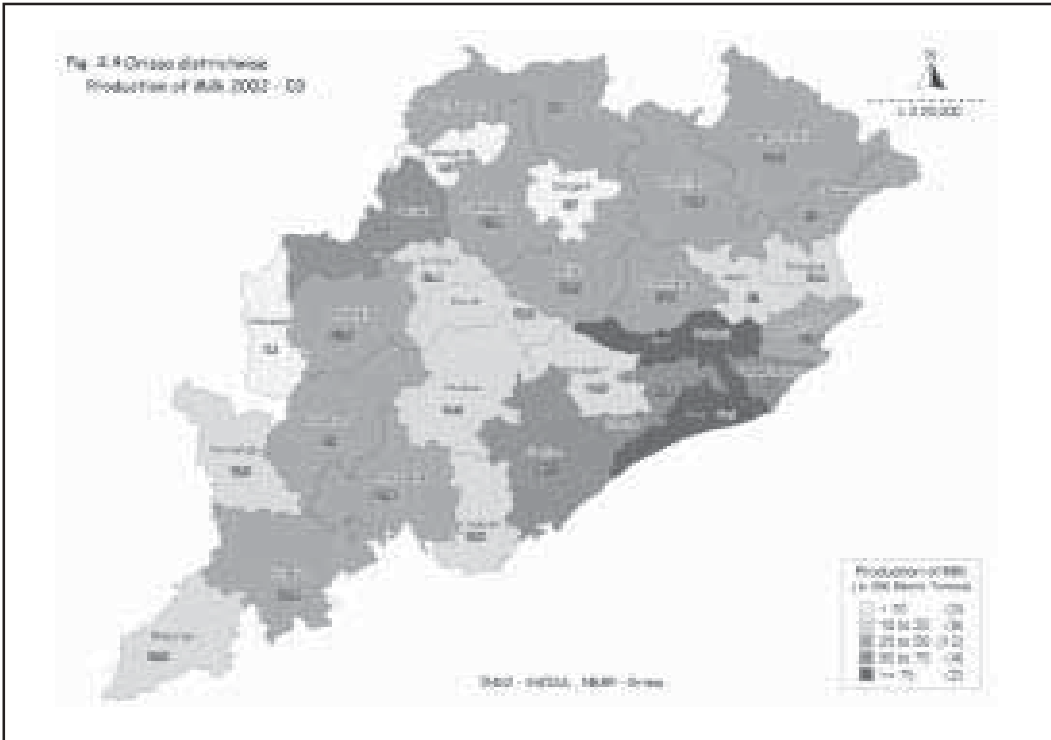
Differences in the development of poultry sector are also significant across regions. The Coastal region is highly developed in poultry because of the development of commercial poultry in Ganjam and Khurda districts (Figures 2.10 to 2.13).

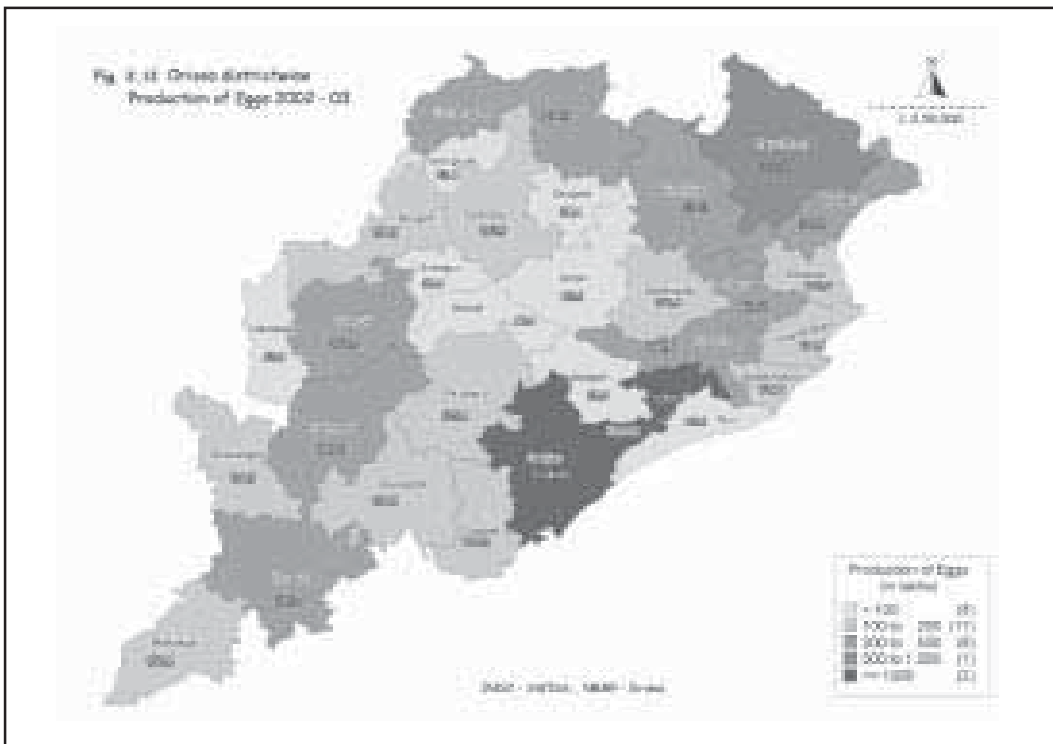
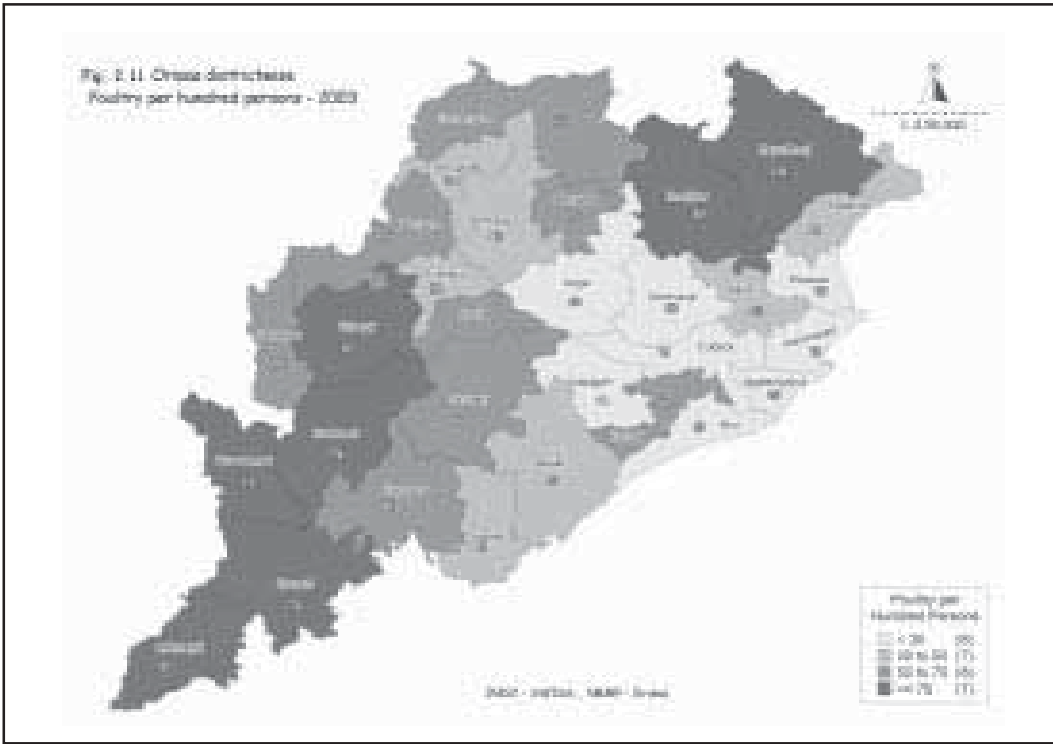
## **2.6 Summary**

Notwithstanding the fact that the livestock products have a high income elasticity of demand and that the livestock sector should make amends for the slow growth of the state's crop output sector, our analysis of secondary data shows that the growth of the sector in the state is rather stunted. The growth rate of small ruminant production, especially that of sheep, is marked by deceleration, and the bovine sector is marked by low productivity. We, however, have to throw in a caveat here, that the statistical system governing livestock production in the state require improvement.

But there is no gainsaying the fact that there is an urgent need to promote the livestock sector in the state for the reason that the per capita consumption of livestock products here is extremely low, with, for instance, the consumption of poultry products is of significance in only a few districts. It is unfortunate that in the KBK region, where poverty is widespread and endemic, the density of small ruminants is low and the veterinary services few and far between. If we are to go by the available data, it seems that unless promotional measures are taken up on a really massive scale it is not quite possible to step up livestock production in the state. This is because to increase the level of production of both the small ruminants and bovines it seems necessary to increase the literacy rate, increase the area under forests, control the population etc. These are factors over which it is very difficult for the government to gain control over in the short-term.











**Chapter III**  
**Economics of Small Ruminant Production**





## Chapter III

### Economics of Small Ruminant Production

#### 3.1 Introduction

Livestock sector plays a crucial role in rural development and eradication of rural poverty. The deceleration in agricultural growth and decline in the size of holding emphasize the need for providing supplementary income. The marginal and small farmers also suffer from negligible financial resources and live in semi-subsistence or subsistence level. The farm employment allows them to take up some subsidiary occupations to increase their cash income. Rearing of livestock forms a suitable subsidiary occupation, which should be encouraged along with crop production. Livestock production has complimentary relationship with crop production and it has broadly two components - bovine and small animal production. Small ruminants form the major part of small animals, the other two being pig and poultry. Of these three activities, small ruminants have stronger complimentary relationship with agriculture than the other two. Though bovine sector is said to have a symbiotic relationship with agriculture, after the introduction of mechanical power in agriculture in the place of animal power, the relationship is only through supply of manure and milk by the bovines and supply of feed and fodder to the livestock by the agriculture. The same relationship can be maintained even by the small ruminant sector.



The small ruminants, namely sheep and goats, are very important in the rural economy of Orissa. The activity is important in all the districts of the state. Except in a few pockets of the Coastal region, extensive system of rearing is adopted. Small ruminants constitute the means of livelihood for over 40 per cent of the rural population, the Government of Orissa has articulated a broad official policy time for its development. The nineties witnessed steep deceleration not only in agricultural growth, but also in the growth of small ruminants. In order to understand the problems farmers are facing, a sample survey was carried out in eight districts in the state. The sample covers both individual rearing units or holdings and collective units or flocks. The latter comprises 300 to 400 animals of five to six owners and the rearing of animals is done collectively. The collective units can derive the economies of scale in labour use. Orissa has two major breeds of goat; Ganjam and Black Bengal as well as others like Raighar, Malkangiri and Orissa Brown, breeds (Kornel, 1999). Ganjam breed has higher body weight than Black Bengal. Similarly, other varieties of sheep available in the state are; Ganjam, Bolangir, Edka, Kuzi, Koraput, and Chotnagpur. (Kornel et al. 2004) Ganjam sheep breed has body weight of 30 KG for male and 24 Kg for female. Bolangir breed has body weight of 24 KG for male and 18 Kg for female (Acharya, 1982). While, Black Bengal is maintained under individual family rearing system, Ganjam variety is adopted in the flock system. This choice is based on the rearing system adopted. In the flock system the animals will be taken to long distances and will stay in the forest for withstanding this strain Ganjam variety is used.

This chapter focuses on both the individual units (or units under the individual system) and the collective ones (units under the flock system). The analysis of the individual units is

based on the data collected from 197 sample farmers and the analysis of the flock system is based on data collected from 27 flocks. The chapter is organized in five sections. Section II deals with the individual or the backyard system and Section III deals with differences across regions in small ruminant production. Section IV examines the features of the flock system. Each system is analyzed by considering socio-economic characteristics, size and composition, production performance and costs and returns. Section V provides summary and conclusions.

### 3.2 Economics of Individual Rearing System

#### 3.2.1 Socio-economic characteristics

Because of the backwardness of agriculture and availability of land for grazing, people depend a great deal on small ruminant production for their income. Small ruminant production in Orissa is a general activity taken up by population belonging to all castes. However, it is mostly the Backward Caste (BC), Scheduled Tribe (ST) and Schedule Caste (SC) households who comprise over 90 per cent of those rearing small ruminants. The shares of these caste groups vary across size of holding. Scheduled castes have a larger share in small herds as compared to the large and forward castes have a larger share in large herds than in small herds. Scheduled tribes have a relatively smaller share in medium size holdings and backward castes have relatively larger share in medium holdings (Table 3.1).

**Table 3.1: Percentage of Households by Social Group**

Size of Poultry Holding	Scheduled Castes	Scheduled Tribes	Backward Castes	Others	Total
Small	26.7	32.6	37.2	3.5	100.0
Medium	15.1	24.5	52.8	7.5	100.0
Large	10.3	32.8	44.8	12.1	100.0
<b>Overall</b>	<b>18.8</b>	<b>30.5</b>	<b>43.7</b>	<b>7.1</b>	<b>100.0</b>

The holdings under individual rearing system are classified into small, medium and large on the basis of the number of small ruminants owned. Small units are defined as those having less than five animals, medium units between five and nine animals and large units ten and more animals. Smallholdings account for 43.6 per cent, but their share in animals is only 17.9 per cent. On the other hand, medium holdings account for 26.9 per cent and their share in animals is 24.0 per cent. Large holdings form only 29.4 per cent, but their share in animals is 58.1 per cent (Table 3.2).

**Table 3.2: Distribution of Small Ruminant Holdings by size of holding**

Size of SR Holding	No. of holdings	Percentage to total	No. Animals total	Percentage to total
Small	86	43.65	309	17.88
Medium	53	26.90	415	24.02
Large	58	29.44	1004	58.10
<b>Overall</b>	<b>197</b>	<b>100.0</b>	<b>1728</b>	<b>100.0</b>

Small ruminant holdings are classified into traditional and new entrants. If new households taking up the occupation increases and the traditional ones do not drop out, the activity should assume more and more importance over time in rural livelihoods. Our sample shows that 43.6 per cent are the new entrants and a majority of them have entered the activity during the last

five years (Table 3.3). On one side we have noted that more and more are taking to the activity and on the other, as we observed in the previous chapter, there has been a deceleration in the growth of small ruminants in the state. These facts seem incompatible. But one must bear in mind the possibility that the increasing growth in small ruminants due to the ever increasing number of new entrants into the activity may be counter balanced to some extent by the decline in the size of animals maintained by the traditional ones. It is important to note the size of holding preferred by the new entrants. The new entrants seem to maintain smallholdings rather than large holdings. However, those who entered during the last five years are more or less equal in all the size-groups.

**Table 3.3: Distribution of Small Ruminant Holdings by years of experience**

Size of SR Holding	Traditional	More than 5 years	5 years and less	Total
Small	43.02	31.40	25.58	100.00
Medium	60.38	18.87	20.75	100.00
Large	72.41	5.17	22.41	100.00
<b>Overall</b>	<b>56.35</b>	<b>20.30</b>	<b>23.35</b>	<b>100.00</b>

The activity is seen to be popular even among the educated persons. Among the heads of the households, 59.9 per cent are literates and 27.9 per cent of the heads have studied beyond primary level. The proportion of illiterates is more among smallholdings as compared to the other two categories (Table 3.4).

**Table 3.4: Distribution of Holdings by Level of Education of Head**

Size of SR Holding	Illiterate	Below Primary	Primary	Below Secondary	Secondary & above	Total
Small	45.35	22.09	6.98	17.44	8.14	100.00
Medium	35.85	24.53	15.09	13.21	11.32	100.00
Large	36.21	15.52	13.79	20.69	13.79	100.00
<b>Overall</b>	<b>40.10</b>	<b>20.81</b>	<b>11.17</b>	<b>17.26</b>	<b>10.66</b>	<b>100.00</b>

Small ruminant production is taken up along with other livestock activity. The households maintaining small ruminants also maintain bovines and poultry. For instance, bovines are maintained by 76.1 per cent of the holdings and poultry by 46.2 per cent. Only 13.2 per cent of the holdings have no other livestock. Pig is rarely maintained by small ruminant holdings, but one finds them being maintained more by the large and medium holdings than small holdings (Table 3.5).

**Table 3.5: Distribution of Holdings by Types of Other Livestock Owned**

(% to Total Households)

Size of SR Holding	Bovine	Poultry and Duck	Pigs	None
Small	74.42	33.72	1.16	15.12
Medium	71.70	54.72	3.77	13.21
Large	82.76	56.90	3.45	10.34
<b>Overall</b>	<b>76.14</b>	<b>46.19</b>	<b>2.54</b>	<b>13.20</b>

It is also important to see whether it is mixed farming system or pure system that dominates the sector. Landless holdings account for only 12.7 per cent of the holdings. Though the activity is taken up under mixed farming system, most of them are marginal and small farmers. Marginal farmers account for 62.4 per cent and small farmers account for 13.7 per cent. Thus, weaker sections comprising of the landless, marginal and small farmers dominate the activity. Earlier we have seen that it is those belonging to socially backward groups who rear these animals in most cases. Medium and large farmers account for only 11.1 per cent of the holdings. Though the herd size and landholding size have no systematic association, medium and large land holdings have a higher share in large holdings of small ruminants. For instance, 81.4 per cent of the small holdings belong to the landless and marginal farmers, their share in large holdings is only 63.8 per cent. On the other hand, medium and large farmers have a share of 9.3 per cent in small holdings and 20.7 per cent in large holdings (Table 3.6).

**Table 3.6: Distribution of Holdings by Size of Operated Area**

Size of SR Holding	Landless	Marginal (< 1 ha)	Small ((1-2 ha)	Medium (2-4 ha)	Large (Above 4 ha)	Total
Small	12.79	68.60	9.30	8.14	1.16	100.0
Medium	16.98	60.38	18.87	3.77	0.00	100.0
Large	8.62	55.17	15.52	15.52	5.17	100.0
<b>Overall</b>	<b>12.69</b>	<b>62.44</b>	<b>13.71</b>	<b>9.14</b>	<b>2.03</b>	<b>100.0</b>

Irrigation ratio is low among the small ruminant holdings and it is higher in large holdings than the small. Only 21.7 per cent of the net area is irrigated. Further, while 27.9 per cent of the net area is irrigated among large holdings, only 15.4 per cent is irrigated among medium holdings and 17.7 per cent among large holdings. The sources of irrigation vary with size of the small ruminant holdings. While Well irrigation is very high among large holdings, canal and rivers are important sources for small and medium holdings. Tank irrigation is insignificant for all the holdings (Table 3.7).

**Table 3.7: Distribution of Small Ruminant Holdings by Source of Irrigation**

Size of SR Holding	Percentage of Irrigated Area	Canal	Tank	Well	Other Sources	Total
Small	17.74	23.30	7.77	2.91	66.02	100.0
Medium	15.44	96.00	0.00	4.00	0.00	100.0
Large	27.86	26.32	4.05	47.37	22.27	100.0
<b>Overall</b>	<b>21.73</b>	<b>35.37</b>	<b>4.56</b>	<b>28.12</b>	<b>31.95</b>	<b>100.0</b>

Tenancy is moderate among the small ruminant holdings. Only 13.2 per cent of the small ruminant holdings have leased in land and each household has taken an area of 1.24 acres. While the extent of leased in area is positively associated with size of the land holding, the proportion of leasing households is negatively associated with the size of small ruminant holding (Table 3.8).

**Table 3.8: Incidence of Land Tenancy**

(Percentages)

Size of SR Holding	Households Leasing in	Households Leasing out	Area Leased-in (acres)
Small	16.28	0.00	1.14
Medium	11.32	0.00	1.33
Large	10.34	0.00	1.40
<b>Overall</b>	<b>13.20</b>	<b>0.00</b>	<b>1.24</b>

The above analysis of the socio-economic characteristics shows that just as in the case of landholdings, small ruminant holdings are also subjected to high inequality. Smallholdings account for a large proportion of holdings, but their share in animals is quite low. The activity is taken up in the main by socially weaker sections, and new entrants into the activity form a high proportion. A significant proportion of these holdings is owned by educated persons. There is a great deal of diversification in livestock ownership. Many of these holdings also own bovines and poultry. The activity is performed under mixed farming and only a small proportion of them are landless. There is positive association between herd size and landholding size. Irrigation ratio is low and well irrigation is concentrated among large herds.

### 3.2.2 Size and Composition

Each household, on the average, maintains 8.77 small ruminants, of which 70.3 per cent are goats. The proportion of sheep in the herd increases with increase in the size of holding. While only 25.9 per cent sheep in small holdings, 33.8 per cent are sheep in large holdings. It is observed in the field that sheep requires more care and facilities than goat. Sheep cannot withstand heavy rain. It requires better shed than goat. When smallholdings increase, the population of goat is likely to increase (Table 3.9).

**Table 3.9: Number of Small Ruminants per 100 Households**

Size of Holding	Sheep	Goat	Total	Total Animals
Small	25.9	74.1	100.0	359.1
Medium	29.7	70.3	100.0	813.0
Large	33.8	66.2	100.0	1731.1
<b>Overall</b>	<b>29.7</b>	<b>70.3</b>	<b>100.0</b>	<b>877.1</b>

When the holdings are classified into sheep, goat and mixed, it is observed that 69.5 per cent of the holdings are goat holdings, 23.4 per cent are sheep holdings and 7.1 per cent are mixed holdings. Only when herd size increases, both species are maintained. Almost all the smallholdings are pure holdings (Table 3.10).

**Table 3.10: Distribution of Holdings by Type of Species Maintained**

Size of SR Holding	Sheep	Goat	Mixed	Total
Small	25.58	73.26	1.16	100.00
Medium	22.64	69.81	7.55	100.00
Large	20.69	63.79	15.52	100.00
<b>Overall</b>	<b>23.35</b>	<b>69.54</b>	<b>7.11</b>	<b>100.00</b>

Farmers sell only male animals. Females are kept for expanding the herd size. The habit of buying animals is almost rare. Female animals account for 76.5 per cent of the total stock of small ruminants and holding size has no influence in this aspect (Table 3.11).

**Table 3.11: Value of Small Ruminants Stock per Household**

Size of SR Holding	Sheep	Goat	Total
Small	1041	2310	3351
Medium	2188	5091	7278
Large	6171	11131	17302
<b>Overall</b>	<b>2860</b>	<b>5655</b>	<b>8515</b>

The value of the stock is estimated using the sale price of the animal. For the households where sales are not reported, the average value is applied. Each household, on the average, possesses Rs. 8515 worth of small ruminants and one-third of the total value is in the form of sheep. Asset value of the large holdings is Rs. 17, 702 (Table 3.10). It provides a good security for the household. In our field visits, we found that small ruminants provided health security to some households. It is reported in the field visits that a person could meet a significant part of the expenditure for undergoing by pass surgery by selling the small ruminants.

### 3.2.3 Production features

One of the important features of small ruminants is prolificacy, which depends on feeding. The results indicate that profligacy is prevalent among one-half of the goats and only 20 per cent of the sheep (Table 3.12). Giving birth to triplets and quadruplets is very rare among goats and non-existent among sheep. Herd size has a positive influence on prolificacy. While only 44 per cent of the goats managed by the small herds gave more than one kid, 51 per cent of the animals with large herds gave more than one. Such relationship is observed even among sheeps. But the relationship is not as systematic as in the case of goats.

**Table 3.12: Distribution of Animals by Number of Kids Born at a Time**

(Percentages)

Size of SR Holding	Goat			Sheep	
	One	Two	Three & above	One	Two
Small	56.12	42.45	1.43	88.24	11.76
Medium	52.34	44.86	2.80	66.67	33.33
Large	48.82	48.03	3.15	82.35	17.65
<b>Overall</b>	<b>51.60</b>	<b>45.80</b>	<b>2.60</b>	<b>80.00</b>	<b>20.00</b>

Age at first kidding is slightly lower for goat as compared to sheep. While sheep lamb at the age of 18 months, goats lamb at 16 months. But the interval between two kidding/lambings is same for both the species (Table 13.3).

**Table 3.13: Age at First Kidding and Inter Kidding Period**

(months)

Size of SR Holding	Sheep		Goat	
	First Lambing	Inter lambing period	First kidding	Inter kidding Period
Small	17.9	7.9	17.6	7.6
Medium	18.5	7.8	15.8	7.5
Large	17.2	7.6	14.0	7.4
<b>Overall</b>	<b>17.8</b>	<b>7.8</b>	<b>16.0</b>	<b>7.5</b>

The major problem among small ruminants is high mortality. Mortality rate is found to be 31.62 per cent among sheep and 38.62 among goats. These magnitudes should be considered very high. If we allow for 5 per cent mortality, we find that one-third of the production among goats and one-fourth of the production among sheep is lost due to mortality. Mortality is higher in small herds than in the large and this relationship is more systematic among goats than among sheep. The problem is very serious in small herds. In these herds, the mortality rate 54 per cent among goats and 45 per cent among sheep (Table 3.14).



**Table 3.14: Percentage of Deaths to Births among Small Ruminants**

Size of SR Holding	Sheep	Goat
Small	44.74	54.19
Medium	23.21	44.10
Large	31.43	28.32
<b>Overall</b>	<b>31.62</b>	<b>38.62</b>

Because of this high mortality, it has become common among some people to eat even the dead animal and this practice is common even among maintaining large herds. While 13 per cent of small herd owners reported the habit of eating or selling the dead animal, 16 per cent of the large herds reported the habit (Table 3.15).

**Table 3.15: Utilization of Dead Animal****(% to total households)**

Size of SR Holding	Eat	Sell	Throw Away	Total
Small	8.57	4.29	87.14	100.0
Medium	4.88	0.00	95.12	100.0
Large	9.80	5.88	84.31	100.0
<b>Overall</b>	<b>8.02</b>	<b>3.70</b>	<b>88.27</b>	<b>100.0</b>

The losses due to high mortality are two fold. One is the direct loss due to death and the other is loss due to selling the animal at a low price because of the fear of mortality. Prices of sheep and goats fluctuate more due to this factor than differences in seasonality. Loss of income due to mortality is calculated for each household. The average loss per household is found to be Rs. 1568. One-fourth of the loss is due to sheep and three-fourths due to goats (Table 3.16). Note, however, the mortality rate is only marginally higher for goats relative to sheep. Loss due to mortality of goats is high here because they constitute a larger proportion of the small ruminant population.

**Table 3.16: Loss of Income due to Mortality per Household****(Rs.)**

Size of Holding	Sheep	Goat	Total
Small	187	840	1027
Medium	268	1066	1335
Large	780	1804	2584
<b>Overall</b>	<b>383</b>	<b>1185</b>	<b>1568</b>

*N.B. Loss is calculated using the sale price reported by the household*

The high mortality is to be explained in terms of health care practices adopted by the farmers. Farmers are expected to get their animals vaccinated and also go for their de-worming as a preventive measure. Both these practices are not very common. Only 48 per cent of the farmers are getting their animals vaccinated and 22.73 per cent are getting them de-wormed (Table 3.17). Some of the farmers get their animals vaccinated only after

they are actually infected. Vaccination is not very common. Farmers appear to be less serious about vaccination because they observe that some of the animals die even after vaccination. Many farmers made this complaint. This misconception has to be removed through extension and they should be made aware that each vaccine is meant for certain diseases and vaccination will not be effective if the animal is already infected. The practice of vaccination is higher among large farmers than the small. But the opposite is the case with the practice of de-worming. The proportion of farmers vaccinating their animals is 56.9 per cent among large farmers and 39.5 per cent of the small. On the other hand, the proportion of farmers giving de-worming medicine is 31 per cent among the small and 12 per cent among the large. The annual expenditure on vaccination per household comes to Rs. 13.64 per annum and the expenditure on de-worming is Rs. 55.74 per annum. Farmers generally go for traditional methods of treating their animals and rarely go for modern medicines. Only 7.5 per cent of the farmers have gone for treatment and an amount of Rs. 11.99 is spent per household. There is no difference in per animal expenditure on treatment across holding size.

**Table 3.17: Expenditure on Health Care Per Household**

Size of SR Holding	Vaccination		De-worming		Treatment	
	Households (%)	Expenditure (Rs.)	Households (%)	Expenditure (Rs.)	Households (%)	Expenditure (Rs.)
Small	39.53	4.85	31.40	25.72	5.81	7.21
Medium	51.85	14.02	20.37	33.81	9.26	13.15
Large	56.90	26.31	12.07	120.66	8.62	18.00
<b>Overall</b>	<b>47.98</b>	<b>13.64</b>	<b>22.73</b>	<b>55.74</b>	<b>7.58</b>	<b>11.99</b>

Farmers follow extensive system and hence stall-feeding is rare. Only one-third of the households feed concentrates as a supplement to grazing and the proportion of animals fed with concentrates comes to 27 per cent. It is significant to note that the practice of feeding concentrates is more prevalent among small and medium flocks than among large flock. While 40.7 per cent of the small flocks feed their animals with concentrates, only 22.4 per cent of the large holdings feed concentrates (Table 3.18).

**Table 3.18: Practices of Stall Feeding**

Size of SR Holding	Households Feeding Concentrates (%)	Animals Fed with Concentrates (%)	Days of Feeding Concentrates Concentrates in a year	Value of Concentrates Fed Per Animal per Day
Small	40.70	37.54	353	0.03
Medium	33.33	32.00	328	0.04
Large	22.41	21.61	328	0.04
<b>Overall</b>	<b>33.33</b>	<b>26.99</b>	<b>341</b>	<b>0.01</b>

Use of hired labour is a common practice and it is more prevalent in smallholdings than in medium and large. Among the small holders as high as 27.9 per cent of the holdings use hired labour as compared to 13.2 per cent among the medium and 18.9 per cent among the large. A smallholding will not give so much of income for a person to devote his labour time completely on this activity. There are economies of scale in employing the hired labour. The traditional custom of giving food for this hired labour is also highly prevalent (Table 3.19). Cost of hired labour per animal is Rs.58.40 per annum.

**Table 3.19: Use of Hired Labour in Small Ruminant Production**

Size of SR Holding	Households using hired labour (%)	Amount Paid per Animal	Cost of Hired Labour per Animal
Small	27.91	56.70	69.43
Medium	13.21	35.19	49.54
Large	18.97	54.75	55.00
<b>Overall</b>	<b>21.32</b>	<b>52.23</b>	<b>58.40</b>

Family labour is used in 83.23 per cent of the holdings and nearly one-third of the labour is children and old people. The use of old and child labour is prevalent even among large holdings (Table 3.20).

**Table 3.20: Distribution of Holdings by Type of Person Grazing**

Size of SR Holding	Men	Women	Elderly Men	Elderly Women	Child	Hired Labour	Total
Small	24.42	29.07	8.14	8.14	6.98	23.26	100.0
Medium	28.30	18.87	15.09	13.21	15.09	9.43	100.0
Large	31.03	15.52	17.24	5.17	13.79	17.24	100.0
<b>Overall</b>	<b>27.41</b>	<b>22.34</b>	<b>12.69</b>	<b>8.63</b>	<b>11.17</b>	<b>17.77</b>	<b>100.0</b>

Only male animals are sold as females are kept to enhance the stock. The age at sale is between 8 and 24 months. One half of the animals are sold at less than 12 months another 37.5 per cent of the animals are sold at age 12 to 18 months (Table 3.21). It seems that the older the animal the higher will be the price fetched by it at the time of sale.

**Table 3.21: Age at Sale and Price Received per Animal**

Size of SR Holding	Percentage of animals sold at age			Price Received		
	Less than 12 months	12 to 18 months	18 months and above	Less than 12 months	12 to 18 months	18 months and above
Small	46.23	44.34	9.43	872	1136	1750
Medium	48.24	44.71	7.06	849	1268	900
Large	55.13	28.85	16.03	769	839	1524
<b>Overall</b>	<b>50.72</b>	<b>37.46</b>	<b>11.82</b>	<b>816</b>	<b>1072</b>	<b>1488</b>

**Table 3.22: Years of Maintaining Female Animal and Value of Old Animal**

Size of SR Holding	Average Number of Years	Average Value(Rs.)
Small	5.4	700
Medium	5.4	677
Large	5.5	739
<b>Overall</b>	<b>5.4</b>	<b>705</b>

The value of manure produced per household is Rs. 221 and most of it is used on own farm. The value of sales comes to 18.1 per cent. The sale of manure is related to the availability of land for cultivation than flock size. The proportion of sale in the quantity produced is more among medium farmers than among large farmers and small farmers (Table 3.23).

**Table 3.23: Average Quantity and Value of Manure Produced and Sold**  
(Per Household)

Size of SR Holding	Quantity Produced(Carts)	Value of Production(Rs.)	Quantity Sold (Carts)	Value of Sales (Rs.)
Small	0.62	105	0.02	2
Medium	1.39	189	0.38	91
Large	2.72	422	0.38	49
<b>Overall</b>	<b>1.44</b>	<b>221</b>	<b>0.22</b>	<b>40</b>

*N.B. Value is calculated using average sale price*

The small ruminant households are not able to provide proper shelter for the animals. Most of the households (85 per cent) keep the animals in kutcha shed and enclosure. Even among the large holdings a high proportion (71 per cent) have only kutcha shelter. Among the small holdings 8 per cent of the households have pucca shed. In most of these cases, the shed is a part of the house (Table 3.24).

**Table 3.24: Distribution of Holdings by type of Shed**  
(Percentages)

Size of SR Holding	Type of Shed			Type of Enclosure	
	Pucca	Kutcha	Brick	Mud	Bamboo
Small	8.1	91.9	10.5	59.3	29.1
Medium	13.2	86.8	13.2	64.2	20.8
Large	27.6	70.7	20.7	56.9	19.0
Overall	15.2	84.8	14.2	59.9	23.9

### 3.2.4 Costs and Returns

Poverty is very high among the small ruminant households. Poverty line can be taken as Rs. 5000 per capita per year. Under this norm 88.8 per cent of the households are poor. Some of the poor can be treated as chronically poor in the sense that their poverty is not seasonal and even in good agricultural years they are likely to remain poor. A rough measure of it is to fix the poverty line at a much lower level and identify the people whose income falls below that level. When half of the poverty line income is taken as the line for chronic poverty, 61.3 per cent of the households are found to be poor. There are very few households that can be considered as rich. If twice the poverty line is taken as the measure, only 3 per cent of the small ruminant holdings are rich (Table 3.25).

**Table 3.25: Distribution of households by per capita income**

Annual income	No. of households	% to total
Less than 2500	122	61.93
2500 - 5000	53	26.90
5000 - 7500	16	8.12
7500 - 10000	2	1.02
10000 - 15000	1	0.51
15000 & above	3	1.52
<b>Total</b>	<b>197</b>	<b>100.00</b>

There is no relationship between incidence of poverty and size of holding. While the incidence is 90 per cent among the small holdings, it is as high as 86.0 per cent among the large holdings. Similarly, rich households exist even among the small holdings (Table 3.26).

**Table 3.26: Classification of Households as Rich, Middle Income & Poor**

Size	< 5000	5000-7500	Above 7500	Total
Small	90.70	5.81	3.49	100.00
Medium	88.68	11.32	0.00	100.00
Large	86.21	8.62	5.17	100.00
<b>Overall</b>	<b>88.83</b>	<b>8.12</b>	<b>3.05</b>	<b>100.00</b>

Small ruminant households derive a significant portion of income from livestock sector. Bovine, poultry and small ruminants together provide 37 per cent of the household income. This is an important source of income to these households. Agriculture and wage labour together provide 45 per cent of the total income. Income from small ruminants accounts for one-fifth of the total income. Only in the case of small flocks with less than five animals income from small ruminants is very low at 9 per cent. However small holders depend to a large extent on wage labour. Some of them have other sources of income like salaried employment or business (Table 3.27).

**Table 3.27: Household Annual Income from Different Sources**

Size	Agriculture	Wage	Bovine & Poultry	Small ruminants	Others	Total	Per capita income
Small	20.4	30.3	15.3	8.6	25.4	100.0	3600
Medium	18.7	31.4	17.8	23.7	8.4	100.0	3923
Large	27.9	10.5	18.7	26.4	16.5	100.0	6362
<b>Overall</b>	<b>23.1</b>	<b>22.4</b>	<b>17.3</b>	<b>19.5</b>	<b>17.7</b>	<b>100.0</b>	<b>4485</b>

Returns from small ruminant production are estimated by taking the asset value of the females and income generated per annum. This is the return on investment. Family labour cost is not included in total cost because it is not a paid out cost. Potential income is calculated assuming that the entire mortality can be arrested. Potential income per household turned out to be Rs. 4600 and actual income is Rs. 3800. The increase in income comes to 20 per cent. The improvement in income will be very high (45.7 per cent) for the small holdings. Even the medium large holdings gain substantially by arresting mortality (Table 3.28). Return on investment is calculated by taking the value of female animals as investment. Return on investment is found to be 43 per cent. There is significant variation in the return on investment across the size of holding. The lowest return is obtained by the small holdings and highest by the medium holdings. It can be concluded that the individual holdings should neither be too big nor too small.

**Table 3.28: Costs and Returns Per Household**

Size of SR Holding	Cost of Production (Rs.)				Income and Returns (Rs.)			
	Hired Labour	Medical Expenditure	Feed Cost	Annual Repairs	Potential Income	Actual Income	Increase (%)	Return on investment
Small	82	91	455	256	1993	1368	45.7	38.4
Medium	43	114	681	256	4569	4112	11.1	51.1
Large	164	263	1156	300	8462	7214	17.2	41.0
<b>Overall</b>	<b>96</b>	<b>300</b>	<b>722</b>	<b>269</b>	<b>4591</b>	<b>3827</b>	<b>20.0</b>	<b>43.0</b>

**3.2.5 Regional Differences in Small Ruminant Production**

The sample data allows us to understand regional differences in small ruminant production. Out of the 197 sample holdings, 32.5 percent belong to the Coastal region, 14.7 per cent belong to Northern region and 52.8 per cent belong to KBK region. In terms of the sample animals, 24.1 per cent belong to Coastal region, 16.2 per cent to the North and 60.8 per cent to KBK (Table 3.29). Thus, size of holding is lowest in the Coastal region and highest in the KBK region (Table 3.30)

**Table 3.29: Distribution of Small Ruminant Holdings by Region**

Region	No. of holdings	% to total	No. of Animals	% to total
Coastal	64	32.49	417	24.13
Northern	29	14.72	280	16.20
KBK	104	52.79	1051	60.82
<b>Overall</b>	<b>197</b>	<b>100.0</b>	<b>1728</b>	<b>100.0</b>

The average size of the herd is 10.1 in the KBK, 9.3 in the Northern and 6.1 in the Coastal region (Table 3.30). The three regions differ in the type of holdings. The KBK region has the highest proportion of sheep holdings and the Northern region has the highest proportion of goat holdings. There are no pure sheep holdings in the Northern region. Households keep sheep along with goat. The Coastal region occupies the middle position. The proportion of sheep and goat in the total small ruminants also indicates the same pattern (Table 3.31).

**Table 3.30 : Average Number of Small Ruminants per 100households**

Region	Sheep	Goat	Total
Coastal	170	437	607
Northern	110	820	930
KBK	360	650	1010
<b>Overall</b>	<b>261</b>	<b>616</b>	<b>877</b>

**Table 3.31: Distribution of Holdings by Type of Species maintained**

Region	Sheep	Goat	Mixed	Total
Coastal	13.85	81.54	4.62	100.00
Northern	0.00	83.33	16.7	100.00
KBK	35.58	58.65	5.77	100.00
<b>Overall</b>	<b>23.35</b>	<b>69.54</b>	<b>7.11</b>	<b>100.00</b>

Differences are also observed in the production performance as revealed from the proportion of animals giving birth to twins and triplets. Northern region has the highest proportion of animals giving birth to twins and triplets and KBK occupies the lowest position (Table 3.32).

**Table 3.32: Distribution of Animals by Number of Kids at a Time**

Region	Small Ruminants	
	One (%)	Two & More (%)
Coastal	56.2	43.8
Northern	53.0	47.0
KBK	62.4	37.6
<b>Overall</b>	<b>59.5</b>	<b>40.5</b>

The coastal region suffers from the highest mortality rate with a death rate of 56.4 percent. The KBK region has the lowest death rate of 26.2 percent. The mortality rate is higher among sheep than goats in the coastal and the northern regions and the difference is more glaring in the coastal region - 76.9 percent among sheep and 51.6 percent among goats. The KBK region exhibits higher mortality among goats as compared to sheep - 30.2 percent among goats as compared 17.1 percent among sheep (Table 3.33).

**Table 3.33: Percentage of Deaths to Births among Small Ruminants**

Region	Sheep	Goat	All
Coastal	76.92	51.57	56.4
Northern	41.67	39.26	39.5
KBK	17.06	30.24	26.2
<b>Overall</b>	<b>31.62</b>	<b>38.62</b>	<b>36.9</b>

Small ruminant households suffer from high incidence of poverty. The incidence is very high in the northern region (96.5 percent) as compared to other two regions (about 85 percent). Though the incidence is high in coastal region a large proportion of the poor are only marginally poor. It is found that chronic poverty is lowest with 53.1 percent in the coastal region (Table 3.34).

**Table 3.34: Distribution of households according to per capita income**

Per capita annual income	(Percentages)		
	Coastal	Northern	KBK
Less than 2500	53.12	79.31	60.58
2500-5000	34.38	17.24	25.00
5000 & above	12.50	3.45	14.41
<b>Overall</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
	<b>(64)</b>	<b>(29)</b>	<b>(104)</b>

Figures in brackets are number of sample households

### 3.3 Economics of Flock System

#### 3.3.1 General Features of Flock System

Flock system (collective units) is adopted only the Golla community. This community is traditionally known for rearing animals, especially bovines and small ruminants. The flock system is a type of cooperative system of rearing, a flock consisting of about 300 to 400 animals belonging to five or six owners. Out of the six owners, five will work on the flock and one will stay in the village to look after his agricultural operations. The animals will be reared in the forest during the crop season. After the crop season, in the month of November, animals can be taken to farmers' fields for penning. During this period five members will take care of the animals and the sixth member will contact the farmers for penning. This will continue till the end of May. Thus, the animals will stay in the forest for six months and in the farmers' fields for the remaining six months. Generally, it will take two days for each acre of land for a flock of 400 to 500 animals. The owner of the land will pay 10 to 12 Kg of rice and Rs. 10 per day. In some cases, the farmer will pay Rs. 200 for 300 animals. The animal will be milked for three months in a kidding. Milking will start after weaning. The average milk yield is 200 grams per day or total production in one kidding is 18 liters. The price of milk is Rs. 10 per liter. Milking is necessary when the animal has excess milk after the kid's requirement is met. Though the animals are reared jointly, every one will maintain the identity of his flock. Both sheep and goats graze in the forest. While goats stay in the forest, sheep will be brought back to their homes. Black Bengal is not suitable for flock system as it is small and cannot with stand rain. Though some goats of Black Bengal variety are maintained, they are maintained in the village and children will rear them. The pregnant animals are brought to home one day before delivery. The animal will stay at home for 45 days after delivery. In penning the animals are kept in the field only at night. They will be taken for grazing during the day.

The advantage of the flock system lies not only in saving labour time due to economies of labour, but also in getting income from the dead animal. While the skin of the dead animal is thrown away, it is sold in the flock system. Milking is possible in the flock system because milk yield is high for the type of animal maintained in the flock system.

#### 3.3.2 Socio-economic features

A majority of the flock owners (52 per cent) are literates and about one-fifth of them have above primary level of education. All the flock owners have less than five acres of land. A majority of the flock owners (52 per cent) are marginal farmers and 30 per cent are landless (Table 3.35). These two categories share 80.3 per cent of the animals. Each owner maintains - on the average, 40 animals. The landless maintain 34 and the other two categories maintain 42 animals.

**Table 3.35: Distribution of Flock Holdings by size of Operated Area**

Land Category	Percentage to total holdings	Percentage to total animals	Animals Per Household
Landless	29.63	25.0	34
Marginal	51.86	55.3	42
Small & Medium	18.51	19.7	42
<b>Overall</b>	<b>100.00</b>	<b>100.00</b>	<b>40</b>



A significant proportion (one-third) of the flock owners maintain both sheep and goat. In the flocks studied, most of them (48.2 per cent) are sheep flocks. Only 18.5 per cent are goat flocks. The mixed holdings have more animals per holding than the other two. Pure goat holdings are small in size with only 15 animals per holding (Table 3.36).

**Table 3.36: Distribution of Flocks by type of animal maintained**

Type	% to total holdings	% to total animals
Sheep	48.15	41.30
Goat	18.52	15.26
Mixed	33.33	43.44
<b>Total</b>	<b>100.0</b>	<b>100.00</b>

Each household has, on an average, 38.9 animals of which 71.5 per cent are sheep and 28.5 per cent are goats. Adult male animals meant for breeding form only 9.4 per cent of the total animals. If we take the ratio of adult males to adult females, there is one male for every five females. There is not much difference between sheep and goats in this ratio (Table 3.37).

**Table 3.37: Age and Sex distribution of Animals**

Type of	Animal Animals Per Household					
	Sheep	%	Goat	%	Total	%
Adult Male	2.74	9.6	1.00	8.8	3.74	9.4
Adult Female	13.85	48.6	5.15	45.5	19.00	47.7
Young Male	3.81	13.4	1.70	15.0	5.51	13.8
Young Female	8.07	28.3	3.48	30.7	11.55	29.0
<b>Overall</b>	<b>28.48</b>	<b>100.0</b>	<b>11.33</b>	<b>100.0</b>	<b>39.81</b>	<b>100.0</b>

### 3.3.3. Production Performance

It is significant to note that both sheep and goats in the flock system give only one kid (Table 3.38). The proportion giving birth to twins is slightly higher among sheep than goats (5.8 per cent among sheep as against 4.1 per cent among goats).

**Table 3.38: Distribution of Animals by Number of Kids Born at a Time**

Animal Type	One	Two
Sheep	94.17	5.83
Goat	95.86	4.14
<b>Overall</b>	<b>100.0</b>	<b>100.0</b>

*326 sheep and 142 goats kidded during the year*

Flock system is generally managed by the family labour, which accounts 85.2 per cent of the total labour. Use of old persons is quite rare because the animals have to be taken to far off places and they have to stay in the forest. Female participation is also quite low in the flock system (Table 3.39).

**Table 3.39: Distribution of Flocks by Type of Persons Grazing****(Percentages)**

Persons	Percentage
Men	77.78
Hired Labour	14.82
Women	3.70
Elderly Men	3.70
<b>Total</b>	<b>100.00</b>

Mortality is found to be very high in the flock system also. The mortality rate is higher among sheep than goats. While 41.6 per cent of the stock died during the year, the corresponding rate is one-third among goats. The average number of deaths per household is 39.3. It is striking to find that each household, on the average, lost Rs. 16,297 during the last year, of which 76.4 per cent is due to death of sheep and 23.6 per cent due to death of goats (Table 3.40).

**Table 3.40: Loss of income due to mortality per household**

Age	Sheep		Goat		Total	
	No. died	Value (Rs.)	No. died	Value(Rs.)	No. died	Value(Rs.)
Young	4.26	4621	1.63	1238	5.89	5859
Adult	7.59	7828	2.19	2610	9.78	10438
All	11.85	12449	3.82	3848	15.67	16297
% to Present Stock	41.61	41.8	33.66	34.1	39.3	39.7

The high death rate is not completely due to neglect of farmers in vaccination and de-worming. A high proportion of the farmers (77.8 per cent) give vaccination and de-worming is adopted by 70 per cent. Only in case of treatment expenditure of the farmers is low at 33.3 per cent. Expenditure per household ranges between Rs. 105 for vaccination and Rs 174 for de-worming. Though a small percentage of holdings spend on treatment, the amount per household is high at Rs. 147 per annum (Table 3.41).

**Table 3.41: Expenditure on Health Care**

Service	Percentage Utilised	Expenditure per Household (Rs.)
Vaccination	77.8	105
De-worming	70.4	174
Treatment	33.3	147

The price of an animal is highest at Rs.1176 at age is between 12 and 18 months. One-half of the animals are sold at this age. Another 38.5 per cent of the animals are sold at less than one year. Only a few animals (11.5 per cent) are sold beyond one year and it again fetches a lower price. This lower price is due to some special features of the animal and to some extent due to seasonality (Table 3.42).

**Table 3.42: Age at Sale and Price Received per Animal**

Age in Months	Percentage of Households	Price
Less than 12 months	38.46	928
12-18	50.00	1176
18 and above	11.54	981
<b>Overall</b>	<b>100.0</b>	<b>1052</b>

**3.3.4. Costs and Returns**

The most important aspect of this system is that small ruminant income occupies about 60 percent of the household income. They also derive another 9.5 percent of income from bovine and poultry activities. Thus livestock is the major source of income accounting for about 70 percent of the income. Taking Rs.5000/- per annum as the poverty live, incidence of poverty is estimated. It is found that 37 percent of households are poor. If 50 percent of the poverty live is used in defining chronic poverty only 11.1 percent of them are poor. The shares of income from different activities vary across income groups. The chronically poor households derive a very low share of income from agriculture as well as bovine sectors. These two sectors together provide only 10 percent of household income. They depend on small ruminants with the extent of 79 percent of total income (Table 3.43).

**Table 3.43: Distribution of Income across Income categories**

Per Capita Income Category	Share in Households	Percentage Share of Income from various Sources					
		Agriculture	Wage	Milk & Poultry	Small Ruminants	Others	All
Very Poor (<2500)	11.1	7.3	10.8	2.9	79.0	0.0	100.0
Marginally Poor (2500-5000)	25.9	20.0	20.4	10.2	44.7	4.7	100.0
Non-Poor (5000-7500)	29.6	23.5	11.7	5.0	59.8	0.0	100.0
Rich (7500 & above)	33.3	16.3	4.4	12.5	63.6	3.2	100.0
<b>Overall</b>	<b>100.0 (27)</b>	<b>18.9</b>	<b>9.8</b>	<b>9.5</b>	<b>59.4</b>	<b>2.4</b>	<b>100.0</b>

*Figures in the brackets are total number of sample households*

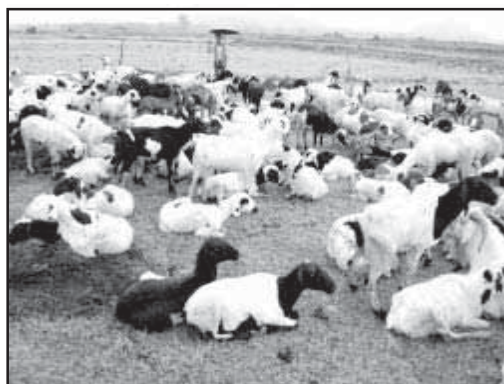
Each household on an average derives an income of Rs.17135/- per annum. In the absence of mortality the income will be higher by 38.7 percent. The return on their investment comes to 28.7 per cent. The high income in the system is because of low cost of production. The farmers are not spending much on treatment as they depend on traditional methods of treatment. It is already pointed out that only 33 percent of farmers are spending on treatment (Table 3.44).

**Table 3.44: Costs and Returns Per Household**

Cost of Production				Returns			Return on
Hired Labour	Medical	Shed Repairs	Total Cost	Actual Income	Potential Income	Increase	Investment
160	63	429	652	17135	23760	38.7	28.7
24.5	9.7	65.8	100.0	-	-	-	-

### 3.4 Summary

The chapter provides an account of the economics of small ruminant production separately for the individual units or individual holdings as also the collective ones or flock system. Besides, it seeks to distinguish the performance of the holdings between different sizes and, toward the end, between different regions of the state. The study shows that the activity of rearing sheep and goat is mainly taken by the households belonging to socially backward classes and by those with little land base. The fact that the small ruminant production activity could be a viable one in ecologically fragile zones seem to be increasingly realized by people of the state and as a consequence more and more households that were earlier distanced from the activity seem to be venturing into it in recent years. But there are also indications that those who are traditionally dependent upon the activity for their livelihood seem to either quit or maintain smaller and smaller flocks. With the result there is a deceleration in the growth of small ruminants in the state. This is an unwelcome development for the reason that the activity seems in general to be a rewarding one. What seems to deter the people from maintaining large herds is the mortality rate among the animals. Although those who take to the activity seem to feel that it can be a source of guaranteed income to them, they seem not to take advantage of the veterinary facilities to protect their animals from diseases. But one is never sure whether their failure to give the benefit of veterinary facilities to the animals is because people do not repose much faith in the facilities or because the facilities are not quite within their reach.



As far as individual holdings are concerned it appears that it is economically viable to maintain holdings of medium size ranging from 5 to 9 animals. It is in respect of these holdings that the rate of return on investment is the highest. The advantage underlying the medium holdings seem to lie particularly in the high prices commanded by them in the sale of animals.

The flock system has its advantages in that it economises on labour use, the animals can be taken to long distances for feeding either in the forest or in fields in the off season and therefore it is possible to minimize the expenditure on concentrates given to the animals, it can bring in significant returns from penning. The flock system is rooted in the principle of economies of scale and therefore deserves to be propagated. It is noteworthy, however, that the mortality rate under the flock system is also quite high, notwithstanding the fact that to give the benefit of veterinary services is much more easier when dealing with a flock than while rearing a few animals. This is a cause for concern and must be addressed to with special focus in extension. May be it is as much necessary to educate the households that take to rearing small ruminants as an activity as it is to improve and/or increase the spread of the veterinary facilities.

**Chapter IV**  
**Economics of Backyard Poultry Production**





## Chapter IV

### Economics of Backyard Poultry Production

#### 4.1 Introduction

There are significant changes in the attitude of the people towards poultry farming in recent times. The activity is no more considered as a low prestige occupation fit for only weaker sections of the society and it has become a full time job for many rural households. The sector has great potential for raising rural incomes because egg production is presently very low and has to be increased by ten times to reach the recommended level of requirement of half an egg per day per individual for half of the Indian population considered as vegetarians.



Though it is one of the fastest growing segments of the rural economy, its growth in recent times has very poor link with poverty reduction. This is because backyard poultry has been by-passed by the poultry revolution, with virtually all the growth occurring in the large scale, 'confined and intensive' (or industrial sector). By contrast, traditional poultry remained a stagnant and low productivity sector. The percentage of native birds in the total poultry population has dropped from 50 per cent to 10 percent (Rangnekar and Rangnekar, 1999). But backyard poultry is a viable source of income to the poor.

Poultry farming has significant advantages over other livestock activities. Firstly, it can be taken up under diversified agro-climatic conditions. Secondly, its requirements of land and capital are low for small scale units. Thirdly, it can provide quick returns and continuous income throughout the year. Fourthly, poultry is the most efficient converter of plant products into food of high value. Fifthly, and most importantly, it can provide demand for coarse cereals, which are produced in the dry land areas. This is one of the ways of stabilizing the prices of coarse cereals.

Poultry is an important source of livelihood for rural poor in Orissa. It is almost completely under backyard system. This is the reason for relatively lower growth of the sector in the state as compared to all-India. With a share of 5 per cent in poultry population, the state produces only 2.6 per cent of the total eggs produced at the national level. It should be noted that productivity is low because of the dominance of back yard system in the state rather than the low productivity of birds in back yard system. This chapter examines the structure of the backyard poultry in Orissa and estimates the returns from this system. The analysis is based on the data collected from 170 poultry units consisting of 2313 birds.

#### 4.2 Socio-economic Characteristics

The poultry units are classified into four categories - very small, small, medium and large. In the backyard system, most of the units are maintained with less than five birds. Units with one, two, three and four and above are designated as very small, small, medium and large respectively. Our sample comprises more or less equal number of units in the four categories, but the proportion of birds is more in the large units. Large holdings account for 35.8 per cent of the birds and very small holdings account for 15.0 per cent. Small and medium account for the remaining 49.2 per cent of the birds.

Hen accounts for 19.8 per cent and cock 8.9 per cent of the total birds. The rest is made up of chick. For each hen there are 3.6 chicks. This is roughly the multiplier in the poultry sector. The number of chicks per hen depends upon whether the owner keeps all hens for production or some for meat. It is found that the number of chicks per hen is higher on smallholdings than on the large. While the ratio is 6.5 for the small units, it is 2.86 for the large units. The proportion of cocks in the total birds increases with increase in the size of the holding. While the proportion is 7.2 per cent in the very small units, it rises to 9.3 per cent in the large flocks (Table 4.1). In these flocks cocks are reared for cock-fight. The price of the cock reared for fight is very high. A cock of five months old fetches Rs. 400, while a hen of the same age fetches only Rs. 200.

**Table 4.1: Distribution of Poultry Holdings by size of holding**

Size of Holding	Holdings (%)	Birds (%)	Percentage share in total birds			
			Hen	Cock	Chick	Total
Very Small	24.71	14.96	12.43	7.22	80.35	100.0
Small	30.59	23.48	18.60	8.66	72.74	100.0
Medium	24.12	25.72	20.67	8.24	71.09	100.0
Large	20.59	35.84	23.64	9.29	67.67	100.0
<b>Overall</b>	<b>100.0</b> <b>(170)</b>	<b>100.0</b> <b>(2313)</b>	<b>19.84</b> <b>(459)</b>	<b>8.86</b> <b>(204)</b>	<b>71.30</b> <b>(1650)</b>	<b>100.0</b>

*Figures in brackets are absolute numbers*

Backyard poultry is the activity of the poor. The sample data show that 62.9 per cent of the owners are scheduled tribes and 17.1 per cent are scheduled castes. Thus, these two castes together account for 80.0 per cent of the poultry farmers. Further, caste has clear association with the size of the unit. The share of scheduled tribes decreases from 85.7 per cent in the very small units to 51.43 per cent in the large units. On the other hand, the share of others increases from 2.4 per cent to 37.1 per cent. There is not much difference between small and medium categories in terms of the ownership (Table 4.2).

**Table 4.2: Percentage of Households by Social Group**

Size of Holding	Scheduled Caste	Scheduled Tribe	Backward Caste	Total
Very Small	11.90	85.71	2.38	100.0
Small	19.23	59.62	21.15	100.0
Medium	24.39	54.66	21.95	100.0
Large	11.43	51.43	37.14	100.0
<b>Overall</b>	<b>17.06</b>	<b>62.94</b>	<b>20.00</b>	<b>100.0</b>

Backyard poultry is completely in the management of women, whose educational levels are low - 68.8 per cent are illiterates. However, some of them (11.8 per cent) have above primary education. Educational levels are positively correlated with the size of the holding. In the large holdings 23.1 per cent of the women managing the poultry have above primary education. The corresponding proportions in the very small and smallholdings are 2.4 per cent and 13.5 per cent respectively.



**Table 4.3: Distribution of Persons Managing Poultry by Level of Education**

Size of Holding	Illiterate	Below Primary	Primary	Below Secondary	Secondary	Above Secondary	Total
Very Small	69.05	28.57	0.00	2.38	0.00	0.00	100.0
Small	78.85	5.77	1.92	11.54	0.00	1.92	100.0
Medium	65.85	19.51	4.88	2.44	7.32	0.00	100.0
Large	57.14	14.29	5.71	17.14	2.86	2.86	100.0
<b>Overall</b>	<b>68.82</b>	<b>16.47</b>	<b>2.94</b>	<b>8.24</b>	<b>2.35</b>	<b>1.18</b>	<b>100.0</b>

Poultry sector has the advantage that it can be taken up with other livestock activities. The main reason for this is the low requirement of land and investment. Only 16.5 per cent of the poultry units have no other livestock. This proportion is as low as 5.7 per cent among the large units. Bovine and small ruminant activities are very common along with poultry activity. Bovine activity is taken up by 73.5 per cent of the holdings and small ruminant activity by 39.4 per cent of the poultry farmers. Pig rearing is also taken up by 8.8 per cent. A large proportion of medium and large poultry units also maintain pigs.

**Table 4.4: Distribution of Poultry Holdings by Types of Other Livestock Owned  
(Percentage to Total Households)**

Size of Holding	Bovines	Small Ruminants	Ducks	Pigs	None
Very Small	76.19	45.24	-	2.38	19.05
Small	67.31	34.62	-	5.77	17.31
Medium	68.29	29.27	7.32	14.63	21.96
Large	85.71	51.43	8.57	14.29	5.71
<b>Overall</b>	<b>73.53</b>	<b>39.41</b>	<b>3.53</b>	<b>8.82</b>	<b>16.47</b>

Though poultry does not require any land base, an examination of the data on land ownership helps to understand the economic status of the households maintaining poultry. A very high proportion of the landless and marginal farmers maintain poultry (Table 4.5).

**Table 4.5: Distribution of Poultry Holdings by Size of Operated Area**

Size of Holding	Landless	Marginal	Small	Medium	Large	Total
Very Small	21.43	59.52	4.76	11.90	2.38	100.0
Small	26.92	53.85	9.62	7.69	1.92	100.0
Medium	19.51	43.90	19.51	7.32	9.76	100.0
Large	11.43	57.14	11.43	14.29	5.71	100.0
<b>Overall</b>	<b>20.59</b>	<b>53.53</b>	<b>11.18</b>	<b>10.00</b>	<b>4.71</b>	<b>100.0</b>

#### 4.3. Production Performance

As mentioned above, backyard poultry is a low investment activity. The value of birds per household is only Rs. 362, of which two-third of the value is due to hen and one-third due to cock. The value of investment is only Rs. 156 in the units of very small size. The share of hen in this case is 55.1 per cent. In the case of large units investment per household in poultry is Rs. 718 and the share of hen in it is very high at 67.1 per cent (Table 4.6).

**Table 4.6: Average Value of Poultry per Household**

Size of Holding	Hen	Cock	Total
Very Small	86	70	156
Small	172	94	266
Medium	258	130	388
Large	482	237	718
<b>Overall</b>	<b>235</b>	<b>126</b>	<b>362</b>

The two indicators of production performance are number of times the hen lays and the number of eggs it gives in each laying. Most of the birds lay thrice a year (62.9 per cent). Some birds (10.2 per cent) lay even four times a year. Thus, we find that 73.1 per cent of the birds are highly productive. It appears that small holdings are the most efficient producers as 92 per cent of the birds in the very small category and 79 per cent in the small category lay eggs three or four times a year, whereas the corresponding proportions for medium and large holdings are 62 and 72 respectively. The average number of eggs per bird per annum is 38 and it is higher among smallholdings at 42.5 (Table 4.7). Kurup's estimate of 102 eggs per bird per year is too high and is not comparable to the present estimate (Kurup, 2003 p74).

**Table 4.7: Percentage of Hen by Number of Layings per Annum**

Size of Holding	Once	Twice	Thrice	Four times of Layings	Average No. per Year	Yield of Eggs
Very Small	0.00	8.33	89.58	2.08	2.9	40.2
Small	2.83	17.92	64.15	15.09	2.9	42.5
Medium	13.04	25.22	58.26	3.48	2.5	34.2
Large	1.42	26.95	56.74	14.89	2.9	37.3
<b>Overall</b>	<b>4.88</b>	<b>21.95</b>	<b>62.93</b>	<b>10.24</b>	<b>2.8</b>	<b>38.1</b>

Utilization of eggs is based on the season. Consumption is more in summer as they are



likely to get spoiled if kept for hatching. Producers consume or sell more than one-half of the eggs produced during summer. On the other hand, only 25 per cent of the eggs will be consumed or sold in other seasons. Thus, backyard poultry is intended for production of meat rather than eggs. The pattern of consumption of eggs among very smallholdings is different from that of other categories. They consume a very high proportion of eggs produced in summer and a very low proportion in other seasons.

The main interest of the farmers in backyard poultry is not production of eggs because returns are very low from sale of eggs. They hatch them and sell the birds. However, summer is not a good season for hatching as many eggs get spoiled while hatching. Hence, farmers consume or sell a significant proportion of eggs in summer and hatch most of them in other seasons. Each household, on an average, produces 91.9 eggs, one-third in summer and two-thirds in winter. In summer, 51.8 per cent of eggs are used for consumption as compared to 30.1 per cent in winter. Size of holding has positive association with the proportion of eggs used for hatching. Since production is very low in small units, they use most of the eggs for home consumption. Large units take a chance to hatch a higher proportion of eggs. In other seasons the variation across holding size is very low (Table 4.8).

**Table 4.8: Production and Utilization of Eggs Per Household per Annum**

Size	Summer					Other Season				
	Produced	*Utilization of Eggs(%)				Produced*	Utilization of Eggs (%)			
		Consumed	Spoiled	Hatched	Sold		Consumed	Spoiled	Hatched	Sold
Very Small	14.7	63.9	10.9	25.2	-	31.2	19.9	17.9	62.2	-
Small	27.7	54.9	11.6	30.3	3.3	58.8	33.5	13.9	47.3	5.3
Medium	29.9	45.8	14.1	35.1	5.0	65.9	24.7	13.8	55.1	6.4
Large	54.1	36.0	14.4	41.8	7.8	96.2	22.4	10.6	64.0	3.0
<b>All</b>	<b>30.5</b>	<b>46.9</b>	<b>13.1</b>	<b>35.1</b>	<b>4.9</b>	<b>61.4</b>	<b>25.9</b>	<b>13.4</b>	<b>56.6</b>	<b>4.2</b>

\* Production is per household

The above results indicate inverse relationship between size of poultry holding and the number of eggs produced per bird. To test this hypothesis, the following regression equation is estimated for the 169 households producing eggs:

$$\ln Y = 3.80 - 0.369 \ln X - 0.101 DF + 0.378 DST - 0.044 DSC + 0.145 DLIT \quad R^2 = 0.20$$

$$(5.70) \quad (1.37) \quad (0.37) \quad (0.35) \quad (1.75) \quad F = 7.98$$

Where Y = annual production of eggs per bird

X = size of the holding measured in birds

DF = Dummy for feed, DF=1 if concentrates are given and 0 other wise

DST = dummy for scheduled tribes, DST = 1 if the household belongs to scheduled tribes and 0 otherwise

DSC = dummy for Scheduled castes, DSC = 1 if the household belongs to Scheduled castes and 0 otherwise

DLIT = dummy for education, DLIT = 1 if the women managing the birds is literate and 0 otherwise

Both productivity and size are taken in logarithms.

The critical value of F for 5 and 168 degrees of freedom is 3.11 at 1 per cent level of significance. The calculated value of F is 7.98. Since the estimated value of F is more than the critical value, we reject the null hypothesis that all the regression coefficients are simultaneously zero. The coefficient of size is negative and statistically significant, indicating negative association between size of holding and productivity. The coefficient of feed dummy is negative indicating feeding concentrates is not necessary in backyard poultry. Though the coefficient is



not significant at 10 per cent level in two-tailed test, it is significant in one-tailed test. The coefficients of caste dummies are not statistically significant. However, the sign of the coefficient for scheduled tribes is positive and that of scheduled castes is negative indicating that the birds maintained by the former have higher productivity and the birds maintained by the latter category have lower productivity than those maintained by the other castes. The result shows that there is no evidence to show

that the scheduled tribes are inefficient in backyard poultry as compared to other castes. The coefficient of literacy dummy is positive and statistically significant at 5 per cent level in one-tailed test, which is appropriate in the present context because literacy is not expected to make a negative contribution. Thus, the analysis provides three significant conclusions. First, productivity of birds is inversely related to size of the unit. The elasticity of yield with respect to size of the unit is 0.37 indicating that, given education, caste and the type of feed, a one per cent increase in the size of the herd leads to 0.37 per cent decline in the productivity of the birds. Secondly, literacy has a positive impact on the productivity of birds. Thirdly, there is no evidence to show that the scheduled tribes are less efficient managers of poultry than other communities. Fourthly, backyard poultry is based on freely available feeds and there is no need of feeding the birds with grains and concentrates unless the freely available feeds become scarce.

The major problem in the poultry sector is the mortality due to various factors - a very high proportion of birds (22.5 per cent) died during the year. Each holding, on an average, lost 13.3 birds, of which 3.4 birds are the grown ups and 9.8 are chicks. The very small units suffered the highest mortality rate of 32.6 per cent and large units also suffered from high mortality rate. Thus, mortality is a serious problem in backyard poultry. Farmers report that Ranikhat disease is common in the area. Despite high productive efficiency of birds, this disease kills most of the birds, adversely affecting the productivity (Table 4.9).

**Table 4.9: Birds Died per Holding and Mortality Rate among Chicks**

Size of holding	Hen & Cock	Chick	Total	Mortality Rate
Very Small	2.9	7.3	10.2	32.6
Small	2.7	6.8	9.5	20.3
Medium	2.3	7.9	10.1	16.5
Large	6.5	19.8	26.3	24.4
<b>Overall</b>	<b>3.4</b>	<b>9.8</b>	<b>13.3</b>	<b>22.5</b>

Farmers are not accustomed for taking adequate medical care. Only 39.4 per cent of the households give vaccination to the birds and there is no variation across households. Expenditure is relatively higher for very small units as compared to the other units. There is no expenditure incurred on treatment (Table 4.10).

**Table 4.10: Expenditure on Health Care**

Size of Holding	Vaccination		Deworming		Treatment	
	Households Giving (%)	Expenditure Per Household	Households giving (%)	Expenditure per Household	Households giving (%)	Expenditure per household
Very Small	33.33	6.43	19.05	2.50	0.00	0.00
Small	48.08	11.64	25.00	2.54	0.00	0.00
Medium	39.02	13.44	21.95	4.00	0.00	0.00
Large	34.29	19.50	11.43	6.25	0.00	0.00
<b>Overall</b>	<b>39.41</b>	<b>12.39</b>	<b>20.00</b>	<b>3.35</b>	<b>0.00</b>	<b>0.00</b>

Though the birds get most of the feed from outside and kitchen waste, the farmers supplement the feed with rice bran and broken rice and other cereals. Feeding these concentrates is independent of the size of the unit. This supplementation is more common among the small units (93.9 percent) than the large (80 per cent) (Table 4.11).

**Table 4.11: Percentage of Households feeding various Items**

Size of Holding	Rice Bran	Broken Rice	Kitchen Waste	Coarse Cereals	None	Total
Very Small	50.00	35.71	4.76	7.14	2.39	100.0
Small	48.08	21.15	7.69	3.85	19.23	100.0
Medium	34.15	26.83	26.83	-	12.19	100.0
Large	42.85	31.43	20.00	5.71	0.0	100.0
<b>Overall</b>	<b>44.12</b>	<b>30.97</b>	<b>15.48</b>	<b>4.52</b>	<b>4.91</b>	<b>100.0</b>

There are no significant differences in the type of shelter provided to the birds. A high proportion of the holdings (82.3 percent) have sheds for the poultry. There is not much variation across the size of flock (Table 4.12). The differences are only due to the feasibility to keep the small number of birds in baskets.

**Table 4.12: Distribution of Holdings by type of Shed**

Size of Holding	Basket	Basket & Shed
Very Small	17.07	82.93
Small	27.27	72.73
Medium	11.11	88.89
Large	10.34	89.66
<b>Overall</b>	<b>17.73</b>	<b>82.27</b>

#### 4.4 Costs and Returns

Households with backyard poultry derive their income mainly from agriculture and casual labour. These two sources provide 53.6 per cent of the total household income. Income derived from the bovine sector is negligible (6.3 per cent). The contribution of poultry sector is 16.1 per cent. This high contribution is because of the large holdings, which derive 23.2 per cent of their household income. Holdings with one bird derive only 5.0 per cent of their income from poultry sector.

Per capita annual income is only Rs. 3752, which is substantially lower than poverty line, indicating that most of the farmers engaged in back yard poultry are poor. The average incomes of the very small and small units are very low. In the medium size, the average income is highest and a large proportion of the poultry units in this group are expected to be non-poor. Next in order is the category of large units. Their per capita income is Rs. 4123 per annum. Thus, medium and large units are slightly better than the very small and small units in terms of per capita income (Table 4.13)

**Table 4.13: Percentage Shares of Income from Different Sources**

Size of Holding	Agriculture	Wage	Bovine	Other	Poultry	Total	Per capita income
Very small	26.10	47.68	10.96	8.84	4.98	100.0	3168
Small	20.37	33.30	6.26	24.92	13.77	100.0	3404
Medium	30.66	20.53	3.57	26.63	17.64	100.0	4422
Large	29.08	12.63	6.15	28.93	23.20	100.0	4123
<b>Overall</b>	<b>26.97</b>	<b>26.59</b>	<b>6.31</b>	<b>24.08</b>	<b>16.05</b>	<b>100.0</b>	<b>3752</b>

Poverty is very high among poultry owners. If we take Rs. 2500 per annum (Rs. 208 per month) as poverty line for identifying the chronically poor, the incidence comes to 36.5 per cent. If Rs. 5000 per capita per annum is taken as poverty line, the incidence of poverty among poultry holdings is 75 per cent. However, some of the farmers (11.7 per cent) can be considered as rich because their income exceeds 1.5 times the poverty line (Table 4.14).

**Table 4.14: Distribution of households according to per capita income**

Annual Income	No. of Households	% to Total
Less than 2500	62	36.5
2500 - 5000	66	38.8
5000 - 7500	22	12.9
7500 - 10000	7	4.1
10000 - 15000	8	4.7
15000 & above	5	2.9
<b>Total</b>	<b>170</b>	<b>100.0</b>

Incidence of poverty is estimated for the four categories of farmers considering Rs. 5000 per capita per annum as the poverty line. It is found that more than 80 per cent of the farmers in the very small and small categories are poor. Even the other two categories suffer from high incidence of more than 60 per cent (Table 4.15). We can consider the households getting more than Rs. 7,500 as rich. Under this norm, 11.7 per cent are rich and most of them are from medium and large holdings.

**Table 4.15: Percentage of Poor, Middle Income and Rich**

Size of Holding	Less than 5000	5000-7500	More than 7500	Total
Very Small	83.33	14.29	2.38	100.00
Small	80.78	9.61	9.61	100.00
Medium	70.73	11.90	16.67	100.00
Large	62.86	17.14	20.00	100.00
<b>Overall</b>	<b>75.29</b>	<b>12.94</b>	<b>11.70</b>	<b>100.00</b>

Backyard poultry provides about Rs. 2200 per annum per household. The variation across households is very large. If the mortality is arrested, income per household increases by 18.1 per cent. The gain will be more for very small units in relative terms. In absolute terms, the gain is, more or less, the same for all the categories of households.

Cost of production has only two components namely, feed and medical expenses. As the farmers are not spending much on health care, feed cost accounts for 96.2 per cent of the total cost. There is not much variation in the proportion of expenditure on these two items across farm size.

Backyard poultry gives very high return, as the investment requirement is quite low. The return on investment is calculated as the ratio of income to the cost of hen, cock and shed. Cost of shed is not included in this case because clear estimate is not feasible. Return on investment is found to be 331.7 per cent in backyard poultry. This high return is understandable because it is a low investment activity. The major constraint in backyard poultry is not investment, but it is in getting medical services. The return on investment is low for very small units at 180.7 per cent. This is partly because these units have no cock, which gives high return when reared for cock fights.

**Table 16: Costs and Returns Per Household**

Size	Cost of Production			Income and Rate of Return			
	Medical	Feed	Total Cost	Potential	Actual	Possible Increase	Return on Investment (%)
Very Small	2.62 (1.6)	99.10 (98.4)	101.72 (100.0)	1059	665	59.2	180.7
Small	6.23 (4.5)	131.65 (95.5)	137.88 (100.0)	2851	2395	19.0	351.9
Medium	6.12 (4.6)	126.46 (95.4)	132.58 (100.0)	4602	4173	10.3	304.1
Large	7.40 (3.4)	212.80 (96.6)	220.20 (100.0)	7408	6258	18.4	387.9
Overall	5.55 (3.8)	139.06 (96.2)	144.61 (100.0)	3768	2199	18.1	331.7

#### 4.5 Summary

The backyard poultry is associated with a high rate of return because it involves little financial commitment by way of investment. However, the high growth performance of the poultry sector is confined mostly to the commercially run large scale sector. The growth has bypassed the traditional backyard poultry sector. Backyard poultry has now come to become the prerogative of the socially and economically weaker sections of the society. The backyard poultry focuses more on meat production rather than production of eggs. It is seen that most of the birds lay eggs thrice a year. The survey has also revealed that the smaller the number of birds kept, the larger would be the number of eggs produced per bird in a year. The regression analysis clearly showed that the smaller the size, the greater is the productive efficiency, literacy has a positive contribution to productivity, scheduled tribes are not inferior to other castes consisting of backward and forward castes in productive efficiency and given the availability of feed by way of kitchen waste and outside feed, there is no need of feed the birds with concentrates. The one major problem that plagues backyard poultry is the high mortality rate among the birds. This is the direct result of the utter disregard to the vaccination of the birds. There are economies of scale involved in providing health care to poultry. Which explains & why mortality rate in backyard poultry is high. This also explains why the backyard traditional poultry sector is not gaining in significance, despite high rate of return. The merit of backyard poultry lies in its ability to contribute a substantial proportion of income of those who are otherwise poor. For the nutritiously starved poor, backyard poultry brings in little pleasures of life within their easy reach - it enables them to indulge in the consumption of the much cherished food. How much the poor look for these small pleasures in life can be gauged from what Verrier Elwin brought to our notice once: A tribal, who longed all his life to eat gorgeous meat served to the rich, and who was about to be hanged, wants, as his last wish, that such meat be served to his son for once.





**Chapter V**  
**Economics of Pig Production**





# Chapter V

## Economics of Pig Production

### 5.1 Introduction

Pig production is an important activity in economically backward areas. It excels other farm livestock by its efficient feed conversion and prolificacy in reproduction. Farmers in agriculturally developed countries consider pig as 'mortgage lifters'. In future meat production from sheep and goat is not likely to meet the demand of the increasing population because ruminants comparatively with a low prolificacy and prolonged generation interval take a longer period to increase their numbers and productivity than pig. It is obvious that pigs and poultry have to supply a sizeable portion of meat. The quantity of meat available per unit live weight of pig is more than that with other kinds of livestock. Pork contains more energy than other meats. Pigs utilize garbage, garden waste and discarded feeds very efficiently. They are the most efficient converters of feed into edible meat. Out of 590 million pigs in the world, about 34 per cent are reared in tropical countries. India accounts for only one per cent of the world pig population. Pig rearing in our country continues to be primitive because they are reared only by certain rural people who are educationally, economically and socially most backward. They are too poor to provide nutrients to pigs and let loose them to seek their own food, which eventually becomes scavenger. As a result of such continued neglect and poor management, indigenous pigs could not establish themselves as economically sound and viable component in animal production.



However, the situation in Orissa is different from that of all India. Pig production is the livelihood for 2.23 lakh households in the state (Kurup, 2003 p69). The activity NSS data shows that all landholding groups, except large farmers, take up this activity. But it is more concentrated among the medium farmers, who own 43.1 per cent of the total pigs in Orissa (NSSO, 1997). This high participation indicates that the activity is not confined to socially weaker sections. The importance of pig production in Orissa is also known by the fact that, among all the categories of livestock, the population of pigs increased at the highest rate in the late nineties. While total livestock declined at 3.67 per cent, pigs increased by 13.21 per cent during the late nineties. Pig has great resilience for natural calamities like cyclone. The devastating cyclone of October 1999 in Orissa reduced the population of bovine, sheep and duck. But pig, goat and poultry have shown remarkable resilience (Kurup, 2003). This chapter focuses on the management practices in pig rearing, costs and returns and the constraints faced by the farmers. The study is based on a sample of 40 households maintaining pigs.



### 5.2 Socio-economic Characteristics

All communities participate in pig production, despite the fact that it has a low social status. This is an indication that it is profitable and suitable to the poor. Though the activity is taken up by all castes, scheduled castes and scheduled tribes form a higher proportion than others. It is significant to note that 22.5

per cent of the sample households belong to other castes (Table 5.1). The view of Kurup that it is the livelihood for only scheduled castes and scheduled tribes does not appear to be valid (Kurup, 2003 p 69).

**Table 5.1: Distribution of Sample Households by Social Group**

Social Group	No. of Households	Percentage to total households
Scheduled Castes	13	32.5
Scheduled Tribes	18	45.0
Backward Castes	2	5.0
Others	7	17.5
<b>Total</b>	<b>40</b>	<b>100.0</b>

It is found that in the Bangladesh D.P. villages in Malkangiri district, a high proportion of households are rearing pigs. Thus, the activity is taken up both by the weaker sections as well as others. This dual pattern is also revealed in the educational status of the owners. While one-half of the pig owners are illiterates, there are 22.5 per cent of the owners with above primary level of education. This is an indication of the economic viability of the activity. (Table 5.2).

**Table 5.2: Levels of Education of Owners**

Level of Education	% of Households
Illiterate	50.0
Below Primary	20.0
Primary	7.5
Above Primary	22.5
<b>Overall</b>	<b>100.00</b>

Pig rearing is not taken up as a separate activity. It is combined with other livestock production, especially bovine and poultry sectors. It is found that 72.5 per cent of the pig rearers own bovines, 62.5 per cent of them own poultry and 20 per cent of them own small ruminants (Table 5.3). Thus, the owners of pigs are not isolated from other livestock production.

**Table 5.3: Distribution of Holdings by Types of Other Livestock**

Livestock	Percentage of Households	Average per Household
Bovine	72.5	2.83
Poultry	62.5	3.72
Small Ruminants	20.0	5.00
None	20.0	--

A high proportion of the pig owners are landless and marginal (75 per cent) and no large farmers are associated with this activity (Table 5.4). In terms of the animals, one-half of the animals are with the landless and a quarter of them are with the marginal farmers.

**Table 5.4: Distribution of Pig Holdings by size of Operated Area**

Land Category	Percentage to total holdings	Percentage to total animals
Landless	40.0	50.53
Marginal	35.0	26.15
Small & Medium	25.0	23.32
<b>Overall</b>	<b>100.00</b>	<b>100.00</b>

### 5.3 Production Performance

Each household, on the average, maintains 7.1 animals of which 60 per cent are females and 40 per cent are males. Though they sell both males and females, they keep slightly more females to maintain the production levels. Among the adult animals, the ratio of females to males is 1.79:1 (Table 5.5).

**Table 5.5: Distribution of Total Animals by age and sex**

Type of Animal	Percentage to total animals	Average No. of Pigs Per Household
Adult Male	13.41	1.0
Adult Female	24.04	1.7
Young Male	26.86	1.9
Young Female	35.69	2.5
<b>Overall</b>	<b>100.0</b> <b>(283)</b>	<b>7.1</b>

Each household, on the average, has got 13 piglets born and out them 19.7 per cent of them died. Proficiency is very high among pigs. The average number of piglets born at a time per animal is 6.3 and there are animals with more than ten piglets at a time. The distribution of pigs by number of piglets born is shown in Table 5.6. It can be observed that the maximum number (25.5 percent) of pigs gave birth to 6 piglets. Next in importance are five and four piglets - 18.3 and 15.9 per cent respectively.

**Table 5.6: Distribution of Pigs by Piglets at a Time**

No. of Piglets	Percentage of Animals	Cumulative Percentage
3	3.7	3.7
4	15.9	19.6
5	18.3	37.9
6	25.5	53.4
7	6.1	69.5
8	8.5	78.0
9	7.3	85.3
10	9.8	95.1
11	3.7	98.8
12	1.2	100.0
<b>All</b>	<b>100.0</b>	<b>-</b>

### 5.4 Costs, Income and Return on Investment

Feed is the major expenditure in pig rearing. Stall-feeding is a common practice in pig rearing - 95 per cent of the households practice the system of feeding at home. They feed items relating to rice like rice bran, rice soup, broken rice and kitchen waste. Rice bran is the most commonly used feed in pig production - 67.5 per cent of the owners feed their animals with rice bran and another 17.5 per cent of the owners feed wheat bran.

All the households are not taking the animals out. Only 67.5 per cent of the households take their animals for grazing, in which is mostly females participate. The share of females in total labour is 59.2 per cent. Elderly people also contribute significantly in grazing the animals with a share of 22.2 per cent (Table 5.7).

**Table 5.7: Age and Sex of Persons Rearing**

Person rearing	Percentage
Men	29.7
Elderly Men	11.1
<b>Total Men</b>	<b>40.8</b>
Women	48.1
Elderly Women	11.1
<b>Total Women</b>	<b>59.2</b>
Overall	100.0
<b>Not rearing %</b>	<b>32.5</b>

Pig rearing provided 37.0 per cent of the household income and this is the major source of income for them. Labour income is the second important source for them. Per capita income of these households is Rs. 3738 per annum (Table 5.8). Kornel and Brunse (2002) has shown that on an average a family earns Rs. 5518/- per annum due to sale of pigs. The study was undertaken in 7 villages of Kundra block in Koraput district.

**Table 5.8: Income by Source**

Source	Percentage Share
Agriculture	17.80
Wage Income	34.57
Milk Income	0.70
Other Income	9.99
Poultry	1.58
Pig	36.95
<b>Total</b>	<b>100.0</b>
Per capita Income	3738

It is significant to note that 80 per cent of the households rearing pigs are poor. But a majority of them (55 per cent) are moderately poor and only 25 per cent are chronically poor. Some of these households, though a small proportion of total households (7.5 per cent), are rich in the sense that their per capita income is higher than the poverty line by 50 per cent. Hence, policies to support the sector should not keep these households in as representing the sector, as most of the households in pig production are poor (Table 5.9).

**Table 5.9: Distribution of households according to per capita income**

Annual Income	No. of Households	Percentage to total Households
<2500	10	25.0
2500 - 5000	22	55.0
5000 - 7500	5	12.5
7500 - 10000	3	7.5
<b>All</b>	<b>40</b>	<b>100.0</b>

The major expenditure in pig production is feed. The activity is managed by family labour. Medical expenses are also negligible. Income per household is Rs. 7942 per annum. If the mortality is completely arrested, income will rise by 18 per cent. Return on investment is 74.1 per cent. This low return, despite low cost of production is because of the high cost of the animal (Table 5.10).

**Table 5.10: Costs and Returns Per Household**

Cost of Production		Returns			Return on
Medical	Feed	Actual Income	Potential Income	Increase	Investment
4.03	1106	7942	9346	18.0	74.12

### 5.5 Summary

Pig is likely to become an important animal for supply of meat as it is more efficient than the ruminants in terms of prolificacy in reproduction and small generation interval. The activity has to come out of its primitive nature. Orissa has a special place in pig production. Only large farmers have low participation in pig production. However, scheduled tribes and scheduled castes have greater role in pig production. One-half of the animals are with the landless and a quarter of them are with marginal farmers. While weaker sections dominate the activity, there are some households with better educational and income levels participating in the activity. Thus, there is dualism in the activity. The activity is not isolated from other livestock activities and 80 per cent of the pig producers own other livestock. However, their participation is high in bovine and poultry and low in small ruminant production. Pig has high prolificacy of four to ten piglets at a time. But mortality is also high at 20 per cent. As in the case of poultry, women participation is very high in the activity. Participation the elderly people is also high. Women and elderly men account for 70 per cent of the total labour in the sector. These households derive major share of their income from wages and pig production. A very high proportion of the households in the activity are poor, but because of the income from this activity, most of them are marginally poor. While 80 per cent are poor, 55 per cent are marginally poor and only 25 per cent are chronically poor. Each household, on an average, derives an income of Rs. 7942 per annum and it will rise by 18 per cent if the mortality is arrested. The activity has a high return of 74.12 per cent.



The most important disease in village pigs is Swine fever which is a contagious viral disease. Losses are also due to heavy worm infestations as well as piglet anemia due to iron deficiency in Orissa. The Swine fever is controlled by vaccination and worms are treated with anthelmintics and piglet anemia with iron compounds. The future prospectus is bright.





## **Chapter VI**

### **Conclusions and Policy Recommendations**





## Chapter VI

### Conclusions and Policy Recommendations

#### 6.0 Introduction

This chapter provides major conclusions of the study and also provides policy suggestions. The chapter is divided into three sections. Section I focuses on major conclusions of the study. Section II provides a comparative picture of the three sub-sectors viz., small ruminants under individual family rearing system, backyard poultry and pig production. Section III is devoted to policy suggestions for improving the small animal production.

#### 6.1 Major Conclusions

##### 6.1.1 Less Developed among Major States

Orissa has some special features among the major states in India. The state has experienced a low growth rate of population, but it is only due to high birth and death rates that exist in the first state of demographic transition. Though the state has moderate level of literacy, its improvement during the 90s is not satisfactory. The state has high concentration of scheduled tribes. The state has known for its communal peace. Employment opportunities for women are quite low because of low agricultural growth. Labour is pushed out of agriculture because of its very poor performance in the 1990s. The state has the highest incidence of poverty, which remained constant in the nineties. Among the three regions in the state, the KBK region has the highest incidence of poverty at 72.4 percent as against 32.7 percent in the coastal region and 52.6 percent in the northern region. The agricultural sector witnessed serious crisis in the 90s because of the sharp decline in the irrigated area and consequent decline in crop yields. The manufacturing sector also showed a poor performance and it is due to the poor performance of registered manufacturing. The poor performance of agriculture, despite high rainfall, is partly due to poor quality of the soil. In such a situation, livestock sector especially small ruminants, pig and poultry production is a viable option for improving the rural incomes and reducing poverty.

##### 6.1.2 Poor Performance of Livestock Sector in Nineties

Livestock sector has been a traditionally important sector in the state. It has a livestock population of 23.3 million of which two-third are bovines and one-third are small ruminants. Though bovine sector is dominant in terms of number of animals, it is very poor in milk production because draught animal is the major focus in the bovine sector. Among small ruminants, goat is more important than sheep with four out of every five animals being goats.

The population of small ruminants grew at a high rate of 3.57 percent and pigs at the highest rate of 4.5 percent per annum till 1982. In the next two decades the growth rates of both small ruminants and pigs decelerated. In the 1990s the growth rate of the former fell to 0.18 percent and that of the latter to 0.26 percent per annum. The poultry sector showed a better performance and the deceleration started only in the 1990s. The growth rate was high at 4.2 percent in the 1980s and it came down to 0.75 percent in the 1990s. Thus, the ranking of the three sectors in the order of performance in the nineties is poultry, pig and small ruminants.

The data on estimates of meat and egg appear to be defective as they are at variance with the growth in animal population. There is a need to strengthen the statistical system pertaining to the estimation of livestock products.

### **6.1.3 Low Consumption of Livestock Products**

Per capita consumption of meat and eggs is significantly lower in rural Orissa as compared to rural India. Consumption of eggs is very low in rural areas because of the nature of backyard poultry, which focuses more on chicken production rather than production of eggs. Per capita consumption of mutton as well as chicken is lower because of low per capita income.

### **6.1.4 High Regional Disparities in Livestock Sector**

Inter-regional variations are very high in the density of small ruminants as well as pigs. When the density is calculated per 100 persons of human population the coastal region has the lowest density. But when the density is calculated per 100 hectares of geographical area, the coastal region has the highest density and KBK the lowest.

Among the factors influencing the number of small ruminants per 100 persons, the proportion of forest area and the proportion of scheduled tribes have positive influence and rate of urbanization and literacy have negative influence. From this we can conclude that the activity is important in the backward areas and socially backward communities.

### **6.1.5 High Regional Disparities in Veterinary Services**

The state has 3479 veterinary institutions of which 540 are veterinary hospitals and 2939 are livestock aid centers. Each institution is serving an area of 50 Km and 12,500 animals. The coastal region has more veterinary facilities than the other two. Each veterinarian serves an area 33.3 Km and population of 1100 animals in this region as compared to 50 Km and 1400 animals in the northern region and 100 Km and 1700 animals in the KBK. The high development of veterinary services in the coastal region is because of its advancement in the dairy sector. Thus, the veterinary services have a bias towards the dairy sector.

### **6.1.6 Increasing Participation in Small Ruminant Production**

Small ruminant production is no more a traditional activity confined to a few communities. All the communities participate in the activity and about 45 per cent of the people in the activity are new entrants. A significant proportion of them have education beyond primary level. The activity is taken up along with other livestock activity. Only 13.2 per cent of the small ruminant holdings have no other animals. However, most of the producers are marginal and small farmers.

### **6.1.7 High Mortality in Small Ruminant Production**

Mortality rate is found to be 31.62 per cent among sheep and 38.62 per cent among goats. In addition to the direct loss due to death, the farmer incurs loss while selling the other animals. The high mortality is due to low adoption of vaccination and de-worming. Only 48.0 per cent of the farmers vaccinate and 22.7 per cent give de-worming medicine. Farmers appear to be less serious about vaccination because they observe that some of the animals die even after vaccination. Many farmers made this complaint. The ineffectiveness of vaccination is partly due to vaccinating the animals after they are actually infected. This misconception has to be removed through extension and they should be made aware that each vaccine is meant for certain diseases and vaccination will not be effective if the animal is already infected. The practice of vaccination is more common among large holdings than the small and the practice of de-worming is more common among the small than the large.

### **6.1.8 High Contribution of Small Ruminant Sector to Household Income**

Small ruminant households derive 37 per cent of the household income from the livestock sector. Small ruminant production alone provides one-fifth of the household income. Only in the case of small herds income from small ruminants is very low at 9 per cent. Small holders derive a large proportion of income from wage labour.

Potential income per household, based on no mortality, turned out to be Rs. 4,600 and actual income Rs. 3,800. The increase in income comes to 20 per cent. But the gain is 45.7 per cent for the small holdings.

#### **6.1.9 High Rate of Return from Small Ruminant Sector**

Small ruminant production gives 43 per cent rate of return. There is significant variation in the return on investment across the size of holding. The medium size holdings got the highest rate of return.

#### **6.1.10 Regional Differences in Performance of Small Ruminant Sector**

The average investment size of the flock is highest at 10.1 in the KBK and lowest at 6.1 in the coastal region. The KBK region has the highest proportion of sheep holdings and the Northern region has the highest proportion of goat holdings. The coastal region occupies the middle position. The three regions also differ in the prolificacy. The Northern region has the highest proportion of animals giving birth to twins and triplets and KBK has the lowest. The coastal region suffers from the highest mortality rate with a death rate of 56.4 percent and the KBK region has the lowest death rate of 26.2 percent. Incidence of poverty is very high in the northern region (96.5 percent) as compared to other two regions (about 85 percent). Though the incidence is high in coastal region a large proportion of the poor are only marginally poor.

#### **6.1.11 Distinct Features of Flock System**

Flock system is a collective farming system, which is adopted only the Golla community. A majority of the flock owners (52 per cent) are literates and about one-fifth of them have above primary level of education. All the flock owners have less than five acres of land.

The animals maintained in the flock system are of Ganjam variety, which is different from Black Bengal commonly maintained in individual family system. The Ganjam variety, goats are tall. The variety suits the flock system as the animals are maintained in the forest. These animals give birth to single kid.

Flock system is generally managed by the family labour, which accounts 85.2 per cent of the total labour. Use of elderly persons is quite rare in the flock system because the animals have to be taken to far off places for grazing and they have to stay in the forest. Women participation is also quite low in the flock system.

#### **6.1.12 High Mortality in Flock System**

On an average, each household lost 39.3 animals during the year and the loss in monetary terms is Rs. 16,297 during the last year, of which 76.4 per cent is due to death of sheep and 23.6 per cent due to death of goats. A high proportion of the farmers give vaccination and deworming is adopted by (77.8 per cent and 70.0 per cent respectively).

#### **6.1.13 High Contribution to Income but Moderate Return on Investment**

Income from small ruminant production accounts about 60 percent of the household income. They also derive another 9.5 percent of income from bovine and poultry activities. Thus livestock contributes 70 percent of the income. Taking Rs.5,000/- per annum as the poverty line, incidence of poverty is estimated at 37 percent. When large flocks are maintained, we expect that the activity can provide adequate income to cross the poverty line. Even under the norm of 50 percent of the poverty line, 11.1 percent are below the line and these are chronically poor.

Each household on an average derives an income of Rs.17, 135/- per annum. In the absence of mortality the income will be higher by 38.7 percent. The return on their investment comes to 28.7 per cent. The high income in the system is because of low cost of production. Farmers are not spending much on treatment as they adopt traditional methods of treatment.

#### **6.1.14 Backyard Poultry as Integral Part of Livestock Production**

Though poultry sector is one of the fastest growing segments of the rural economy, its growth in recent times has very poor link with poverty reduction. This is because backyard poultry has been by-passed by the poultry revolution, with virtually all the growth occurring in the large scale, 'confined and intensive' (or industrial sector).

Backyard poultry sector has the advantage that it can be taken up with other livestock activities. The main reason for this is its low requirement of land and capital. Most of the households maintaining backyard poultry (84.5 per cent) also have other livestock.

#### **6.1.15 High Proportion of Landless and Marginal Farmers**

Landless and marginal farmers form about 75 per cent of the holdings. Most of the birds lay thrice a year (62.9 per cent) and some (10.2 per cent) lay even four times. It appears that small holdings are the most efficient producers as 92 per cent of the birds in the very small category and 79 per cent in the small category lay eggs three or four times a year, where as the corresponding proportions for medium and large holdings are 62 and 72 respectively. The average number of eggs per bird per annum is 38 and it is higher among smallholdings at 42.5.

#### **6.1.16 Low Consumption of Eggs due to Preference for Chicken Production**

As returns are low from sale of eggs, they hatch them and sell the birds. Because of high spoilage of eggs in summer, farmers consume or sell a significant proportion of eggs in summer and hatch most of them in other seasons. Size of holding has positive association with the proportion of eggs used for hatching. Since production is very low in small units, they use most of the eggs for home consumption. Large units take a chance to hatch a higher proportion of eggs.

#### **6.1.17 Negative Size Elasticity of Productivity**

Productivity of birds is inversely related to size of the unit. The elasticity of yield with respect to size of the unit is 0.37 indicating that, given education, caste and the type of feed, a one per cent increase in the size of the herd leads to 0.37 per cent decline in the productivity of the birds.

#### **6.1.18 High Productivity with Freely Available Feeds**

Backyard poultry can be managed with freely available feeds and there is no need of feeding the birds with grains and concentrates unless the freely available feeds become scarce. This is going to happen once households increase their poultry number through reduction of mortality and increase in hen units.

#### **6.1.19 Scheduled Castes as Good Managers**

Scheduled tribes are no less efficient managers of backyard poultry than forward and backward castes. However, we have no evidence to show that scheduled castes are also equally efficient. Literacy has a positive impact on the productivity of birds.

#### **6.1.20 High Mortality in Backyard Poultry**

The major problem in the poultry sector is high mortality due to various factors. A high proportion of birds (22.5 per cent) died during the year. Each holding, on an average, lost 13.3 birds, of which 3.4 birds are the grown ups and 9.8 are chicks. The very small units suffered the highest mortality rate of 32.6 per cent. Ranikhat disease is common in the area. The high productive efficiency of birds is counter-balanced by the high mortality and income realized turns out to be low.

#### **6.1.21 Poor adoption of vaccination**

Vaccination is not popular in backyard poultry. Only 39.4 per cent of the households give vaccination to the birds and there is no variation across households.

#### **6.1.22 Feed Supplementation with Bran and grains**

Though the birds get most of the feed from outside and kitchen waste, the farmers supplement the feed with rice bran and broken rice and other cereals. Feeding these concentrates is independent of the size of the unit. This supplementation is more common among the small units (93.9 percent) than the large (80 per cent).

#### **6.1.23 High Poverty in Backyard Poultry**

More than 80 per cent of the farmers in the very small and small categories are poor. Even the other two categories suffer from high incidence of more than 63 per cent. However, 4.8 per cent of the poultry farmers are rich.

#### **6.1.24 Income from Backyard Poultry**

Cost of production has only two components namely, feed and medical expenses. As the farmers are not spending much on health care, feed cost accounts for 96.2 per cent of the total cost. Income per household is about Rs. 2200 per annum. If the mortality is arrested, income per household increases by 18.1 per cent. The gain will be more for very small units in relative terms. However, the gain is more or less the same for all the categories of households in absolute terms.

#### **6.1.25 Return on Investment**

Return on investment is found to be 331.7 per cent in backyard poultry. This high return is understandable because it is a low investment activity. Further, the return from cock reared for fight is also very high. The return on investment is low for very small units at 180.7 per cent. This is partly because these units have no cock, which gives high return when reared for cock fights.

#### **6.1.26 High Potential for Pig Production if comes out of primitive Nature**

Pig is likely to become an important animal for supply of meat, as it is more efficient than the ruminants in terms of prolificacy in reproduction and small generation interval. The activity has to come out of its primitive nature.

#### **6.1.27 Special Place for Pig Production in Orissa**

While weaker sections dominate the activity, some households with better educational and income levels are also participating. Only large farmers have low participation in pig production. However, scheduled tribes and scheduled castes have higher participation role in pig production. One- half of the animals are with the landless and a quarter of them are with marginal farmers. There is dualism in the activity.

#### **6.1.28 Integral Part of Other Components of Livestock**

A large proportion of pig owners (80 per cent) maintain other livestock. Their participation is high in bovine and poultry, but low in small ruminant production.

#### **6.1.29 High Prolificacy, High Mortality and High Female Participation**

Pig has high prolificacy of four to ten Piglets at a time. But mortality is also high at 20 per cent. As in the case of poultry, women participation is very high in the activity. Participation the old is also high. Women and Elderly men account for 70 per cent of the total labour in the sector.

### 6.1.30 Major Source of Household Income

Major part of the household income comes from wages and pig production. Each household, on an average, derives an income of Rs. 7942 per annum and it will rise by 18 per cent if the mortality is arrested. The activity has a high return of 74.12 per cent.

### 6.1.31 High Poverty, but Low Chronic Poverty

Though poverty is high, they are marginally poor because of the high income derived from this activity. While 80 per cent of the households in pig production are poor, 55 per cent are marginally poor and only 25 per cent are chronically poor.

## 6.2 Comparative Performance of Small Ruminant, Poultry and Pig Sectors

The three sectors have certain similarities and differences. This comparative analysis focuses on differences in the incidence of poverty, sources of household income, level of education, size of land holding and costs and returns. A common feature of the people participating in these sectors is high incidence of poverty at more than 75 per cent. Among the three sectors the households in the backyard poultry are in a slightly better position with the incidence of poverty at 75.3 per cent. On the other hand, the households in small ruminants production suffer from the highest incidence of 88.8 per cent. It is significant to note that incidence of poverty is lower in pig production than in small ruminant production. This is partly due to the high incomes derived in pig production (Table 6.1).

**Table 6.1: Incidence of Poverty of Sample Households in Various Activities**

(Percentages)

Income Status	SR* Individual	Poultry	Pig-rearing
Very Poor	61.9	36.5	25.0
Marginally Poor	26.9	38.8	55.0
Total Poor	88.8	75.3	80.0
Non- Poor	8.1	12.9	12.5
Rich	3.1	11.7	7.5
<b>All</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\* SR stands for small ruminants

Income derived from the livestock sector is very high in small ruminant and pig production. The total livestock income for these households is close to 40 per cent. But the two categories differ in terms of the share of income from the main livestock activity. In pig production almost all the livestock income comes from the main activity whereas in small ruminant production nearly one half of the livestock income comes from other livestock. Thus, pig production appears to be an activity with high potential for meat production and income generation for the poor. In the case of backyard poultry production livestock income relatively lower at 22.4 per cent. This is partly because these households are deriving substantial income from other activities like business, salaried employment besides agriculture and casual labour (Table 6.2).



**Table 6.2: Contribution of Different Sectors to Household Income**

Source	SR* Individual	Poultry	Pig-rearing
Agriculture	23.1	26.9	17.8
Wage	22.4	26.6	34.6
Main Livestock	19.5	16.1	36.9
Other Livestock	17.3	6.3	2.3
<b>Total Livestock</b>	<b>36.8</b>	<b>22.4</b>	<b>39.2</b>
Others	17.7	24.1	10.0
<b>All</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\* SR stands for small ruminants

The educational level of people involved in these activities are not very low especially in small ruminants and pig rearing. Literacy rate is 50 per cent and more than 30 per cent have primary and above level of education. Only in backyard poultry literacy rate is very low (31.2 per cent). This is partly because backyard poultry is completely managed by women whose educational levels are lower than those of male (Table 6.3).

**Table 6.3: Distribution of Households by Level of Education**

Level of Education	SR* Individual	Poultry	Pig-rearing
Illiterate	40.1	68.8	50.0
Below Primary	20.8	16.5	20.0
Primary and above	39.1	14.7	30.0
<b>All</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\* SR stands for small ruminants

Among these three activities, landlessness is highest in pig rearing and lowest in small ruminant production. While 40 per cent of the households in pig production are landless the corresponding proportion for small ruminants is only 12.7 per cent. But when we consider the proportion of economically weaker sections in these activities, there is not much variation across the three activities. The proportion ranges between 85.3 per cent and 90.0 per cent. Thus, these three activities are mainly taken up by the economically weaker sections (Table 6.4).

**Table 6.4: Distribution of Households by Size of Operated Area**

Level of Education	SR* Individual	Poultry	Pig-rearing
Landless	12.7	20.6	40.0
Marginal	62.4	53.5	35.0
Small	13.7	11.2	15.0
Weaker sections	88.8	85.3	90.0
Medium	9.1	10.0	10.0
Large	2.0	4.7	0.0
<b>All</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\* SR stands for small ruminants

Feed is the main item of expenditure in all these three activities. However, the share of feed varies from 52.1 per cent in small ruminant production to 99.6 per cent in pig production. Only small ruminant production has hired labour, medical and shed repair expenses, which together account for 48 per cent. Poultry and pig production have no substantial expenditure on medical and hired labour. It is significant to note that pig production provides a very high level of income per household as compared to the other two sectors. The annual income from this sector is Rs. 7,942 where as income from small ruminants is Rs. 3,827 and income from poultry is Rs. 2,199. The main reason for such high income is partly due to the efficiency of pigs in reproduction and a relatively a large size of holdings. However, mortality rate is higher among pigs as compared to small ruminants and poultry. If the mortality is arrested the incomes will increase by about 20 per cent in all these three sectors. As a result of this improvement, a significant proportion of the marginally poor households will cross the poverty line. Though, actual income is lowest in the poultry sector it has the highest return on investment because of the low feed cost and absence of other costs. Between small ruminants and pig production the latter has a significantly higher rate of return on investment (Table 6.5).

**Table 6.5: Costs and Returns Per Household**

Activity	% Share in Cost of Production				Income and Returns (Rs.)				
	Hired Labour	Medical	Feed	Repairs	Potential Income	Actual Income	Increase (%)	Mortality Rate	Return
S.R* Individual	6.9	21.6	52.1	19.4	4591	3827	20.0	25.5	43.0
Poultry	-	4.1	95.9	-	3768	2199	18.1	22.5	331.7
Pig	-	0.4	99.6	-	9346	7942	18.0	38.5	74.12

\* SR stands for small ruminants

### 6.3 Policy Suggestions

The study on small animal production focus on four components viz., small ruminants under individual family rearing system, small ruminants under flock system, backyard poultry and piggyery. A common problem to all the four systems is the high rate of mortality. This is partly due to the negligence of farmers in vaccinating their animals and giving de-worming medicines. They have a feeling that the vaccines are not effective. They vaccinate after the animal is infected and feel that the vaccine is not effective. Extension agencies have to educate the farmers about the need for vaccinating the animals at the right time. All the small ruminants should be vaccinated for PPR(Peste-des-Petits). Since the vaccine is effective for three years, all males have to be covered once and females twice.

The supplies of the vaccines are not regular in some of the areas. In the areas where the supply of vaccine is timely and adequate, the mortality rate is found to be significantly lower. The administration has to monitor the supply of vaccine and its utilization at the field level regularly.

Because of the availability of land, farmers are able to rear under extensive system. As land is becoming scarce and other developments are also taking place, fodder becomes a problem. Development of fodder trees on waste lands should be taken up under watershed programme.

The breeds maintained by the farmers are selected on the basis of their suitability for their socio-economic environment. Farmers may be encouraged to maintain good breeding animals of the same breed. This will also improve the productivity of the animals.

In some of the Coastal villages, farmers maintain male animals for breeding and charge for the breeding service. This will create awareness among the farmers to improve the breeds. This activity may be encouraged. This will be useful to improve the quality of the animals in individual rearing system.

Flock system is prevalent in certain areas. It is a cooperative system and encourages collective action. Households under the system derive most of the income from small ruminants. Besides health care, breeding and feeding are major interventions needed for improving the system. What is required is the improvement of the existing breed for meat and milk. For improving the existing breed some animals may be selected on the basis of certain features and the owners may be supported for taking proper care for getting good progeny. These male animals have to be supplied to the flock owners.

Flock system requires vast extent of land at one place. Some of the flocks are maintained in the forest areas. Any development of the forest with tree cover has to keep in mind the usefulness of the trees for feeding the small ruminants. The needs of the shepherds have to be kept in mind while planning development of the land.

Breed improvement has to go hand in hand with feed improvement. When breed improvement is taking place, milk requirement for the kid/lamb will also increase. For this, better feeding of the animals is also needed. The farmers should give concentrate feeds and vitamin supplements. Making them aware of these items is very important. However, it will get popularity only when it is economically viable. When grazing lands are available, it is neither acceptable nor economically rational to suggest feeding concentrates. Efforts should be made to improve the quality of grazing by planned grazing.

There are some inhibitions about castration in some areas. One of the reasons for not castrating the animal is the need to offer the animal to the goddess. Religious sentiments won't permit to offer castrated animals. This thinking has to be changed slowly. Service personnel should identify the areas where the castration is not done on the religious grounds and change the attitudes slowly.

The problem of risk is very high in small ruminant production. It is higher than in bovine production. The risk of mortality of the animal is very high. Insurance is the most effective tool for relieving the farmers from this risk. Insurance has to be designed by taking into account the peculiarities of the small ruminant production. Incentives like no claim bonus have to be designed to make it effective. Since most of the households maintain small ruminants, a decentralized system will be more effective than centralized system.

Flock system exists only in areas where public lands or forest are available and only one community, known as Golla community adopt this system, whereas people of all castes rear small ruminants under individual rearing system. When wasteland development is taking place, the needs of this community have to be taken into account. It is possible to protect their interests and develop the lands in the best possible way. This flock system is good as it involves collective action.

The development of the small ruminant sector requires establishment of village cooperatives to assist the small producers in feed and fodder development, animal health care and processing and marketing of meat products. The village cooperatives will be linked to a district union, which takes care of setting up of market yards, slaughter houses, ancillary industry pertaining to meat packaging and processing and utilization of slaughter by products, maintain breeding ram/buck centers and supply breeding rams/bucks to the societies during breeding season and maintain veterinary aid centers.

An alternative to such wide network of cooperatives is to organize the sheep farms into cooperative for developing the organized nucleus flocks for breeding ram/bucks. The best ewes and rams in the cooperative will be pooled and the rams/bucks produced in the nucleus will be made available to the cooperative flocks.

Another alternative with less outside involvement is to identify better producing flocks, register those flocks which would like to participate in breeding of ram/bucks and provide them with subsidy for rearing young ram lambs and male kids selected from such flocks. Some performance recording on such flocks will be made and such records will be utilized in selecting superior rams/bucks to be used in these flocks as well as for distribution to other flocks. Such flock owners may be persuaded to follow suitable breeding programmes for improving their flocks as well as for producing superior breeding rams/bucks.

The best way to increase meat production in tropical and sub-tropical region is to improve fertility and breeding performance and growth rate. The aim should be to achieve three to four lambings kiddings in two years.

Grassland management and fodder production are important in tropics and sub-tropics. The major constraint with extensive grassland development is to even out food supplies. The best method of making use of the vegetation is to invest capital in fences. The animals move in rotation from one paddock to another so the vegetation can grow undisturbed in the rest of the periods. Proper management of the grasslands will increase the carrying capacity of the animals.

Carrying capacity is the area required to feed a sheep. It varies from 1.4 hectares to 4 hectares. The present carrying capacity has to be estimated and efforts should be made to improve the carrying capacity by systematic development of land.

Backyard poultry needs support in terms of reducing mortality and improving the breed. There is no need of any intervention in terms of feeding. To improve the breed, cocks of good quality improved indigenous same breeds have to be introduced in the village. Health care is very important in backyard poultry. Services should be accessible because it is uneconomical to travel long distances with the bird. At the same time, the epidemics have eternity problem. If a bird is infected, all others will be affected.

Backyard poultry focuses on meat production rather than egg production. Egg production will not take place unless the size of the holding increases and marketing facilities are created.

Pig production gives high income to the household. If the demand for pork increases, the activity has high potential for rural livelihoods. There is a need to convert the production system from primitive to modern and get out of the system of scavenging. Reducing mortality is an important way of improving the incomes from pig production.

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## Appendix I

**Table A2.1: District-wise Density of Small Ruminants, Pigs and Poultry  
(Per Lakh Population)**

<b>District</b>	<b>Small Ruminants</b>	<b>Pigs</b>	<b>Poultry</b>
Gajapati	25612	3284	69369
Ganjam	11526	429	45853
Puri	12988	137	18669
Khurda	7661	288	67761
Nayagarh	14586	13	16185
Jagatsinghpur	13969	500	28192
Cuttack	15511	164	22186
Kendrapara	11355	709	28872
Jajpur	19183	317	34056
Bhadrak	13847	359	33527
Balasore	18704	925	54685
Coastal	14175	484	38635
Mayurbhanj	34412	3665	103152
Sundargarh	27664	6436	74735
Keonjhar	35042	1454	75085
Jharsuguda	10593	794	32352
Baragarh	17455	614	33328
Sambalpur	20652	1859	36678
Deogarh	30356	1534	64285
Dhenkanal	13338	109	36015
Angul	25916	301	29447
Boudh	46994	307	41083
Phulabani	30705	6459	81876
Northern	26839	2548	42635
Malkangiri	38277	10258	135071
Koraput	26060	4265	64910
Rayagada	24824	4690	60144
Nawarangpur	17656	5734	72978
Kalahandi	24169	576	68493
Nawapada	22080	245	45698
Balangir	28977	254	67443
Subarnapur	23882	166	32572
KBK	25318	2925	67674
State	20488	1635	51911

Source: Statistical Abstract of Orissa- 2005

**Table A2.2: Density of Veterinary Institutions and Personnel across Districts**

District	Per Veterinary Institute		Per Veterinary Employee	
	Area (Sqkm)	Animals	Area (Sqkm)	Animals
Gajapati	66.54	1797.52	94.02	2539.98
Ganjam	29.00	1267.42	27.26	1191.63
Puri	21.74	1258.66	25.77	1491.75
Khurdha	23.84	1214.51	28.13	1433.12
Nayagarh	44.20	1581.33	51.18	1831.01
Jagatsinghpur	15.89	1623.57	17.02	1739.54
Cuttack	19.96	1860.13	20.59	1918.57
Kendrapara	25.92	1700.75	33.90	2224.05
Jajpur	23.96	2669.87	25.65	2858.88
Bhadrak	22.57	1559.60	24.80	1714.02
Baleshwar	26.25	2442.50	26.62	2476.66
Coastal	26.87	1685.69	29.06	1823.52
Mayurbhanj	49.85	4083.35	53.98	4421.87
Sundargarh	66.98	3158.77	64.75	3053.48
Kendujhar	61.50	4338.44	61.50	4338.44
Jharsuguda	47.30	1213.23	52.03	1334.55
Baragarh	42.30	1400.01	42.92	1420.60
Sambalpur	50.82	1512.98	50.82	1512.98
Debagarh	122.50	4420.92	122.50	4420.92
Dhenkanal	42.81	2205.23	42.81	2205.23
Angul	65.72	2903.47	63.75	2816.37
Baudh	88.51	5404.29	96.81	5910.94
Kandhamal	74.96	2060.48	89.12	2449.68
Northern	58.08	2881.63	59.82	2967.95
Malkangiri	89.09	2789.31	94.93	2972.21
Koraput	57.19	1839.84	86.34	2777.79
Rayagada	60.45	1736.96	72.92	2095.09
Nabarangapur	60.82	1906.28	80.17	2512.82
Kalahandi	52.80	2071.13	57.81	2267.66
Nuapada	70.04	2523.67	87.55	3154.59
Bolangir	47.30	3116.62	60.88	4011.20
Sonapur	48.69	2656.31	49.72	2712.83
KBK Region	58.46	2262.45	71.97	2785.34
State	44.76	2222.66	48.98	2432.41

Source: Statistical Abstract of Orissa 2005



**Table A2.3 Production of Eggs, Milk and Meat**

District	Eggs Per 100 Persons (Nos.)	Milk Per 100 Persons (Kgs.)	Meat* Per 100 Persons (Kgs.)
Gajapati	2174.09	20.72	2571.14
Ganjam	5330.04	20.96	466.68
Puri	613.30	53.10	1057.44
Khurda	9208.29	34.91	764.36
Nayagarh	642.44	18.04	1522.24
Jagatisinghpur	1031.08	57.70	1438.12
Cuttack	1054.34	42.22	680.45
Kendrapara	1339.63	24.88	1126.72
Jajpur	1275.59	14.19	921.60
Bhadrak	1374.40	18.12	1222.87
Balasore	1673.79	15.79	827.36
Coastal	2801.98	28.93	938.98
Mayurbhanj	3315.51	13.56	675.52
Sundargarh	1588.76	16.96	903.49
Keonjhar	2127.35	18.93	1140.21
Jharsuguda	635.65	13.38	2677.96
Baragarh	1387.10	41.61	1126.76
Sambalpur	1644.70	27.60	1515.58
Deogarh	1326.12	20.90	4717.12
Dhenkanal	954.28	30.09	1333.80
Angul	574.82	27.06	1299.12
Boudh	1248.89	27.56	3985.30
Kandhamal	2089.17	22.03	2559.39
Northern	1779.21	22.89	1392.15
Malkangiri	3344.12	20.23	3084.11
Koraput	1911.26	23.58	1362.82
Rayagada	1681.49	31.87	1801.21
Nawamgpur	1503.85	12.29	1465.25
Kalahandi	2138.83	21.68	1138.90
Nuapada	1042.23	13.32	2743.60
Bolangir	3548.40	24.91	1076.88
Subarnapur	671.61	19.29	1900.95
KBK	2113.51	21.54	1593.40
State	2471.14	25.51	1215.20

\* Sheep+goat+pig

Source: Statistical Abstract of Orissa 2005

**Table A2.4: District-wise Density of Livestock****(Per 1000 hect)**

<b>District</b>	<b>Small Ruminants</b>	<b>Pigs</b>	<b>Poultry</b>
Gajapati	307	39	832
Ganjam	444	17	1766
Puri	561	6	806
Khurda	511	19	4522
Nayagarh	324	0	360
Jagatsinghpur	886	32	1788
Cuttack	924	10	1321
Kendrapara	559	35	1422
Jajpur	1075	18	1908
Bhadrak	737	19	1785
Balasore	995	49	2909
Coastal	621	21	1694
Mayurbhanj	734	78	2202
Sundargarh	521	121	1409
Keonjhar	659	27	1413
Jharsuguda	259	19	792
Baragarh	403	14	769
Sambalpur	290	26	515
Deogarh	283	14	599
Dhenkanal	320	3	863
Angul	463	5	527
Boudh	566	4	495
Phulabani	248	52	662
Northern	471	45	748
Malkangiri	333	89	1176
Koraput	349	57	870
Rayagada	292	55	707
Nawarangpur	342	111	1415
Kalahandi	408	10	1155
Nawapada	304	3	630
Balangir	589	5	1372
Subarnapur	554	4	755
KBK	387	45	1035
State	484	39	1227

*Source: Statistical Abstract of Orissa- 2005*

## Acknowledgements

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This book is the result of a sample household survey conducted to support the livestock sector policy (small animals) implementation in Orissa. It is a detailed analysis of the sample data collected from the south, north coastal and western regions of Orissa as elaborated within the context of small animals i.e., sheep, goat, pigs and backyard poultry production and rural development in the state. Although much of the study design and interpretations of the results is the outcome of discussions and meetings with farmers, colleagues, animals husbandary field officials and ISNRMPO, the responsibility for the content and conclusion in this publication, lays entirely with the authors.

Orissa is a highly resource rich state, especially in livestock resources. Unfortunately it has high incidence of poverty among the major Indian states. In the nineties the state has witnessed steep deceleration in agricultural as well as industrial growth. The state has certain special features: a high proportion of scheduled tribe population, low urbanization and low improvement in literacy rate. The state has opportunity in agriculture due to its available water resources and high rainfall. In such a situation, the livestock sector has a great potential to provide livelihood for the rural population. The dairy sector has limited growth as agriculture depends heavily on animal draught power, and on the other hand the dairy sector has potential in only certain parts of the state. The small animal production consisting of small ruminants, poultry and piggery has great potential for development. The study examines the structure of this sector with a focus on the productive efficiency and returns.

The study is sponsored by the Indo Swiss NRMPO, Bhubaneswar. Dr. Kornel Das, Programme Coordinator initiated the study. The authors are extremely grateful to him for his constant help in conducting the field work in different parts of the state and active discussion throughout the study.

A number of persons assisted in the conduct of field work. Our thanks are due to Dr. Gopal Padhi, local livestock consultant who accompanied the team during the field work. All the veterinary officers at the district and block levels extended their support during the field visits. We are extremely grateful to them. Special mention may be made of Dr. N.K. Routroy and Dr. B.N. Rao, Chief Veterinary Officer of Ganjam and Bolangir districts, respectively. Our thanks are also due to Dr. Jadu Nath Parida, Dr. K.C. Samantha Rai, Dr. Girish Chandra Kar and Dr. Goura Sahu veterinary officers for arranging field visits in the areas under their administrative jurisdiction.

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We are thanks the sample farmers who have given their valuable time and patiently explained the many questions asked by the investigators. Looking the study objective which is to contribute to the improvement of income from small animals rearing in rural areas, we dedicate this publication to the farmers of Orissa.

**Prof. S. Subrahmanyam**  
**Prof. C.S. Murthy**  
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## Foreword

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Livestock sector especially the small animals are known for their usefulness to poor communities. The sector under the pretext of focus for poverty alleviation is gaining ground. Orissa State, resource rich but with large population of poor communities is striving hard to attain breakthrough in the endeavor. The state has multi facet and multistage approach in alleviating poverty and one of them is the livelihood approach. The livestock comes handy to the targeted communities and is already a part of the livelihood. This is very well reflected in the recent Livestock sector policy paper, Orissa.

The present study report has well taken the demographic and socio-economic as well as the livestock economy environment of the state. Economics of small animals viz., sheep, goat, pigs and backyard poultry in Orissa has been derived keeping in view the social accounts, production feature in different systems and market environments and finally the cost and return. Recent focus increasingly is coming on 'Risk factors' that is taking the cost return structure to adverse preposition; the same has been pointed out in detail for a reasonable solution.

The possible strategy at the initial entry point is to motivate farmers through confidence building measures. Priority in the list is the reduction of mortality of animals through accessible and quality service at the door step of the farmer. It is then to be followed by improvement in production and finally a dependable market system where the smallholder farmers' interest is well taken care of, particularly under a low literacy environment and communities under transition from forest dependent economy to one market oriented economy.

Present study has come out clearly that village pigs, backyard poultry followed with small ruminants are 'Pro-Poor', and justify their inclusion to alleviate poverty.

We express our gratitude to Mr. Goutam Buddha Mukherji, Former Agriculture Production Commissioner - cum - Additional Chief Secretary & Dr. R.N. Bohidar, Former, Agriculture Production Commissioner - cum - Additional Chief Secretary, Govt. of Orissa for the vision to initiate the present study.

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The views expressed in this book are that of the authors and not of the Organisation that has sponsored the study. We appreciate the hard work they have put into complete this study and report. I am sure this report will create more awareness on the ground reality and much more needs to be achieved in order to make differences in the field of small animals and livelihood in Orissa. We also give our thanks to Department of Animal Husbandry and Veterinary Services, Government of Orissa for extending all cooperation to complete this study. This is the beginning.

### **Kornel Das**

Programme Coordinator,  
Indo-Swiss Natural Resource Management Programme, Orissa.

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