Livestock and Poultry Sector in Chhattisgarh: Present Status and Approach for Future Development

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The young state of Chhattisgarh epitomizes in its aspirations the dreams of its predominantly rural and tribal communities by making conscious attempts to do away with past legacies and adopt fresh approaches towards economic and social empowerment.

Rich in natural resources with mostly thickly forested areas in the North and South and the "Rice Bowl" in the central plains, the state dreams of diversification in agriculture and allied sectors, which have been identified as essential for equitable growth in the state.

The state government is committed to capitalize on its 'new state advantage' and has developed a motto of good governance for healthy development.

This situational analysis report seeks to capitalize on this unique environment of growth and the state's distinct commitment of propelling critical linkages between livestock and people's livelihoods. The Analysis of livestock economics of the state revealed that livestock has potential to alleviate the poverty of Chhattisgarh. The population and distribution of cattle, buffalo, sheep, goats, pigs and poultry and demand and supply of feeds and fodder crops in all districts of the state were determined. The production of milk, meat and egg and draught power were estimated. The animal health status in the state was surveyed — commonly occurring diseases, losses due to diseases, prevention and control measures were documented. The management and administrative status of veterinary health services was studied and its SWOT analysis was done to identify further requirements. On the basis of this situational analysis a plan was prepared for up gradation of animal wealth, improved marketing of animal products, value addition of animal products and improving the nutrition and health status of animals.

The report is thus based on a critical analysis of primary and secondary realities to assess the livestock scope and potential of the state and envision for growth cutting across species and agro climatic zones. It was developed through a fully participatory multi-stakeholder process undertaken by the Department of Animal Husbandry, GoCG and supported by CALPI – A programme of the Swiss Agency for Development and Cooperation and Intercooperation, the Centre for Advanced Research and Development and the National Centre for Agriculture Economics and Policy Research, over a two year period starting 2005 and ending 2007.

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1. LAND AND PEOPLE

1.1 Chhattisgarh

Born on November 1, 2000, Chhattisgarh is one of the youngest states of the Indian Union. It was carved out of Madhya Pradesh. The birth of Chhattisgarh was a momentous occasion for its people who had long-cherished a dream for a separate geographical entity and with the expectations of faster development, more prosperity and better governance.

Chhattisgarh state is the land of folklores and folksongs. Chhattisgarhi is a very advanced and proud language of the residents of Chhattisgarh state. Traditional veterinary practices of Chhattisgarh state could be well understood from its folk art forms. The Lorik-Chandra tradition of Chhattisgarh underlines the importance of Routs/ Yadavs as cow-head runners and shepherds. Stall-feeding of domesticated animals is an anathema to Chhattisgarh, and role of Routs in herd management and cure is paramount. The development efforts have to be woven around the delicate social web of the state.

The new statehood has given an opportunity to the political and administrative system to plan and execute developmental activities to fulfill the people's desires of a prosperous state. Being a new state and with limited legacies of the past, this is a historic opportunity for Chhattisgarh. It can leverage on this status to undertake reforms and frame policies to aid rapid social and economic development. Another advantage is the geographic location of the state – it borders seven states in the country. NH-6, which connects the west to the east, passes through some of the most industrialised areas of the state. Chhattisgarh could use this geographic location to its advantage to develop a logistic and warehousing network to service the region.

Chhattisgarh borders seven states – geographically an advantageous position

1.2. Agroclimate and Land Use

The state of Chhattisgarh is spread over an area of 13.6 million hectares. The state is bounded by Uttar Pradesh on the north, Jharkhand on the northeast, Orissa on the east, Madhya Pradesh on the west and northwest, Maharashtra on the south-west and Andhra Pradesh on the south-east.

The state is endowed with rich natural resources. It is blessed with basins of great rivers like the Mahanadi, the Godavari, and the Narmada with a total river length of 1,885 km.. The annual average rainfall in the state varies from 1,200 to 1,600 mm. Nearly 44% of its geographical area is covered with forests. Forests comprise a valuable asset in the State and are a source of livelihood for its people.

The state is broadly divided into three agro-climatic zones, comprising Northern hills (Koria, Sarguja, and Jashpur), Chhattisgarh plains (Korba, Raigarh, Bilaspur, Janjgir, Raipur, Durg, Mahasamand, Kabirdham, Rajanandgaon, and Dahmtari) and Bastar plateau (Kasker, Bastar and Dantiwada). The Chhattisgarh plains occupy about 54% of the geographical area. In this zone forests occupy about one-third of the total area. Two-third of the Bastar plateau is covered with forests. Northern hill zone has about half of the area under forests. Agriculture is practiced on about 56 % of the geographical area. Crops occupy more area in the Chhattisgarh plains than in any other zone (Table 1.1).

Table 1.1 Land use pattern in Chhattisgarh, 2001-02

	Geographical area (000ha)	Land use (%)						
		Forest	Non-agricultural	Barren and uncultivable land	Permanent pastures	Culturable waste	Fallows	Net sown
Chhattisgarh Plains	7,494	33.3	6.3	1.9	0.7	2.0	3.5	44.2
Bastar Plateau	3,263	65.2	2.4	15.2	2.4	5.2	2.1	20.1
Northern Hills	2,847	47.0	4.5	4.4	9.5	0.2	4.5	30.0
Chhattisgarh	13,603	43.8	5.0	5.6	6.4	2.4	3.3	35.5

Some other important physiographic characteritsis of these zones are given in Table 1.2. The climate in CG plains and northern hills is tropical hot and humid, while Bastar plateau has moderate tropical climatic conditions. Rainfall is almost similar in all the zones.

Table 1.2 Climate, rainfall and soil type of different agroclimatic zones of Chhattisgarh

Zone	Total area (lakh ha)	Climate	Rainfall (mm)	Soil type
Northern hills CG plains Bastar pleateau	28.57 (21%) 68.49 (50%) 39.06 (29%)	Eastern tropical, humid and cool Eastern tropical, humid and hot Southern moderate tropical	1,400-1,600 East and south parts 1,400-1,600; North and west parts 1,200-1,400 North and south parts 1,400-1,600; Central part1600	Light to medium light (red-yellow) 55%, Medium heavy to heavy (brown black) 455, Light to medium light (red-yellow) 65%, Medium heavy to heavy (brown black) 35%, Light to medium light (red-yellow) 58%, Medium heavy to heavy (brown black) 42%

1.3 Agriculture

Agriculture in Chhattisgarh is dominated by the small landholders and the landless (Table 1.3). Of 3.6 million rural households in the State 18% are landless, 24% own land ranging between 0.002 and 0.5ha, and 19% between 0.5 and 1.0ha. They share 12 % of the arable land and average size of their land holding is only 0.4ha. Further, nearly 20% of the households own land holding between 1 and 2 ha. Together they comprise 81% of the rural households sharing 31% of the land area. Households with land holding size above 4 ha comprise only 5% of the rural households but share 45% of the land area. This indicates very high inequality in land distribution and thus limited opportunities for bulk of the rural population in land-based agriculture.

Although agriculture remains the main occupation for a majority of rural population in the State, agricultural conditions are not conducive to support an adequate livelihood especially for smallholders. The net sown area comprises 35% of the geographical area, the proportion being higher in the central plain zone (48%) compared to northern and southern zones.

Table 1.3 Distribution of land holdings in Chhattisgarh

	% households 2003	% share in land 1995/96	Size of land holding (ha), 1995/96
Landless (0.002ha)	17.6		
Sub-marginal (0.002-0.5ha)	24.0		
Marginal (0.5-1.0ha)	19.5	12.4*	0.4*
Small (1.0-2.0ha)	19.8	16.9	1.4
Semi-medium (2.0-4.0ha)	13.8	25.6	2.7
Medium (4.0-10.0ha)	4.7	29.7	5.8
Large (>10.0ha)	0.5	15.4	21.0
Total	100	100	1.8

Source; GOI (2006)

* also includes land owned by sub-marginal farmers

Agriculture is rain-dependent and growing of second crop in the post-rainy season is limited due to lack of irrigation, as only 23% of the net cropped area is irrigated. Elsewhere it hardly exceeds 10%. Canals are the major source of irrigation (76%), followed by tubewells (13%) and tanks (6%). Irrigation facilities are largely limited to districts in the central plain zones where about 37 % of the net cropped area is irrigated. Area under irrigation in the northern hills and Bastar Plataeu is 8 and 3% respectively.

Paddy is the main crop grown in the state occupying over two-third of the gross cropped area. Pulses are cultivated on about 17% of the area and oilseeds on 5%. Horticultural crops are grown on about 3.5% of the area (Figure 1.1). The rice yield, however, is low (Figure 1.2).

During 2001/02 and 2004/05 rice yield varied from 832 kg/ha in 2002/03 to 1,729 kg in 2003/04, depending on the amount and paddy distribution of rainfall, while country's rice yield since between 1989/90 has been 1,764kg and 2,086 kg/ha. Summer rice is also grown in the state but on a very small area. The yield of pulses and oilseeds is also low compared to average for the country.

Figure 1.1 Cropping pattern in Chhattisgarh, 2004-05 (% of total cropped area)

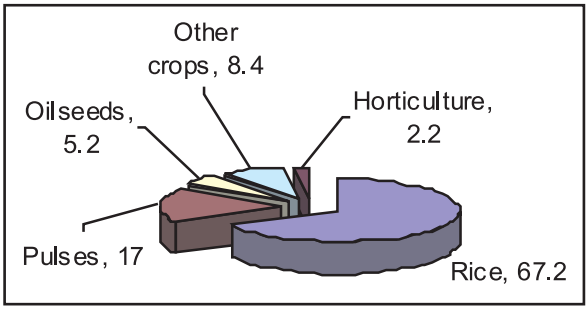
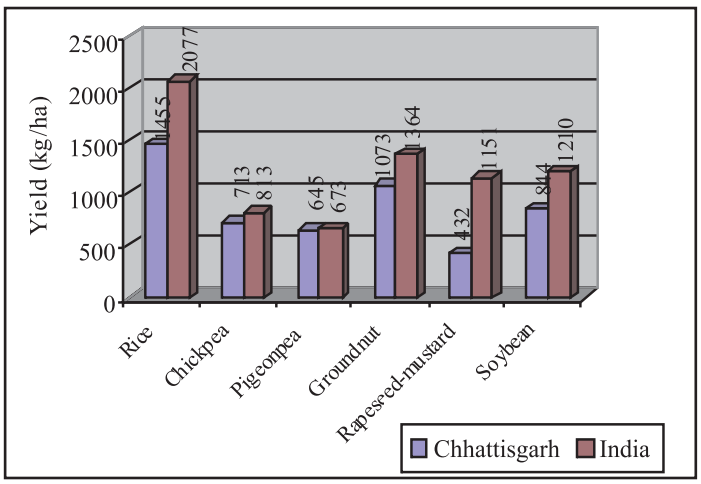


Figure 1.2 Average yield of major crops in Chhattisgarh and India, 1999/2000 to 2003/04



Agricultural practices, however, vary across zones depending on rainfall and irirgation. Paddy, maize, wheat, gram, moong, urd, niger, groundnut, rapeseed and mustard are important crops in the northern hills. Rice, wheat, gram, linseed, sunflower, mustard, safflower, groundnut, sugarcane and intercropping of gram, mustard, potato in wheat and sugarcane are grown in Chhattisgarh plains. In Bastar plateau rice, maize, moong, urd, niger, rapeseed, and mustard are grown; and for tribal area the common crops are small millets, kodomillet and kulthi. In water scarce Bastar plateau and Northern hills, farmers hardly grow any crop in the post-rainy season.

1.4 Livestock and poultry status

Chhattisgarh is very rich in its livestock wealth with 1.27 crore animals (Table 1.4) — cattle population is the highest with 64% followed by goats (16%), buffaloes (14%), and sheep and pigs being the lowest (6%). Animals in general, are smaller in size with poor production potentialities, due to poor genetic potential coupled with the inadequate availability of feed and fodder.

The livestock is an important source of livelihood for the land-constrained poor households especially in the marginal environments. At the state level, the livestock sector contributes about one-fourth to the agricultural income, but is subsistence-oriented. The livestock in Chhattisgarh, is an integral part of the mixed crop-livestock systems, where crop production meets most of the feed and fodder requirements of animals and they provide draught power and dung manure for crop production. Such a synergy is considered beneficial for sustainability of crop and livestock production, and household food security. Distribution of livestock holdings is more equitable compared to land, indicating that the poor have more opportunities in livestock production compared to crop production. The productivity of livestock, however, is low.

Livestock economy of Chhattisgarh is characterized by predominance of cattle. In 2003 the State had 8.9 million cattle heads. Cattle are raised for milk production and draught power. The proportion of males in total population is about 50%. Buffalo is the another important bovine species in the state with a population of 1.6 million in 2003. Like cattle, buffaloes too are maintained for both milk and draught purposes. The sex ratio in buffaloes is adverse to females, primarily because male buffaloes are preferred as draught animals for puddling in rice fields.

Table 1.4 Livestock population in Chhattisgarh (thousand)

Livestock spp.	Population (000)		
	1997	2003	% increase
Total cattle	8785	8882	1.1
Male	4643	4469	-3.7
Female	4142	4413	6.6
Total buffaloes	1942	1596	-17.8
Male	1396	1077	-22.9
Female	546	519	-4.9
Goats	2154	2336	8.4
Sheep	196	121	-38.1
Pigs	456	553	21.3
Poultry	6771	8181	20.8

Source: Livestock Census of India,1997, and 2003.

There is a sizeable population of small ruminants especially goats in the state. In 2003 there were 2.3 million goats and 0.12 million sheep. The population of goats increased by 8.5%, but sheep population declined by 38.2% between 1997 and 2003. Poultry and pigs are other important species, and their population has been increasing at a higher rate (>20%).

The distribution of livestock population across zones shows that the Chhattisgarh plains have 56% of state cattle and buffaloes, and 50 % poultry (Table 1.5). Pigs are largely concentrated in Bastar Plaeau and goats in northern hills. Cattle density is almost similar in different zones. Buffalo density is the highest in northern hills, followed by Chhattisgarh plains and Baster plateau. Northern hills have the highest goat density, while poultry and pig density is higher in the Bastar plateau.

Table 1.5 Land and animal distribution in four agro-climatic zones

Particulars	Northern hills	Bastar plateau	Chhattisgarh plains	Chhattisgarh
Share in livestock population (%)				
Cattle	26.7	17.5	55.8	8462296
Buffalo	28.7	13.9	57.3	1598041
Sheep	22.4	26.3	51.2	120664
Goat	45.9	22.6	31.5	2335723
Pig	26.6	59.4	14.0	552377
Poultry	24.8	24.9	50.3	8181324
Livestock density (Number/100 ha of net sown area)				
Cattle	178	170	176	175
Buffalo	36	26	34	33
Sheep	2	4	2	3
Goat	84	61	27	48
Pig	12	38	3	11
Poultry	160	234	153	170

1.5 The People

1.5.1 Population

Chhattisgarh had a population of 20.8 million in 2001. The population pressure on land is less, compared to most of the Indian states. Compared to the population density of 324 persons/sq.km. for the country as a whole the state had a density of 154 persons/sq. km Growth in population in the state is also slow; during 1991-2001 state's population increased at an annual rate of 1.5 % compared to national average of 1.9%.

Nearly 80% of state's population lives in rural areas and 20% in urban areas (Table 1.6). Urbanization, however, is limited to districts Durg, Korba, Raipur, Korea and Bilaspur, where 30-40% of the total population lives in urban areas. Most other districts are predominantly rural with nearly 90% or more of their population living in rural areas.

Table 1.6 Population characteristics, 2001

	Population (million)		
	Total	Rural	Urban
Male	10.47	8.31	2.17
Female	10.36	8.34	2.02
Total	20.83	16.65	4.19
Scheduled tribe (%)	29.6	33.2	9.3
Scheduled caste (%)	13.9	14.4	11.0
Other backward castes (%)	46.0	46.3	44.2
Other castes (%)	10.5	6.1	35.5
		Literacy rate (%)	
Male	77.86	74.58	89.87
Female	52.28	47.41	71.63
Total	65.12	60.93	81.08

State's population comprises 30% scheduled tribes and 14% scheduled castes, 46% backward castes and 11% other castes. The urban population is dominated by backward and other castes. Tribal people are largely confined to rural areas. The rate of urbanization is about 51% for other castes, 15% backwards, 12% scheduled castes and 5% tribals.

1.5.2 Literacy rate

Literacy rate in the State is at par with the national average (Table 1.6). In 2001 over 65% of the population was literate. Literacy rate is low among the rural population (61%) compared to urban population (81%). It is also low among scheduled tribes and scheduled castes.

1.5.3 Work force

Chhattisgarh has 47% potential population available for work (Table 1.7). Cultivators comprise 45% of the total workers, and agricultural labourers 32%. Altogether the dependency on agricultural sector has increased in the State. The share of cultivators and agricultural labourers in total work force together has increased to 76% in 2001 from 70% in 1991.

Table 1.7 Distribution of workers in Chhattisgarh (000)

Year	Cultivators	Agriculture labourers	House hold industry workers	Other workers	Total workers	Work participation rate (%)
1991	4123 (49.1)	1710 (20.4)	1089 (13.0)	1476 (17.6)	8399 (100.00)	47.7
2001	4316 (44.6)	3088 (31.9)	202 (2.1)	2078 (21.5)	9685 (100.00)	9685

The increasing dependence on agricultural sector does not augur well for the economic development of Chhattishgarh. Historically, as economies grow agriculture provides surplus resources including labour, for the development of other economic sectors.

1.5.4 Economic condition

Several tribal communities of the state are traditionally dependant on the forest produce and also on sheep, goats, pigs and poultry for their livelihood. More than 80% of the population, living in the villages is dependant on agriculture, which being mono-cropping, leaves them unemployed for about 6-8 months in a year. Migration to other states in search of livelihood owing to crop failure, has became a common feature. The increase in the human population has led to further fragmentation of the land holding capacity amongst farmers. Land holding pattern is very disproportionate among the different categories of the farmers.

Several estimates for poverty are available in India, and they differ in magnitude as per the estimation procedure. Chhattisgarh is a newly formed state and official estimates of poverty are not available. The poverty ratio for 1999/ 2000 was estimated using the poverty line defined by the Planning Commission (Table 1.8). The State has 45 % of its population living in poverty; this is much higher compared to country's average poverty rate of 27%. The incidence of poverty is higher in rural areas (46%) compared to urban areas (37%).

The incidence of poverty is very high (56%) among tribals. Poverty ratio is also higher for scheduled castes (47%), and it is higher in urban areas. Among the backward castes 43% population lives in rural areas, and like scheduled castes, the incidence of poverty is higher among those living in urban areas. Only 16% of their population lives below poverty line, and the incidence of poverty is almost the same in rural and urban areas.

Table 1.8 Population under poverty in Chhattisgarh

Social group	Rural	Urban	Total	Rural poor as % of total poor
All	45.9	37.4	44.7	87.4
Scheduled tribes	57.0	35.5	56.0	97.0
Scheduled castes	46.2	54.3	47.2	86.2
Other backward castes	41.7	50.9	43.0	82.9
Other castes	17.0	15.9	16.4	50.7

Poverty in the state is largely a rural phenomenon. Over 87% of the total poor are rural. By social group 97% of scheduled tribe, 86% scheduled caste, 83% backward caste and 51% other caste poor live in rural areas.

2. LIVESTOCK ECONOMY OF CHHATTISGARH

Smallholder farmers dominate the rural sector of Chhattisgarh. About 73% of the land holdings are of less than 2 ha with an area share of only 29%. For these households crop production is unlikely to be the sole source of livelihood. They sustain from off-farm and non-farm activities like animal husbandry and mostly maintain animals as a regular source of food and cash income. Hence, growth in agriculture and animal husbandry is critical to their livelihood.

Smallholders have opportunities in the livestock production. Increasing population, rising per capita income and growing urbanization are fuelling growth in demand for livestock products. Per capita consumption of livestock products has increased much faster as compared to foodgrains over the last two decades. If these trends underlying demand growth were to continue, the demand for livestock products would increase much faster than that in the past. Besides, global market for livestock products is expanding, offering export opportunities. Strategic interventions are required to ensure that the small livestock producers gain from the expanding markets. This chapter examines the performance of livestock economy of Chhattisgarh focusing on its relevance to smallholder farmers.

2.1 Economic structure

The economy of Chhattisgarh is quite diversified. The share of primary, secondary and tertiary sectors each in the gross domestic product ranges between 30-40% (Table 2.1).The economic structure, however has been changing. The tertiary sector has been expanding fast; its share in GDP increased to 40% in trieenium ending (TE) 2004/045 from 30% in TE1995/96. The secondary sector remained almost stable during this period, but the share of GDP fell from 40 to 33% during this period. The theory of economic development suggests a fall in the share of agriculture with economic growth. This is happening in Chhattisgarh.

Table 2.1 Structure and growth of Chhattisgarh economy, 1993/94 to 2003/04.

	GDP (Rs million)		Share (%)	
	TE1995/96	TE20034/045	TE1995/96	TE2004/05
Primary	57,566	66,935	39.9	32.9
Secondary	43,053	54,622	29.8	29.6
Tertiary	43,780	73,651	30.3	39.5
Total	144,399	195,208	100.0	100.0

Source:National Accounts Statistics,Government of India.

The primary sector comprises agriculture (including animal husbandry), forestry, fisheries and mining. The decline in its share in GDP was largely due to decrease in share of agriculture, from 69% in TE1995/96 to 47% in TE2004/05 (Table 2.2). The share of forestry and fisheries improved. On the whole agricultural sector contributes 17.2% to the State GDP.

Table 2.2 Share of agriculture and allied activities in the primary sector GDP

	TE1993/94	TE2003/04	% annual growth (2000-01 to 2004-05)
Agriculture	69.0	46.8	6.2
Forestry and logging	7.1	8.9	6.0
Fisheries	1.5	3.1	6.6
Agricultural sector	77.6	62.0	6.2
Mining and quarrying	22.4	38.0	8.7
Total	100.0	100.0	7.2

Source:National Accounts Statistics,Government of India.

Evidences from India and other developing countries suggest that agricultural growth is necessary for poverty reduction. It was reported for India, that growth in agricultural sector reduces more poverty than the growth in other economic sectors. Fostering rapid growth in agriculture and rural development in the state is thus critical to reduce rural poverty which is as high as 35%.

2.2 Livestock and livelihood

In India livestock are raised as a part of mixed farming systems and are closely associated with socio-economic and cultural ethos of the farming community. A majority of the farmers own tiny pieces of land and a few animals to earn their livelihood. Livestock contribute to the livelihood of the poor in more than one ways:

- Livestock are an important source of food. They produce milk, meat and eggs that are consumed by all, the rich as well as the poor. In subsistence production systems with underdeveloped markets, the livestock producers are often the consumers of livestock products. Livestock products are rich in many nutrients and thus contribute to household nutrition security especially of children and lactating women.
- Livestock generate a continuous flow of output, and thus is an important source of cash income for poor, which they utilise for meeting their day-to-day petty expenses including children's school fees, medical expenses, etc.
- They are important assets available to the poor. They can be easily multiplied through reproduction to generate wealth. Livestock assets are more liquid than others such as land and buildings, and can be easily converted into cash during emergency or crisis.
- Many livestock species like poultry, goat, sheep and pigs are of short-generation interval with high prolificacy rate, and require less land and less initial investment and operational expenses, hence, well suited to the poor.
- Livestock contribute to women empowerment, as women perform most of the animal production related activities in developing countries.
- They serve an important function of banking. Livestock are like a living bank account, with offsprings as interest.
- Livestock act as insurance. By generating a continuous flow of output/income they act as a cushion against income shocks of crop failure especially in rainfed areas where drought is a common phenomenon.
- They are important source of manure and draught power, which are vital to preservation of soil fertility and improving crop production. Livestock thus contribute to sustainable intensification of farming

systems especially of smallholders who lack capital to purchase chemical fertilizers and other inputs.

- ❖ Finally, by recycling agricultural residues (straws and stovers) as feed, they save land for food production, which otherwise would have been required to produce green fodder and other feeds.

Livestock is central in the household livelihood strategies of the rural people especially the smallholders. For instance it was found that smallholders are deriving over half of their income from dairying in India. Small ruminants are considered pro-poor and it was estimated that 25-75% of the household income is coming from small ruminants in various parts of the country.

2.2.1 Distribution of land and livestock

2.2.1.1 Land distribution: Bulk of rural population in Chhattisgarh is in state of deprivation, as a majority of them live in poverty with no access to alternative income opportunities. The land distribution among the 3.6 million rural households is given in Table 2.3. The average size of land holding of 12% is only 0.4ha. Nearly 20% of households own land holding between 1 and 2 ha. Together they comprise 81% of the rural households sharing 31% of land area. Households with land holding size of above 4 ha comprise only about 5% of rural households but hold 45% of the land area.

Table 2.3 Distribution of land holdings in Chhatisgarh

	% households 2003	% share in land, 1995/96	Size of land holding (ha), 1995/96
Landless (0.002ha)	17.6		
Sub-marginal (0.002-0.5ha)	24.0		
Marginal (0.5-1.0ha)	19.5	12.4*	0.4*
Small (1.0-2.0ha)	19.8	16.9	1.4
Semi-medium (2.0-4.0ha)	13.8	25.6	2.7
Medium (4.0-10.0ha)	4.7	29.7	5.8
Large (>10.0ha)	0.5	15.4	21.0
Total	100	100	1.8

* also includes land owned by sub-marginal farmers.

Main occupation for a majority of rural population in the state is agriculture, but its conditions are not conducive to support an adequate livelihood especially for the smallholders. The net sown area comprises 365% of the geographical area, and the cropping intensity is low. Agriculture is largely rain-dependent and growing of second crop after rice is limited due to lack of irrigation. Only 22% of the net cropped area is irrigated.

Paddy is the main crop in the state occupying nearly 67% of the gross cropped area. Pulses are cultivated on about 17% of the area, oilseeds on 5%, and horticultural crops on about 3.5% of the area. Productivity of paddy is low (Figure 2.1) and depends on the amount and distribution of rainfall.Summer rice is also grown in the state but on a very small area. The yield of pulses and oilseeds is also low compared to average for the country.

2.2.1.2 Livestock distribution : Majority of rural households own too little land to rely solely on it for sustaining their livelihood. And, there is a little hope for any significant shift in land distribution in favour of small landholders, rather the number of small holdings is expected to proliferate due to their sub-division (the law of inheritance). Thus, most smallholders would be looking for income generating opportunities in activities like animal husbandry that are less land-dependent.

Distribution of different species of livestock among rural households in Chhattisgarh is given in Table 2.4. Landless households are also deprived of livestock assets. They share less than 1.0% of ruminants including sheep and goat, 2.5% poultry and 11% pigs. Among the landed households, the share of sub-marginal and marginal households in livestock assets is higher than their share in land. Together they own 34% cattle and 22% buffaloes. They however own much of the small animals like sheep, goat, pig and poultry. They share 42% of sheep and goats, 65% of poultry and 47% of pigs. The share of small landholders (1.0-2.0 ha) in cattle and buffalo is significantly higher than their share in land.

Table 2.4 Distribution of livestock resources in rural Chhattisgarh, 2003(%)

	Households	Cattle	Buffalo	Small ruminants	Poultry	Pig
Landless	17.6	0.3	0.2	0.7	2.5	11.1
Sub-marginal	24.0	14.2	6.7	17.8	14.6	22.1
Marginal	19.5	19.5	15.7	24.3	50.8	24.7
Small	19.8	25.0	34.8	23.7	19.6	9.4
Semi-medium	13.8	25.6	17.6	27.2	8.7	19.2
Medium	4.7	12.9	19.6	6.3	3.7	13.3
Large	0.5	2.4	5.4	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

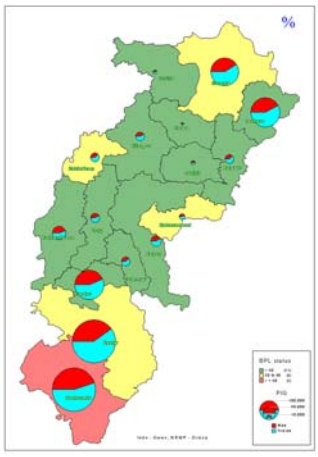
Source: As for Table 2.8

There is a distinct pattern of distribution of large and small animals. Small animals are more equally distributed than large animals. Most of the small animals are concentrated among the households at the lower end of land distribution, and the large landholders (>4.0ha) rarely own sheep, goats, poultry and pigs. A higher concentration of small animals among the smallholders is expected as these animals require less initial capital investment and less operational expenses, have short-generation interval and are prolific breeders, and fit well in the farming systems of resource to poor farmers. Further, animals like sheep and goats largely depend on grazing, enabling the poor to take advantage of common grazing land and water resources. From the point of view of the poor, cattle and buffalo are capital intensive and require more feed and fodder, hence, land and capital are the most limiting constraints for the small land holders.

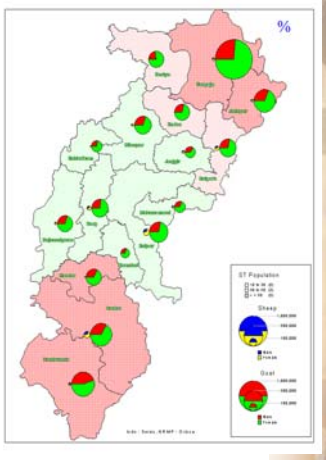
However, not every household owns livestock (Table 2.5). About 57% rural households in the State own cattle, 14% buffaloes, 12% small ruminants, 22% poultry and 3% own pigs. The ownership of different livestock species, as expected, is largely concentrated among the landed households. The presence of any livestock species among the landless households is negligible. Amongst sub-marginal farm households 45% own cattle and 17% poultry. The proportion of these households owning buffalo, sheep and goat and pig is less than 10%.

The ownership of cattle and buffalo however has a strong positive relationship with the size of land holding. Among the marginal farm households 70% own cattle and 32% own poultry. Ownership of buffaloes and small ruminants is restricted to about 15% of these households. In fact, every household owning land above 4.0ha also owns cattle, and every second household owning land above 10.0 ha own a buffalo. The proportion of households owning small ruminants and poultry is almost the same for households owning above 1.0 ha of land.

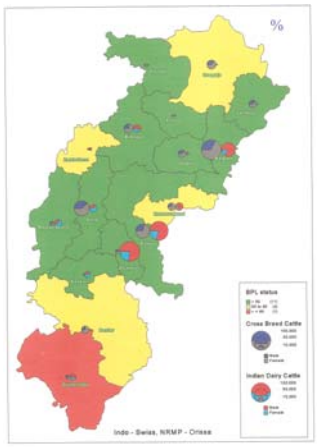
Districtwise BPL status and Ducks



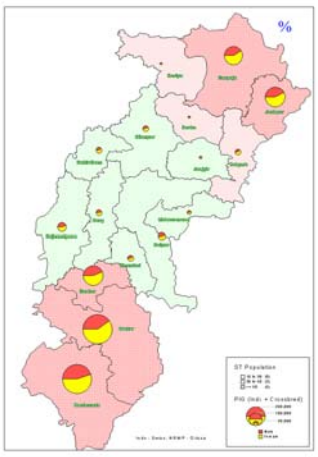
Districtwise BPL status and Pig



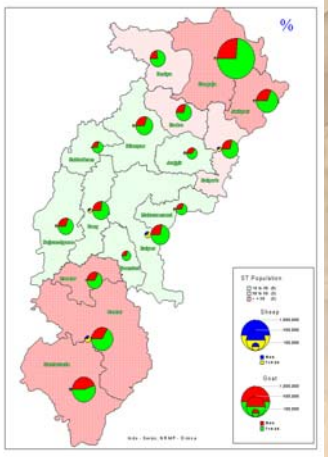
Districtwise BPL status and Sheep - Goat



Districtwise ST population and Ducks



Districtwise ST population and Pigs



Districtwise ST population and Sheep - Goat

Table 2.5 Percent of the rural households owning different livestock species, 2003

	Cattle	Buffalo	Small ruminants	Poultry	Pig
Landless	1.3	0.5	0.7	6.2	1.4
Sub-marginal	45.4	5.1	8.4	17.1	2.6
Marginal	70.6	12.8	15.3	32.3	3.2
Small	78.0	22.3	17.2	23.3	2.1
Semi-medium	84.0	22.7	20.2	28.5	3.3
Medium	93.5	45.0	21.1	29.6	5.7
Large	92.3	52.4	0.0	17.5	0.0
Total	56.8	13.8	12.3	21.5	2.6

Another dimension of livestock ownership is the scale production (Table 2.6). On an average, there are about 4 cattle, 3 buffaloes, 5 small ruminants, 2 pigs and 13 poultry birds per household in Chhattisgarh. On farms less than 2.0ha there is not much difference in the cattle herd; it lies between 3 and 4. Beyond that, it ranges between 5 and 11. Buffalo herd size too does not vary much for the households owning up to 4.0 hac of land (2-3 buffaloes), but afterwards increases with the size of land holding. Small ruminant herd size is almost the same on different categories of households except for the medium farm households who own a smaller herd compared to smallholders. Average number of poultry

birds is the highest for marginal farm households (23 birds/owning household), followed by small and sub-marginal households who maintain about 10-12 birds. Other households have a much smaller flock.

Table 2.6 Average number of animals owned by livestock owning households, 2003

	Cattle	Buffalo	Small ruminants	Poultry	Pig
Landless	3.5	1.0	3.7	6.3	2.0
Sub-marginal	3.0	2.0	5.2	10.0	1.5
Marginal	3.2	2.3	4.8	22.7	1.8
Small	3.7	2.9	4.1	11.9	1.0
Semi-medium	5.0	2.1	5.8	6.2	1.9
Medium	6.7	3.4	3.8	7.5	2.2
Large	10.7	6.9	0.0	1.0	0.0
Total	4.0	2.7	4.8	13.0	1.7

2.2.2 Income contribution

Livestock are an important source of income for the rural households. Between 2000/01 and 2002/03 they generated income worth Rs10,275 million a year i.e. over 23% of the total income from the agricultural sector. At the national level, the contribution of livestock to agricultural income is over 25%. Draught animal power is not included in the income accounts. In Chhattisgarh there are about 4 million draught animals providing energy for various farm and non-farm operations. Inclusion of value of draught power would have raised livestock's contribution. It was estimated that at the national level draught power comprised 17% of the total value of cattle output in 1998/99. This figure for Madhya Pradesh was 43%.

Dairying is the main constituent of livestock income (Table 2.7). It contributes nearly 65% to total income from livestock. Dung is the next important source of livestock income (19%), followed by eggs (7%) and meat (6%).

Table 2.7 Contribution of livestock to agricultural value of output, 1993/94 prices

	2000/01	2001/02	2002/03	Average
Total value of agricultural output (Rs million)	33026	55988	43968	44327
Agriculture (Rs million)	22821	46149	33186	34052
(%)	69.1	82.4	75.5	76.8
Livestock (Rs million)	10205	9838	10783	10275
(%)	30.9	17.6	24.5	23.2
Composition of livestock output (%)				
Milk	67.6	65.1	60.3	64.3
Meat	3.2	3.9	9.2	5.5
Eggs	6.9	7.6	7.3	7.2
Wool	0.2	0.2	0.2	0.2
Dung	18.6	19.2	18.9	18.9
Others	3.5	4.1	4.0	3.9

Besides, being an important source of income, livestock also act as a cushion against income shock of crop failure especially in regions where crop production is largely rain-dependent. This is evident from the less variability in livestock income compared to crop income in the Chhattisgarh State, where the performance of agriculture is determined largely by rainfall. Income from agriculture drops significantly in rainfall deficit years, but from livestock it is less susceptible to rainfall at least in the short-run. However, continued dismal performance of agriculture would adversely affect livestock production.

2.2.3 Employment generation

Livestock sector engaged only about 0.5 % of the rural workforce in 1999/2000 but now its share in rural employment is increasing. The reasons for livestock sector engaging a miniscule proportion of labour force in the State (Table 2.8) are :–

- ❖ Livestock production is extensive and animals are left for grazing especially in the Rabi season when plenty of land remains uncultivated;
- ❖ Huge area under forests also offers avenues for labour-free grazing;
- ❖ Majority of livestock producers are poor and expend little cash on food for their animals;
- ❖ Stall-feeding, that requires more labour, is restricted among the rich households and to high-producing animals.

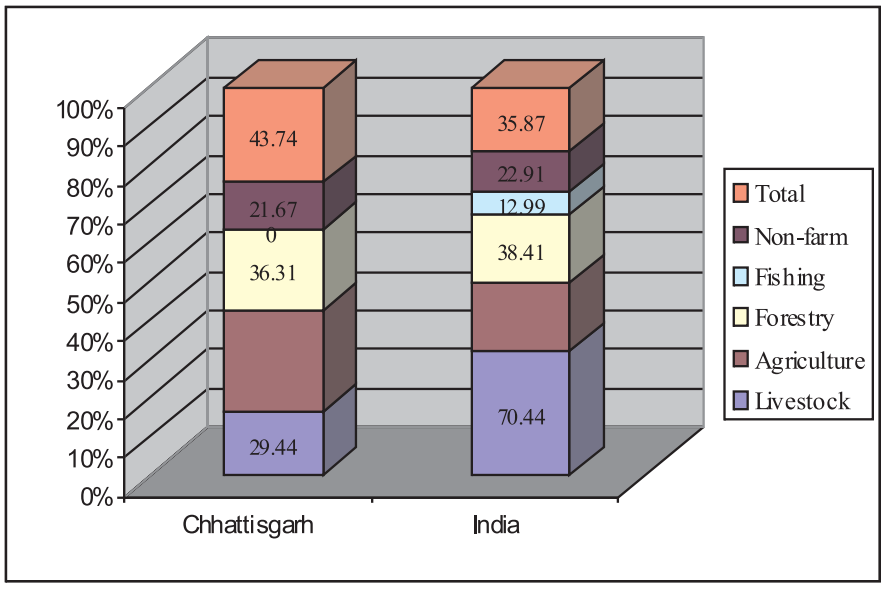
Table 2.8 Percent of rural workers (usual status) engaged in animal husbandry

	Chhattisgarh		India	
	1993-94	1999-00	1993-94	1999-00
Agriculture	90.69	87.88	72.22	70.19
Forestry	0.40	1.05	0.32	0.31
Animal husbandry	0.26	0.51	5.31	5.49
Fishing	neg	Neg	0.44	0.31
Non-farm	8.65	10.56	21.72	23.70
Total	100	100	100	100

Source: Extracted from NSSO electronic

In India animal husbandry is largely in the domain of women. They comprise over 70% of the total workers in this sector (Figure 2.1). In Chhattisgarh women comprise only 29% of the total workers engaged in animal husbandry. Their share in agriculture however is substantial (46%).

Figure 2.1 Female participation in animal husbandry 1999-2000



The livestock production system in Chhattisgarh is low input, low output, subsistence-oriented system. It could be efficient under the prevailing production conditions but management needs to be intensified to harness the emerging opportunities being created by the increasing demand for livestock products to improve the food and nutrition security, and to augment employment opportunities for the rural poor.

Given that livestock distribution is less in egalitarian integration of livestock with crop production is expected to generate significant income opportunities for the rural poor. It was observed that the integration of

livestock adds substantially to the household income (Table 2.9).

Table 2.9 Gross and net returns from mixed farming systems in Chhattisgarh (Rs/household)

Farming system	Gross returns	Net returns
Crops (3.5 acres)	47225	18300
Crops + 2 bullocks + 3 cows	70800	31044
Crops + 2 bullocks + 3 buffaloes	83833	43273
Crops + 2 bullocks + 1 cow + 2 buffaloes + 15 goats	94325	51104
Crops + 2 bullocks + 1 cow + 2 buffaloes + 15 goats + 20 poultry + 20 ducks	104887	58456

Source: Ramrao, W. Y., S.P. Tiwari and P. Singh (2005). Crop-livestock integrated farming system for augmenting socio-economic status of smallholder tribal farmers of Chhattisgarh in Central India. Livestock Research for Rural Development, 17 (8).

Facts reveal that growth in livestock production is expected to have a more beneficial effect on poverty reduction compared to a similar increase in crop production. In India, growth in agricultural sector which also includes livestocks is more pro-poor than the growth in other economic sectors. Livestock sub-sector of Indian agricultural economy has been growing faster than the crop sub-sector and given a higher concentration of livestock among the poor smallholders its contribution to poverty reduction is expected to be significant. It was observed that growth in crop sub-sector reduces poverty but growth in livestock production does more. Thus any intervention that benefits livestock producers can help poor in combating poverty. The issue is why not every poor household owns livestock. Reasons are :–

- The land is a binding constraint especially for the landless and the marginal farmers (<1.0ha) for whom producing staple foods for household food security is the first priority.
- The poor lack access to capital, inputs and technologies needed for owning and maintaining livestock.

Hence, there is a need for some intervention that enables the poor to own livestock.

2.3 Opportunities for livestock sector growth

Livestock sector growth has the potential to reduce poverty but are there opportunities for livestock producers in the market place? To assess this, food basket of the people of Chhattisgarh vis-à-vis food basket of an average Indian consumer was compared. Besides prospects for exports of livestock products were also assessed. The food basket (Table 2.10) of consumers in Chhattisgarh comprises largely staple foodgrains, mainly paddy. Per caput consumption of cereals in Chhattisgarh in 1999/2000 was 12% higher than the country's average consumption. Current level of cereal consumption in the state is almost equivalent to what an average Indian consumed in 1983. The level of pulses consumption in the state is low.

Table 2.10 Per capita consumption of different food items in Chhattisgarh and India (kg/annum)

Commodity	Chhattisgarh	India	
	1999/2000	1999/2000	1983
Cereals	163.7	147.5	168.3
Pulses	8.6	12.5	11.5
Milk	16.4	73.5	43.0
Eggs (numbers)	5.8	15.1	9.2
Fish	1.3	3.5	2.5
Goat meat / mutton	0.25	1.0	1.1
Poultry meat	0.66	0.70	0.3
Total meat	0.96	3.5	2.4

The per capita consumption of foodgrains declined considerably, and that of livestock products increased substantially between 1983 and 1999/2000. During this period, milk consumption increased from 43 to 74kg/per capta per year, meat from 2.4 to 3.5 kg and eggs from 9.2 to 15.1. Consumption

of most of the livestock products is much lower in Chhattisgarh. Milk consumption is about one-fifth, meat consumption is one-fourth and egg consumption is one-third of the country's average consumption of these products.

There are considerable rural-urban disparities in the consumption pattern. Urban consumers take more animal products (Table 2.11). In urban areas per capita milk consumption is three-times more compared to rural areas, meat consumption is also 2.3-times higher but cereal consumption is low.

Table 2.11 Per capita consumption of livestock products in rural and urban areas of Chhattisgarh, 1999/2000 (kg/annum)

Commodity	Rural	Urban
Cereals	166.3	149.3
Pulses	8.1	11.7
Vegetables	65.4	76.1
Fruits	3.8	18.1
Milk	12.2	38.5
Eggs (No.)	3.8	17.1
Fish	1.2	1.6
Goat meat and mutton	0.15	0.80
Poultry meat	0.60	0.98
Total meat	0.81	1.81

Sustained economic and income growth and urbanization brought changes in the food basket in India but in Chhattisgarh these trends have not been as robust – annual increase in per capita income was 1.8% and urban population 1.3% – both are lower than the country's average. Compared to staple food, demand for livestock products is more responsive to income changes. If the per capita income and urbanization experience similar trends as at the national level then demand for livestock products will increases significantly.

At present only a small proportion of population in Chhattisgarh consumes livestock products (Table 2.12) – milk is consumer by 37%, meat by 27% and eggs by 14%. As proportion of consumers of livestock products is higher in urban areas, hence growth in income and urbanization is expected to increase consumers of livestock products.

Table 2.12 Percent population consuming livestock products in Chhattisgarh, 1999/2000

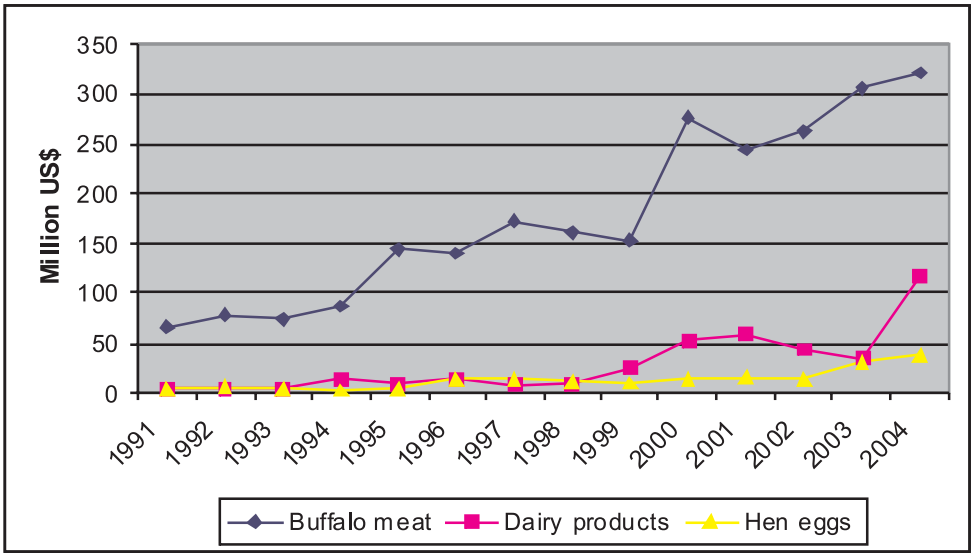
	Total	Rural	Urban
Milk	36.8	31.3	66.7
Meat	27.3	38.7	25.2
Eggs	13.6	10.3	31.8
Fish	35.5	35.5	35.5

Besides opportunities in domestic market, increasing integration of world markets also offer an opportunity to export livestock products. Livestock products account for 18% of the global trade in agricultural products. The global market for livestock products is expanding; between 1991 and 2004 world trade in dairy products (in quantity) increased by 1.5 – times, and in meat it almost doubled. However, India has a negligible share in the global trade in livestock products (0.3-0.4%).

Exports from India, however, are increasing. Having achieved self-sufficiency in milk production in mid-1990s India started exporting dairy products though in small quantities (Figure 2.3). India has monopoly in buffalo meat exports (Figure 2.3). In 2004, India exported dairy products worth US$ 117 million and buffalo meat valued at US$ 321 million. India also exported egg products worth US$ 17 million.

Although at present India's share in world trade in livestock products is miniscule, India has the potential to increase its exports if the past trends in domestic supply of livestock products were to continue. Since 1991, milk and egg production in India increased at an annual rate of 4.5 and 6% respectively.

Figure 2.3 Trends in exports of some important livestock products from India



The low level of consumption rates of livestock products suggests that there are considerable opportunities for growth of livestock sector in the state. And, since smallholders own bulk of the livestock resources they are expected to benefit the most from the demand-led growth. The state should harness these opportunities to reduce rural poverty by devising appropriate policies and programmes for livestock development.

2.4 Status and performance of livestock

Livestock in Chhattisgarh are an integral part of mixed crop-livestock systems. Livestock production is overwhelmingly a rural activity as more than 97% of the livestock population is in rural areas. Assessment of performance and prospects for development of livestock sector in Chhattisgarh are discussed here.

2.4.1 Livestock population

Livestock economy of Chhattisgarh is cattle dominated. In 2003, the State had 8.9 million cattle (Table 2.13), which were raised for milk production and draught power. The 50% males in total population indicate that cattle are an important source of draught power. Almost every household in the state who has some access to cultivable land also owns cattle. Between 1997 and 2003 cattle population in the state increased marginally, mainly due to increase in female population (6.6%), while male population declined by 3.7%.Buffalo population was 1.6 million in 2003. Buffalo is also maintained both for milk and draught purposes. The sex ratio in buffaloes is adverse to female. The buffalo population in the state declined by 17.8% between 1997 and 2003; the decline was sharper in females.

Table 2.13 Livestock population in Chhattisgarh

	Chhattisgarh Population (000)			India Population (000)		
	1997	2003	% increase	1997	2003	% increase
Total cattle	8,785	8,882	1.1	198,882	185,181	-6.9
Male	4,643	4,469	-3.7	95,546	82,479	-13.7
Female	4,142	4,413	6.6	103,335	102,702	-0.6
Total buffaloes	1,942	1,596	-17.8	89,918	97,922	8.9
Male	1,396	1,077	-22.9	18,625	17,888	-4.0
Female	546	519	-4.9	71,293	80,034	12.3
Goats	2,154	2,336	8.4	122,721	124,358	1.3
Sheep	196	121	-38.1	57,494	61,469	6.9
Pigs	456	553	21.3	13,291	13,519	1.7
Poultry	6,771	8,181	20.8	347,611	489,012	40.7

In 2003, there were 2.3 million goats and 0.12 million sheep. Between 1997 and 2003 goat population increased by 8.5% but of sheep declined by 38.2%. Population of poultry and pigs has been increasing rapidly (>20%). Poultry population also increased substantially in the state.

2.4.2 Production and productivity

Production of livestock and poultry products is given in Table 2.14.Meat production is estimated on the basis of records of registered slaughterhouses hence are underestimates, as registered slaughterhouses contribute nearly 50% of the total meat output in the state. The state contributes 0.9% to country's milk output, 2% egg output, 0.5% wool and 0.2% meat production.

Livestock production in the state has been increasing. Milk production increased since 1994/95 at an annual rate of 6.7%, which is much higher compared to 3.8% annual growth at the national level. Growth in egg production is comparable to national average of 3.3%. Wool production increased at an annual rate of about 10% since 2000/01, while total wool production in the country remained almost static during this period.

Table 2.14 Production of livestock products

	Milk (million tonnes)		Eggs (lakh no)		Wool (000kg)		Meat (000 tonnes)*	
	Chhattisgarh	India	Chhattisgarh	India	Chhattisgarh	India	Chhattisgarh	India
1994-95	0.50	63.8						
1995-96	0.51	66.2						
1996-97	0.52	69.1						
1997-98	0.54	72.1						
1998/99	0.68	75.4						
1999/2000	0.72	78.3						
2000-01	0.78	80.6	7,326	366,323	187	48,369	3.06	1,851
2001-02	0.80	84.4	7,704	387,288	241	49,497	3.69	1,922
2002-03	0.80	86.2	7,790	398,228	250	50,542	3.78	2,113
2003-04	0.81	88.1	8,091	404,031	252	48,548	3.83	
2004-05	0.83	91.8	8,139				3.87	
% annual growth	6.12	3.71	2.63	3.27	9.76	0.32	5.20	

* From registered slaughtered houses.

Livestock productivity in the state is poor. The average yield of the non-descript cows that account for 55% of the total milk output (Figure 2.3), is less than 1.0 kg/day (Table 2.15). This is about one-half of the country's average and less than the average yield of a dairy goat in Rajasthan. The crossbred cow though not an important species in the state but yields 3.8kg milk per day, nearly 60% of the national average. Milk yield of buffalo, the second largest producer of milk in the state, is much less compared to the national average. The differences are glaring when compared with the best yielding states in the country.

Table 2.15 Milk yield of different species in Chhattisgarh, TE 2003/04 (kg/in-milk animal/day)

	Chhattisgarh	India	Highest
Local cow	0.90	1.91	Haryana (4.32)
Crossbred cow	3.86	6.50	Punjab (8.80)
Buffalo	2.78	4.15	Punjab (6.00)
Goat	0.21	0.32	Goat (Rajasthan)(1.03)

Improved layers contribute 83% to total egg production in Chhattisgarh, and the desi layers the rest (Figure 2.4). An improved layer on average produces 195 eggs in a year, which is about 52 eggs less than the average for the country. The yield of local layers is also less compared to the national average but the difference is not much.

Figure 2.3 Structure of milk production in Chhattisgarh, TE 2003/04

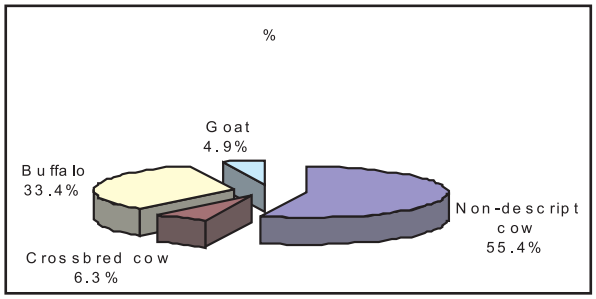
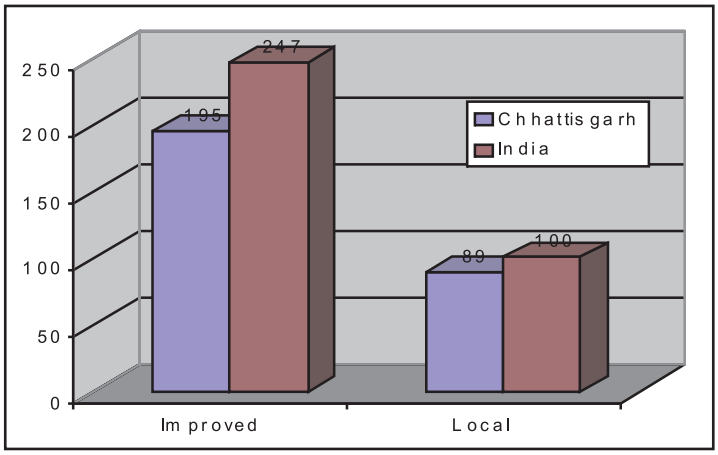


Figure 2.4 Average yield of layers in Chhattisgarh, TE 2003/04 (no./layer/annum)



2.5 Constraints to livestock production

Productivity of different livestock species in the state is abysmally low due to several operational constraints related to production technology, feed and fodder, animal health, investment capital, markets, etc. Assessment of severity of these constraints in expansion of livestock sector will help formulating appropriate livestock development plan.

Feeds and fodder are the most important inputs in livestock production and their adequate availability is central to improving animal productivity (Table 2.16). There is a considerable shortage of feeds and fodders in the State. The annual requirement is estimated at 12.4 million tonnes dry fodder, 37.2 million tonnes greens, and 3.7 million tonnes concentrates. The available resources can meet only half of the dry fodder, 16-56% of the green fodder and one-third of the concentrate requirement. Bulk of the green fodder supply comes from forests, fallows and wastelands. The common grazing lands (permanent pastures and grazing land, fallows and wastelands) comprise 13% of the total geographical area in the state. Fodder from both of these sources is generally of poor quality. Cultivated green fodder supply is only

about 0.3 million tonnes. Lack of irrigation and low availability of fodder seeds are the main constraints to fodder production. The state does not have any fodder seed production farm.

Table 2.16 Availability and requirement of feedstuffs, 2003/04

	Availability	Requirement	Deficit
Dry fodder	65 (63)	124	59
Green fodder	61 (210)	372	311
Concentrates	12	37	25

Source: CARD/CALPI study. Figures in parentheses are estimates from the Ministry of Agriculture Government of India.

The production potential of the animals cannot be realized unless they are protected against diseases and insect pests, which can cause huge losses due to morbidity and mortality. To avoid the production losses there should be a well-developed animal health delivery system. Veterinary institutions in Chhatisgarh (Table 2.17) include hospitals and polyclinics, dispensaries and aid centres/mobile dispensaries. These are manned by 310 professional veterinarians. In addition there are 1,481 auxiliaries to assist the professional. The state, however, is deficit in infrastructure as well as manpower. On an average there are 12,000 livestock units per veterinary institution, and 36,000 livestock units per veterinarian. These figures are much higher compared to the average Indian situation. As per survey report (National Sample Survey Organization of the Ministry of Statistics and Programme implementation) only 195 of the farmers in Chhattisgarh report availability of veterinary services in their villages. The National Commission on Agriculture (1976) recommended a norm of 5,000 livestock units per veterinarian for effective delivery of animal health services.

Table 2.17 Veterinary institutions and veterinarians in Chhattisgarh and India, 2003/04

	Chhattisgarh	India
Number of veterinary institutions	945	51,973
Number of Veterinarians	310	38,100
Livestock units/ veterinary institution	11,915	5,926
Livestock units/veterinarian	36,322	8,084

Source : Basic Animal Husbandry Statistics, GOI and Govt of Chhattisgarh.

Another issue in animal health management relates to curative versus prophylactic disease control. The emphasis in India has largely been on curative treatment. Lack of funds and staff, however, is often cited as a reason for not undertaking prophylactic vaccination. Manpower availability is not a significant constraint and with marginal investment the prophylactic vaccination would yield significant benefits in terms of losses avoided from morbidity and mortality. Since smallholders own bulk of the livestock resources they are expected to benefit the most from this.

Quality of the livestock in Chhattisgarh is poor. Most of the population comprises local non-descript animals. In 2003 only about 3% cattle, 7% buffaloes, 2% sheep and 3% pigs belonged to the crossbred/improved category (Table 2.18). Proportion of improved poultry, however, is higher (38%). Adoption of crossbreeding technology is higher in urban areas where 11% cattle, 43% buffaloes and 51% poultry are crossbred or of improved category. This is obvious as urban livestock production is commercial-oriented while a majority rural population maintains livestock for meeting its household requirements. The size of urban livestock however is small.

Table 2.18 Share of crossbred/improved in population of different species, 2003 (%)

	Total	Rural	Urban	% share of urban	
		% crossbred/improved		crossbred	Total
Cattle	2.8	2.6	11.4	12.3	3.1
Buffalo	6.7	4.7	42.9	33.6	5.3
Sheep	1.7	1.8	1.5	2.8	3.3
Pig	2.5	2.4	3.8	11.0	7.2
Chicken	38.0	37.3	51.4	7.0	5.2

Reasons for low adoption of crossbreeding technology in the state are:

- High-producing animals are not high producing anilamls were not able produce to full potentialdue to lack of feeed, proper care and management . The state is also facing high deficiency of feed ingerediants and in animal health infrastructure.
- Crossbred animals are more susceptible to diseases and environmental stress compared to indigenous breeds.
- Initial capital requirement of improved animals especially cattle and buffaloes is more, while a considerable proportion of the state population is poor.
- Low adoption in cattle is because the agriculture is largely dependent on cattle for draught power, while male crossbred calves are not considered good draught animals.

Efforts however are being made to improve quality of livestock through artificial insemination, a widely acclaimed tool for genetic enhancement. There has been 2.5-times rise in the number of artificial inseminations between 1997/98 and 2003/04 (Table 2.19). Artificial insemination is largely restricted to cattle and buffaloes but its low adoption is due to :–

- Not encouraging success of artificial insemination,
- Only 20% calf born rate (about 5 inseminations are needed for every conception),
- Loss in the potential production of an animal because of repeated insemination, and it discourages livestock producers to adopt this technology,
- Lack of poor infrastructure for storage of semen resulting in low conception rate in AI,
- State does not have any semen production centre or frozen semen bank and largely depends on other states for procurement of semen. The other breeding infrastructure in the state is also poor.

Table 2.19 Artificial inseminations done in Chhattisgarh

	Chhattisgarh		India	
	1997-98	2003-04	1997-98	2003-04
Number of AI centers & sub centers	260	275	48,200	46,300
Number of AI's done ('000)	88	202 (41)	18,800	24,500
Number of AI's done per centre	338	735	390	535
Total breedable population ('000)*	2974	3142	111,200	113,000
Breedable bovine inseminated (%)	2.96	6.43	16.9	21.7

Figures in parentheses are calve born.Source: Basic Animal Husbandry Statistics, GOI and Chhattisgarh.

Capital is a major constraint to expanding livestock production as about 45% of the rural population in the state is poor. Credit for animal for husbandry and dairy development is provided by commercial banks, cooperatives and regional rural banks as an investment credit (Table 2.20). Livestock sector received about Rs 150 million in 2004/05. Thus the growth in livestock sector credit is higher than the growth in total credit to agricultural sector, but it is much less than contribution of the livestock to agricultural gross domestic product. The share of dairy development in livestock sector credit fell to 37% in 2004/05 from 96% in 1999/2000, and share of poultry increased to 35% from 4%. Sheep, goats and pig farming received 28% of the livestock sector credit in 2004/05. The increasing share of small animals in institutional credit is important from the perspective of poor who own bulk of these.

Bias in lending against livestock sector is because of several reasons but it should not be there because livestock are reproducible assets, and once created keep on reproducing adding to scale without much external assistance. Another problem is that credit is provided only for investment purposes, and short-term credit requirements to meet operational costs are ignored. This has acted against the poor who are unable to meet operational costs from their own resources. The poor are eligible for institutional credit against mortgage of the animals; however, institutions hesitate advancing credit probably because of problems of moral hazards.

Table 2.20 Ground level credit disbursement to livestock sector in Chhattisgarh (Million Rs)

	1999/2000		2003/04		2004/05	
	Million Rs	%	Million Rs	%	Million Rs	%
Short term credit	1913.8		3229.1		4496.0	
Term credit						
Minor irrigation	202.2	18.8	216.4	12.6	460.2	17.6
Land development	10.8	1.0	35.8	2.1	70.7	2.7
Farm mechanization	674.0	62.8	996.7	57.9	1519.4	58.3
Plantation and horticulture	105.8	9.9	35.1	2.0	55.9	2.1
Dairy development	44.6	4.2	41.5	2.4	55.2	2.1
Sheep and goat	0.0	0.0	46.0	2.7	40.8	1.6
Poultry	1.8	0.2	13.0	0.8	52.6	2.0
Fisheries	13.0	1.2	46.0	2.7	24.3	0.9
	20.5	1.9	291.6	16.9	328.3	12.6
Total	1072.8	100.0	1722.1	100.0	2607.4	100.0
Total (short-term and long term)	2986.7		4951.2		7103.4	

Markets for live animals and their products are not well developed in Chhattisgarh. There are 26 registered and 9 unregistered slaughterhouses in the State. Mainly goats, sheep and pigs are slaughtered for meat. Cattle slaughtering is banned in the state. A considerable proportion of live animals is exchanged amongst livestock producers themselves and between producers and itinerary traders. Itinerary traders assemble animals from producers for sale in the regulated markets to larger traders as well as to other buyers. Bulk of the trade takes place between producers and itinerary traders. Markets for poultry are developed and organized around urban cities. Bulk of trade in broilers and eggs takes place between. producers and traders directly or indirectly through commission agents in the designated markets or at the farm gates.

Milk market is largely informal. Vendors and milk dealers dominate the informal market. They operate on a small scale — collect milk from the producers, sell to urban consumers, creameries and confectioners. Informal markets, however, are unstable and often exploitative particularly during the flush production season. Prices are determined arbitrarily, and under-pricing is common during the season. There were 424 dairy cooperative societies with 19,000 members in 2003/04. They procured about 6 million kg milk i.e., nearly 0.75% of the total milk produced in the state. On average a cooperative has 45 members and procures 43kg milk per day, which means less than 1 kg/day average milk supply per member. The reasons for low procurement are low productivity of animals, and farmers keep milk producing animals to meet their own requirements.

3. DAIRY AND DRAUGHT ANIMAL POWER

Dairying is the most important livestock activity in Chhattisgarh. Dairying accounts for about two-third of the total value of livestock production. Cattle and buffalo are the major dairy animals. Their role however goes beyond milk production. Cattle, mainly the local cattle, are dual-purpose with males being an important source of draught power in agriculture. Male buffaloes are also used for draught purposes mainly for puddling of the rice fields. Dairy animals are also an important source of dung, which is used as manure and domestic fuel. This chapter looks at the status and performance of dairy and draught animals in the state.

3.1 Dairying: Milk production and availability

Milk is rich in several a nutrients and is considered to be a whole food especially for children and pregnant and lactating women. Per capita availability of milk in Chhattisgarh is one of the lowest amongst Indian states leaving aside the northern eastern states. In 2005-06, the per capita milk availability in Chhattisgarh was only about 103g/day, as against the national average of 241 g/day (Figure 3.1).

A considerable proportion of population in the state does not consume milk. Only about 37 % of the total population in Chhattisgarh consumes milk, and among urban population it is higher (67%). It is argued that rural dairy producers especially in the tribal belt do not consume milk because they believe that the offspring has the first right to milk.

Notwithstanding the ethical considerations in consumption, milk output in Chhattisgarh is low. Milk production has been increasing in the state since its inception, and in 2005-06 it was 8.39 lakh tonnes. Between 2000-01and 2005-06 it increased by 8 % (Figure 3.2). Some better milk production pockets of the state are Pakhanjoor, Basna and some blocks of Raigarh and Bilaspur districts, here marketable surplus is available. On the whole dairy in the state is subsistence-oriented. Most milk produced is consumed by the producing households. Only a small amount of milk (5 lakh litres) enters the market.

Figure 3.1. Per capita availability of milk in different states 2005-06

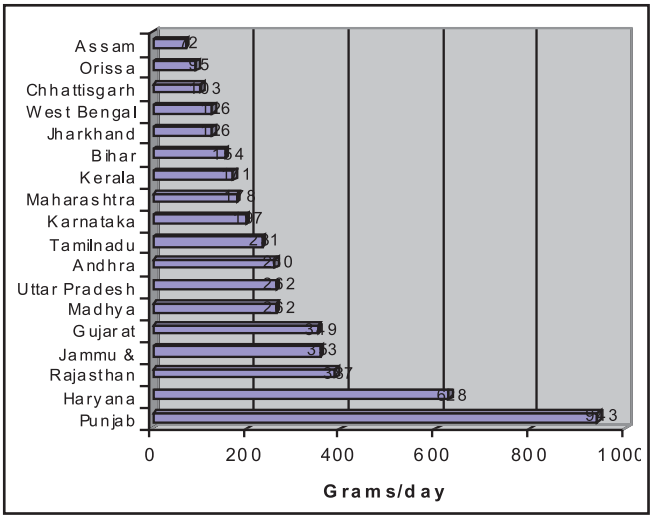


Figure 3.2. Trend in milk production in Chhattisgarh

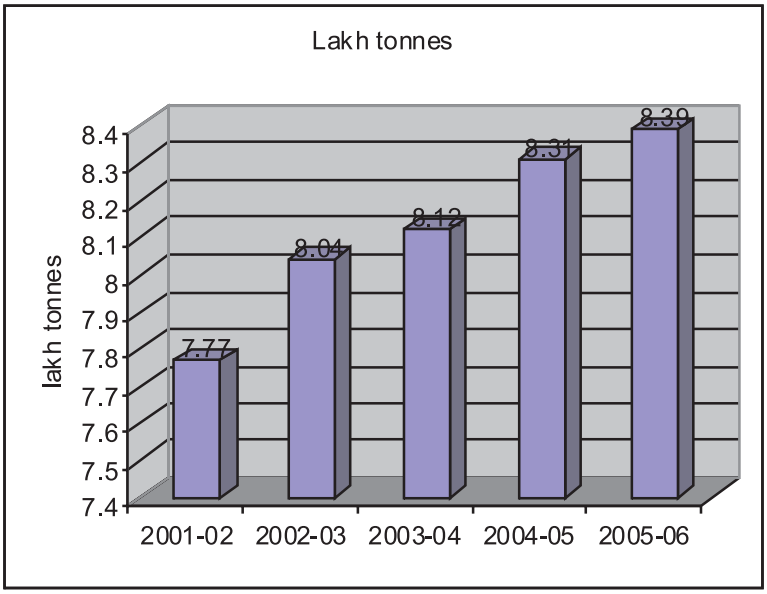
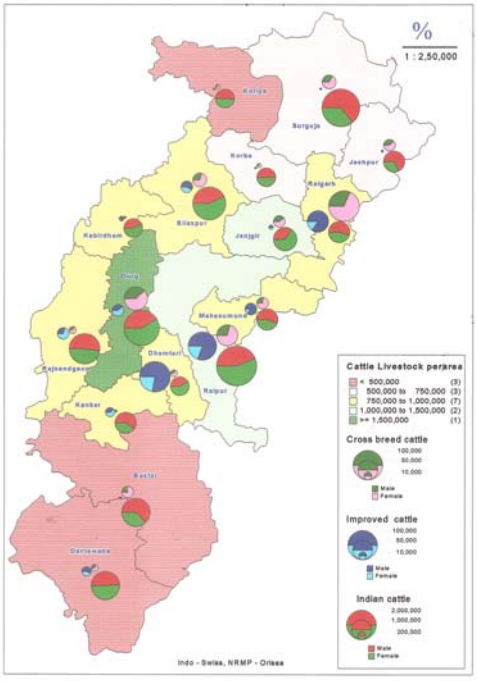


Table 3.1 Milk production in Chhattisgarh 2004-05

Item	Estimated number of animals in milk animal	Average yield /day/ (kg)	Milk production (000 million tonne)
Cross bred cows	381,42	3.863	53.780
Cows (non-descript)	1,368,835	0.912	455.658
Buffaloes-improved	51,022	5.727	106.654
Buffaloes non descript	220,460	2.153	173.247
Goats	521,754	0.218	41.516
Per day total milk produced in Chhattisgarh	830,855		

Source: Animal Husbandry Department, Government of Chhattisgarh.

Most of the milk output in Chhattisgarh comes from cows, mainly non-descript cows (Table 3.1), their share is 61 % in total milk production, buffaloes account for 34 %, and the rest comes from goats. Non-descript cows however are low-yielding. Their average daily milk yield is only 0.91kg. Nevertheless there is considerable scope to improve milk production in the state by introducing high-producing buffaloes and crossbred cows. On an average the milk yield of an improved buffalo is over 5.7 kg/day, which is even higher than that of a crossbred cow. The proportion of improved buffaloes and crossbreds in their respective populations is, however, very low. Only 2.8 % in-milk cows and 19 % of the in-milk buffaloes belong to the crossbred/improved breeds.



3. 2 Cattle and buffalo population

The total population of cattle and buffaloes is 1.04 crore, out of which crossbred breedable cows are 0.80 lakh, indigenous breedable cows 27.31 lakh, breedable buffaloes 3.30 lakh, and total breedable cows and buffaloes 31.42 lakh. The district –wise bovine population of Chhattisgarh is given in Table 3.2.

Table 3.2 Bovine population of Chhattisgarh in 1997 and 2003

District	Cattle-1997	Buffaloes-1997	Cattle-2003	Buffaloes-2003
Raipur			1.17	0.17
Mahasamund			0.37	0.05
Dhamtari			0.304	0.05
	1.8	0.5	1.844	0.27
Durg	0.95	0.19	0.94	0.15
Rajnandgaon			0.66	0.14
Kawardha			0.304	0.062
	0.79	0.14	0.964	0.202
Jagdalpur			0.62	0.107
Kanker			0.331	0.045
Dantewara			0.638	0.07
	1.6	0.25	1.589	0.222
Bilaspur			0.756	0.16
Korba			0.292	0.08
Janjgir			0.46	0.122
	1.7	0.47	1.508	0.362
Sarguja			0.94	0.2
Koriya			0.28	0.052
	1.19	0.25	1.22	0.252
Raigarh			0.432	0.085
Jashpur			0.383	0.037
	0.87	0.16	0.815	0.122
Total Population	8.9 million	1.96 million	7.94million	1.43 million

Source : Livestock Census,Government of India. Chhattisgarh.1997 and 2003).

Cattle: The population of crossbred females is high in Raipur, Durg, Raigarh, Bilaspur and Dhamtari districts. These districts are in Chhattisgarh plains which avail major share of irrigation resources of the state and the agriculture is also advance (Maps 3.1, 3.2). The rate of upgradation of the indigenous cattle and buffalo population has been faster after the formation of Chhattisgarh state. As per 2003's livestock census, there was about 250 % rise in upgraded cows and buffaloes (Table 3.3; Figure 3.3). Livestock owners in Chhattisgarh have shown increased acceptance of upgradation of indescript cattle population in rural areas, which itself is an achievement of importance. With setting up of Chhattisgarh State Livestock Development Corporation, this process is bound to go still faster in future.

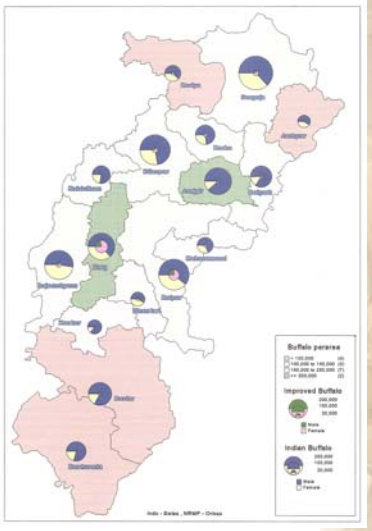
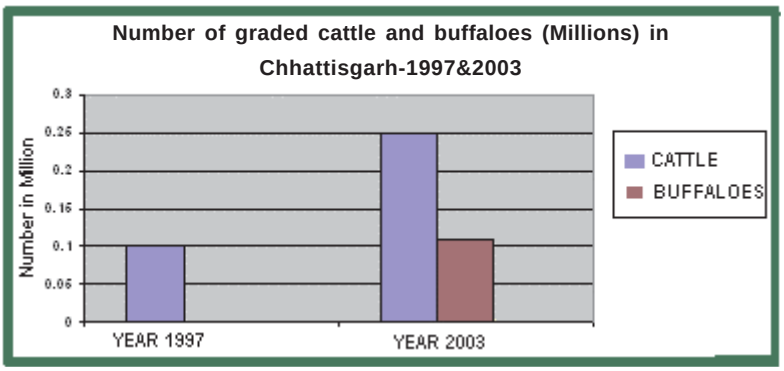


Table 3.3 Distribution of Up graded cattle and buffaloes in Chhattisgarh (in million)

State		Total crossbred cattle	Total indigenous cattle	Total cattle	Total buffaloes	Share of graded cattle & buffaloes
Chhatisgarh-1997		0.1	8.68	8.78	1.94	0.09 %
Chhattisgarh-2003	Holstein+Jersey Crossbred	0.13			Population of Graded Murrah Buffaloes= 0.11Million	
	Sahiwal+Gir+ Hariana+Others	0.12				
	All Cross-Breds	0.25	8.63	8.88	1.60	3.43 %

Source. Government of CG AHD 2003.



The milk producers are becoming more marketing oriented, the ratio between the cow and buffalo population shall change from the existing 5.6 cows to 1 buffalo, and it may stabilize in Chhattisgarh state towards 3 cows to 1 buffalo, in next ten years.

Buffaloes : In Chhattisgarh the total population of buffaloes is 1,598,041 (Table 3.4). Buffalo population is high in Raipur, Durg, Janjgir and Sarguja districts.The Dairy buffaloes in Chhattisgarh are mostly of Murraha breed and almost all come from Haryana State.

Table 3.4 Buffalo population in Chhattisgarh (2003 Census)

No. of male & female calves below 1 year	No. of female buffaloes >1 year	Draught male buffaloes	Total No. of buffaloes in the state (all)
136763	438,998	878,911	1,598,041

3.3 Infrastrcture

Procuring milk in rural areas through producer cooperatives and moving processed milk to urban-demand centers became the cornerstone of government dairy development policy. This policy initiative gave a boost to dairy development and initiated the process of establishing the much-needed linkages between rural producers and urban consumers.

The Dairy development is a thrust area of significance to Government of Chhattisgarh, and is aiming to improve the livelihood of poor in rural areas especially the women. The Department of Animal husbandry is the key player to implement the dairy development policy and coordinating agency to all others like Private sector, National Dairy Development Board assistance to cooperatives, Goseva Ayog, Government of India assistance and the farming community as a whole.

Recommendations of State Planning Commission for Dairy Development:The following key recommendations for Dairy Development in the state were suggested :

- Re-organisation of the Directorate of Dairy Development
- Implementation of Integrated Dairy Development Programme (100% centrally sponsored) in all the district of the state.
- Support to training and employment programme for women (STEP)
- Promoting private sector to establish private dairies in the state
- Distribution of milch cattle and infrastructure for milk processing and storage
- Organization of dairy co-operative societies

Key Dairy Development Related Matters Dealt by A.H. Department : Animal husbandry Department deals with following aspects of dairy development

1. Activities pertaining to increasing production, distribution of inputs. Introduction of programs which contributes to reduction in cost of milk production and implementation of dairy development activities.
2. Survey, extension, development and statistics pertaining to dairy activities.
3. Technical Training.
4. DCS organization, registration, promotion and liquidation and development.
5. Execution of programmes for employment generation through dairy industry.
6. Registration under milk and milk product order 1992.
7. Inspection and quality control in relation to milk and milk products and cattle feed. Prevention and prohibition of synthetic milk, milk products.
8. Milk procurement and sale price fixation with farmer coopertive societies.
9. Human resources development in relation to milk production and dairy industry.

Chhattisgarh State Livestock Development Corporation (CDLDC): The CDLDC, livestock policy and programme implementation arm of Chhattisgarh government was created under the National Programme for cattle and buffalo Breeding (NPCBB) fully supported by Government of India to (i) gain quick genetic improvement of Cattle and Buffalo population of the state thus improve production and productivity from milk and draught capability ; (ii) ensure sustainable cattle and buffalo production through supply of quality Bull/semen and other inputs like LN2; (iii) establishment of private AI workers to reach the service delivery to the farmers' doorstep.

Semen banks: CDLDC has established one frozen semen production centre at Anjora, Durg. Semen banks housing cattle bulls (13 Gir bulls; 3 Red Sindhi + Jersey crossbred bulls; 2 HF(62.5%) + Sahiwal bulls; 1 HF (50%) + Sahiwal bulls; 2 Jersey bull calves) and buffalo bulls (7 Murrah bulls and 1 Surti bulls), are functioning in the state.

Breed improvement: The special efforts of state government to popularise AI among the masses resulted in improved number of AI from about 66,000 AIs per annum to about 15,500 AIs per annum — about 145 % increase — between 2001 and 2005-06 (Table 3.5). The number of crossbred calves born per year too rose from 17,761 to 43,317 birth of crossbred calves — a distinct hike of about 155 % (Table 3.6).

The number of AI centres functioning in the state:

Government Unit (Stationary)	:	261
Government Unit (Mobile)	:	519
NGO (JK Trust)	:	147

Table 3.5 Artificial insemination and related performance

Parameter	2001-02	2002-03	2003-04	2004-05	2005-06 (T)
AI done (lakh)	1.57	1.94	2.08	2.33	3.24
Calf births (lakh)	0.35	0.37	0.47	0.57	0.77
No. of centers	8.30	914	890	902	927
Average No. of AI per center	189	213	234	259	350

Table 3.6 Performance of AI and proposed targets

Year	AI (lakh)	% of breeding coverage	Calving (lakh)
2001-02 (Performance)	1.57	4.99	0.35
2002-03 (Performance)	1.94	6.17	0.37
2003-04 (Performance)	2.09	6.61	0.47
2004-05 (Performance)	2.33	7.41	0.57
2005-06 (Target)	3.24	10.31	0.77
2006-07 (Target)	3.40	10.82	1.08
2007-08 (Target)	3.68	11.71	1.13
2008-09 (Target)	4.80	15.27	1.23
2009-10 (Target)	6.10	19.41	1.60
2010-11 (Target)	7.00	22.27	2.44
2011-12 (Target)	8.00	25.46	2.80

At present, one AI unit is covering on an average 3,390 breedable population. The ultimate objective of the policy is to provide the AI service to whole cattle population at farmers' door-steps, which means CDLDC is going to ensure timely and adequate supply of liquid nitrogen and bear the responsibility of training and running a good number of lay inseminators, with the help of its regional and district level department assistance.

As a matter of policy, CDLDC will promote exotic breeds of HF and Jersey only in urban areas. The CDLDC will promote crossing of local zebu with high pedigree bull/ semen of indigenous breeds like Red Sindhi, Sahiwal,Tharparkar, Ongole and Gir. Under the local buffaloes up-gradation programme the society will promote crossing with Murrah bull frozen semen. Surti buffalo bull semen will be used on demand from farmers.

Building a competent institution to envisage upgradation of 4.75 million indigenous cows and buffaloes in 19,720 villages and 98 towns, spread over the plains, hills and remote villages of the state over next seven to ten years is a daunting task. But, this organization has been floated to accomplish this goal, and it will strive to achieve that successfully in the given time-frame.

Milk marketing : In January 2000, Raipur Milk Union had 266 active primary dairy cooperatives and an average milk collection of 33,500 kg per day. The NDDB took over the management of Raipur Milk Union, Urla Milk Plant (installed capacity of one lakh litre per day) and its attached chilling centres in Bilaspur (10,000 LPD capacity +pasteurizing and sachet packing plant), Dhamtari (2,000 LPD capacity), Basna (2,000 LPD capacity), Jagdalpur (4,000 LPD capacity+ Pasteurizing Plant + Sachet Packing Plant) and Pankhajur (2,000 LPD capacity). The number of active dairy cooperatives have remained the same and has actually performed marginally better The same is the case with the quantity of milk collected by the milk union (Table 3.7-3.9).

Table 3.7 Performance of milk cooperatives in last six years

Serial No.	Year	Number of active dairy cooperatives	Average per day milk collected (kg)
1	2000-2001	266	24265
2	2001-2002	262	25933
3	2002-2003	249	16738
4	2003-2004	214	18877
5	2004-2005	213	15919
6	2005-2006	274	24672

Table 3.8 Milk collected on 26/02/2006 by RMU (kg)

Raipur	Bilaspur	Basna	Dhamtari	Jagdalpur	Pankhajur	Pendra	Total procurement
12924	827	4752	4166	1292	330	993	25284

Table 3.9 Milk sold on 26/02/2006 by RMU (kg)

Raipur	Bilaspur	Bhilai	Durg	Rajnand'	Jagdalpur	Kanker	Dha	Korba	Kawardha
15650	10978	2775	2575	695	683	505	255	3253	530

Total = 38,392 kg

The organized RMU is able to pick up about 10 % of the available surplus from the market. And such low volume of milk is arresting the growth of RMU as a viable cooperative. The total spread and distances between collection centres and supply centres of RMU make the transport cost higher.

Integrated Dairy Development Project (Post 2000 AD) : Government of India sanctioned Integrated Dairy Development Project in February 2002 in 5 Districts Raigarh, Ambikapur, Koria, Kabirdham and Jashpur, for 6 years with a total outlay of Rs. 1,549.79 lakh. The major components are capital expenditure for civil work and plant machinery of milk processing and marketing, milk procurement, input services, subsidy on cattle induction, manpower development, working capital, Headquarter expenditure.

Milk processing units for future: Project proposals for setting up five new integrated dairy development projects at Raigarh (10,000 litre milk processing plant), Ambikapur (10,000 litre milk processing plant), Koriya (5,000 litre milk processing plant), Kabirdham (5,000 litre milk processing plant) and in Jashpur (5000 litre milk processing plant) were approved. State government has already approved the projects' set up plan prepared by the dairy section. By the year 2008-end five mini milk plants will start functioning. Meanwhile, for the 11th Five Year Plan, six additional integrated dairy development projects have been suggested. After developing these ten mini-milk sheds and promoting about 50 cooperative societies, plan is to integrate these with NDDB's mainstream Raipur project, after about ten years.

Women Dairy Cooperatives: Promotion work of 89 Women dairy cooperatives with 8,130 members have been accomplished under HRD, GOI's sponsored dairy development project in Bilaspur, Raipur, Durg and Mahasamund districts. Their training, incorporation into the program and actual activity of milk procurement and marketing have begun with them.

Private Dairy Sector:

Private Dairy Sector in Chhattisgarh

The presence of 'Amul' Brand milk and milk products in large cities / towns like Raipur, Bilaspur etc., is well known and is growing. There is lack of data on daily sale of Amul products in Chhattisgarh. The AVIs dairy, priately owned dairy has about 40,000 litres of milk procurement and sale in the district of Durg, Rajnandgaon and Raipur. Another private owner dairy, Ghansyam Aggarwal Co. is marketing 20,000 to 30,000 litres of milk in Raipur and Bilaspur districts. They are coming up with a 'Milk Powder Plant' in Raipur'. Private dairies

of Andhra Pradesh are marketing milk during lean season and have a good market in Bastar district.

During interation with field officers it was revealed:

- Most of the field officers do not know about breeding policy of the state.
- No AI charges are being collected from the farmers. AI is done free.
- Many indigenous breeds semen is being used in addition to Jersey, HF and their crosses. The indigenous breeds are Gir, Sahiwal, Red Sindhi, Kankrej, Ongole etc.,
- The LN and FS supply is very irregular to most of the AI centres. Expansion of AI programme should be taken up only after strengthening the supply of liquid nitrogen and frozen semen.
- As per the availability of semen the request of the farmers is considered for insemination of the cows. Regarding buffaloes, only Murrah semen is being used.
- Each institution is providing service for more than 30 villages in a area of 20 to 25 km radius.
- AI programme is popular only in urban and semi urban areas where milk marketing is available.
- Most of the tribals do not drink milk. The animals are reared mostly for dung, which is used partly as a fuel and partly as a fertilizer.
- People in rural areas prefer indigenous breeds as they also require male animals for draught purpose.
- Presently most of the AI is being done at the farmers doorstep and in grazing herds with the help of graziers. Very few animals come to institutions for AI.
- In certain districts, during summer, animals are taken for grazing. They will be away from the villagers for more than 3 to 4 months. In such herds, breeding bulls are to be supplied.
- All the staff involved in AI activity should be trained as many of them are not trained in handing AI equipment.
- Farmer awareness camps are to be organized. The graziers who look after the livestock at the villages are to be trained in identifying heat symptoms and to convince the owners of the animals for utilizing the AI services.

3.4 Methods to improve milk production

The market trend analysts predict that by the year 2020, India is not only going to consume 40.3 % of the total global milk produced but will also be the world leader in milk production. Chhattisgarh state has to take appropriate action speedily to take advantage of such opportunity.

This whole issue of how to make Chhattisgarh a milk surplus state could be sorted out probably by not thinking uni-directionally or sequentially. The answer lies in following rigorously a long term perspective plan.

Gau Seva Aayog and Sponsored Goshalas : Go-Seva Adhinyam was passed. Subsequently a Gau Seva Aayog (Cattle Service Commission) was set up. Eleven Goshalas have been recognized by the commission and Rs 32.26 lakh have been allotted for defraying programs of the commission, and about 5,000 cows are housed in these goshalas.

Milch cows to every BPL tribal household scheme : A perspective plan of Rs 10,291.65 lakh has been sanctioned by the State Government, which includes cost of animals, manpower, office expenses training, milk collation center, milk transport subsidy, cost of renovation /expansion of processing facility, market development activities. The objective is to supply 50,000 dairy cows in 500 villages over 5 years. The plan envisages provison of 10,000 cows for 100 villages per year. Each beneficiary shall receive two cows in-milk and such 50 beneficiaries shall be assisted per village. Ten blocks of Bastar, Kanker and Dantewara were identified for the implementation of first phase of this program. Subsequently, to improve the performance of the programme strategic changes have been brought in. Cows have been distributed to BPL families living in cluster village and having milk market potentiality. The beneficiaries were assisted to join hands and function from a Dairy cooperative platform, which has increased the success rate of the programme. NDDB has assisted the cooperatives.About 6,500 newly calved Hariana cows have already been provided to as many tribal, below poverty line (BPL) households, till February end, 2006.

Upgrading of buffaloes : The animal genetic resources of India are represented by a broad spectrum of native breeds of buffaloes. The most important and most difficult task at hand is to choose the best set of buffalo breeds for agro-climatic regions of Chhattisgarh. AMUL has succeeded to register an average per buffalo per day yield of 4.3 litres (for 275 days of lactation) with its indigenous breeds of Mehsana, Surti and Jaffrabadi buffaloes, Chhattisgarh can also bank upon the available buffalo population. Murrah breed is popular and is performing well in Chhattisgarh.. With adequate support buffalo production will develop as the leading income generating activity of the rural masses of Chhattisgarh, in foreseeable future. There is scope to introduce Surti buffaloes of Gujarat in rural areas of Chhattisgarh where farmers prefer small to medium size buffaloes for milk and draught. Buffalo bullocks are more suited to paddy field operations due to special anatomy of feet.

State Dairy Laboratory (SDL) : The State Government is establishing State Dairy Laboratory at Raipur and Bilaspur. The State Dairy Laboratory is to play a key role in clean milk production through public awareness and implementation of hygiene practices in milk production and handling; and enforcing adulteration control measures are to be undertaken by the Department in near future. The need is to harmonize with the International Food Standards under SPS agreement (Agreement on Application of Sanitary and Phytosanitary Measures). In this context the infrastructure of SDL shall be utilized to meet the present and upcoming challenges.

3.5 Infrastructure and human resource development

Future plan for infrastructure development: New Intensive Dairy Development Project for six Districts has been submitted to GOI covering United Bastar (Jagdalpur, Kanker, Dantawada), Janjgir-Champa, Korba and Rajrandgaon districts. The major components are — 26 milk routes; 60 old dairy cooperative societies (DCSS) to be reorganized; 270 new DCS; fat testing machine registers, furniture; management grant for three years; chemical supply; milk tester supply; cattle induction: 4,800 with 50% subsidy; training and extension; training of DCS secretary, tester, members and farmers; animal health care and breeding programme with the

help of veterinary field staff; milk chilling infrastructure (6,000 LPD); milk processing infrastructure (26,000 LPD); milk marketing: local, RDS, CGMFED etc; monitoring: TMC at apex level and PIC at district level.

3.6 Lessons learnt

- Public awareness programme on massive scale to increase consumption of milk and milk products particularly in those parts/ communities who do not milk cows and do not drink milk. This amounts to culture adoption and it shall take at least 10 to 15 years of extension.
- To make changes in the byelaws of DCS to increase producers participation on all levels including at decision process, and increase milk production in the village.
- Establishment of Mini Dairy Laboratories at all District Head Quarters.
- Farmers have shown limited acceptance to AI of exotic dairy breeds and dual purpose cattle breeds (milk and draught) in regions where agriculture prospects are high. The tribal tracts have not opened up to the idea. AI services are picking up in irrigated, industrial zones and a strong peri-urban presence is existent.
- Calf mortality is very high, so appropriate measures to improve calf survibility are most essential for dairy development in the state.
- The dairy farmers in Chhattisgarh mostly depend upon North India for supply of Murrah milch buffaloes and crossbred cows even for replacement.
- Private dairy industry is active in the state and the market is dynamic and competitive. The NDDB and Government are boosting dairy production and marketing. Improvements in livestock and accessibility of markets for the rural population shall create more job opportunities. People's participation through cooperative and federations and their monitoring by PRIs will create ownership and more participation in livestock management.
- The breeding policy envisages 100% AI in cattle and buffaloes by 2020. Implementation of service charges in animal breeding and health services shall improve the demand for quality services and accountability. Focus has to be on buffalo development also. Chhattisgarh has luckily one good herd of Sahiwal and its development and conservation is most essential. Experiences of PPP's have been mellow till now. Involvement of JK Trust for AI and cattle breeding services was fully supported by GOI funds. More synergy is needed. Terms of collaborations need to be made clearer.
- Trainings and exposure visits to farmers on loss reduction due to infertility in buffaloes and crossbred cows, are important. The losses are currently up to 30% of breeding cows. The AHD, cooperatives and societies need capacity development on input supply, backward and forward linkages as well as skills in monitoring to optimize impact of programmes. Trainings should further be decentralized to district and village level.

Draught animals

In India all basic necessities of agriculture were woven around the cow, with contributions in all aspects of farming – draught, manure and transport. According to some researchers, (Table 3.10) cows in India contributed to the tune of about 1,900 crores in 1933, with the following break-up.

Table 3.10. Wealth produced by indigenous zebu in India (1933)

Item	Value (Rs crore)
Cattle labour for cultivation	612
Cattle labour for transport	161
Milk	810
Manure	270
Other products-	22.5
Hide	20
Meat	10
Bones, etc.	10
Live animal export trade	0.36
Total wealth produced	1915.86 Crores

Source: Vasu VM, Cattle Energy Utilisation / Research, Chapter V – Part II, Annex V – II (7).

Most land holdings in Chhattisgarh are small, where tractors and tillers are uneconomical as they are viable only in holdings of more than 5 hectares. The use of animal power becomes inevitable in these small holdings. Tractors are not suitable for slushy / water-logged fields and hilly terrain, where cropping is done in terraced fields, too narrow for these vehicular equipment while animal drawn vehicles are suitable for uneven roads, short distances. Estimates (Tenth Plan Working Group Report – p41) are that :–

- Two-thirds of the energy required for ploughing the cultivated area comes from animal power
- Animal-drawn vehicles haul two-thirds of the rural transport
- 2 billion people in the developing countries depend on draught animal power for farming and rural transportation.

Draught power is critically short at the time of crop planting and is insufficient for other purposes throughout the year. Draught power will remain a major source of energy in agriculture into the foreseeable future, and the lack of draught power in some places may be the primary constraint to increasing crop production. Bullocks will continue to be the common source of farm power, mainly because they are adequate and live on waste residues. Animal power is generally used for tillage operations, haulage and operation of some water-lifting devices. A draught cow is a multipurpose farm animal, providing power, milk, dung, calves and meat. Normal draught power of bovines is presented in Table 3.11.

Table 3.11 Normal draught power of bovines

Animal species	Weight (kg)	Approximate draught (kg)	Average speed of work (m/sec.)	Power developed (m/sec)
Bullocks	500–900	60–80	0.6–0.85	0.75
Buffaloes	400–900	50–80	0.8–0.90	0.45
Cows	400–600	50–60	0.7	0.70

Source: FAO-1966.

Draught animals of the State are bullocks and male buffaloes. There were about 30 lakh landholders in Chhattisgarh (in 2002) and average landholding size in the state was 1.4 hectare. About 21.5 lakh land holdings were of the small and marginal farmers. About 21.5 lakh pairs of bullocks and male buffaloes shall be required for ploughing the agricultural fields of 21.5 lakh small-marginal cultivators in the state.

As per the livestock census 2003, the state had about 14 lakh pairs or 28 lakh of draught bullocks. Besides, there were about 4.4 lakh pairs or 8.8 lakh of draught male buffaloes in the state. In all, about 18.4 lakh or 18.5 lakh pairs of draught bovines are available in the state (Table 3.12). Even if, 2 lakh younger cow-bullocks and buffalo draught bullocks of the yester years came of age and joined the yoke, there would still be only 19.5 lakh pairs of draught animals in the state (for 2003). Supply side of

buffalo and cow bullocks can meet only 18.5 lakh pairs of draught's demand. Whereas, the agriculture based requirement is for another 4 lakh more draught animals ,which has to be met.

Table 3.12 Status of draught animals' availability in Chhattisgarh (for year 2003)

No. of working draught cow-bullocks years of age	No. of male cow-calves between 1-3	No. of working draught buffalo-bullocks of age)	No. of male buffalo-calves (1-3 years available as draught	Total No. of bullocks and male buffaloes
28,37,086	8,04,961(Not yet available for draught)	8,78,911	1,09,290 (Not yet available for draught	37,15,997 (= 35 % of total bovine population of state)

Source: Chhattisgarh Livestock Census Report, 2003.

Ongoles and Nagauris Sell in Chhattisgarh

The canal irrigated villages, particularly those that get irrigated with the Gangrel canal and its distributaries, developed as the major rice belt of Chhattisgarh. About 1.5 lakh hectares of double canal irrigated or tube well irrgated land emerged. The small but thousands of enterprising farmers from 7 core districts of Chhattisgarh rice bowl started buying very good quality bullocks from the traders of Uttar Pradesh, Rajasthan, Bundelkhand (Madhya Pradesh) and Maharashtra. These enterprising paddy farmers wanted fast and sturdy bullocks. They spent up to Rs 30,000 for a pair of champion draught bullocks.

The word spread very fast through grape vine. By the year 2002, a large number of Gir and Gir-cross bullocks, Kenkatha and Hariana bullocks, Red Kandhari, Gaolaos and Ongole bullocks, Digras. Bastaria and even mewati, Kankrej and Nagauris started coming to Chhattisgarh. Every year, about one lakh draught bullocks come, either walking, travelling on the trains, or by the truck-loads. These caravans of draught bullocks brought along with some sturdy buffalo male calves of Pandherpuri, Nagpuri, Murrah crosses, or whatever they could bring. These draught animal sellers come in droves of five men and 60 to 100 cattle, per group. Each group had to travel either from Ratanpur to Takhatpur or then further to Kota, in some cases they go up to Lanigir, before selling all their prized bullocks and buffalo calves. Ratanpur in Bilaspur is emerging as the major draught bovine trading centre.

Between mid December and mid February, in two months, about 2,000 heads of choicest draught get sold in Ratanpur. Average revenue per pair for the trader come to about Rs 18,000. These draught traders then move in various am all towns of Dhamtari, Janjgir, Durg and Kawardha between mid February and mid-April. Our estimate is about one lakh to 1.5 lakh draught animals are sold by the outside traders every year. But it is a mere rough estimate. A detailed study will reveal more facts about the draught trading in Chhattisgarh.

6.4 Buffalo draught power

Buffaloes also provide leather, draught and dung, and the estimated value of contribution would come to around Rs 3,200 crore for the year 1996-97 (at current prices). Therefore, the total value of outputs offered by buffalo to India was to about Rs 53,500 crores in 2003-2004 (at current prices). In Chhattisgarh male draught buffaloes are preferred over the bullocks because they are better suited for paddy cultivation. Hence more than 50 % of the total buffalo population in Chhattisgarh is used as a draught animal (Table 3.13).

Table 3.13 Buffalo population in Chhattisgarh (2003 Census)

No. of male and female calves below 1 year	No. of female buffaloes > 1 year	Draught male buffaloes	Total No. of buffaloes in the state (all)
136,763	438,998	878,911	1,598,041

6.5 Improvement

Improved performance is a function of better feeding, care and management : About a decade ago, average DAP output per animal (average weight 187 kg) during ploughing operation was 0.19 kW (0.25 hp), i.e., 27 % less than what was recorded by later in 2001. Assumption is that the salutary DAP effect could be attributed to improved animal care, resulting in 34% increase in average weight of the animal. Over the last decade, there has been substantial change in the DAP system, and draught animals have assumed a greater role and were provided with better care (Table 3.14).

Table 3.14 Bullock draught power output during different agricultural operations

Operations	Average speed (km/h)	Tractive effort (KGF)1	Power (kW)2
Ploughing 2.4	78	0.52	
Levelling 2.7	48	0.36	
Puddling* 1.6	95	0.42	
Weeding and earthing up*	2.6	47	0.34

A figures are based on 8 hours' operation (7 hours' ploughing and 1 hour's levelling) by a pair of bullocks. Each bullock weighed 250 kg. 1.1 kgf = 9.806 Newton; 2.1 kW = 1.34 hp; * Estimates based on Singh and Naik (1987).

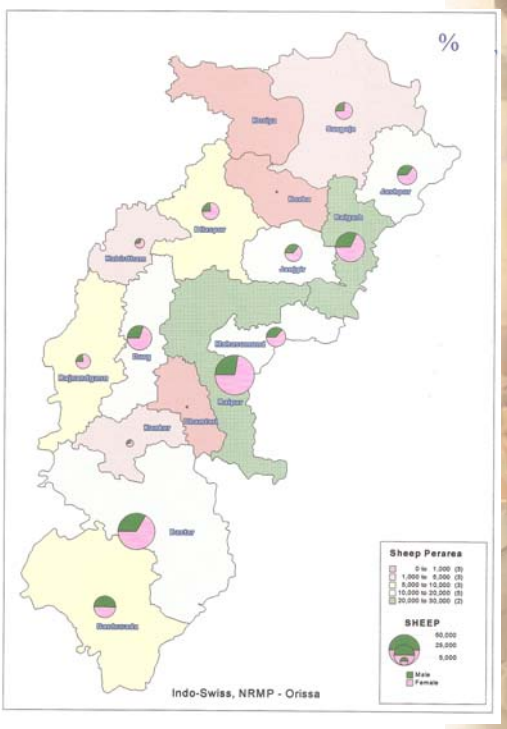
To have better draught animal power the following aspects should be considered:

- For landless people to be able to repay a loan for purchase of bullocks, to feed them, and earn sufficient income to meet everyday costs, they must be able to work their animals for 6 hours/day.
- Draught animal nutrition- Animal nutrition is a principal factor in increasing the performance of draught animal power. This is possible only if the balanced feed is available.
- Breeding and selection — Selection of the best local bull is necessary. Draught animals are currently selected according to their conformation, temperament and health; however, farmers often rely on what is available locally.

4. MEAT PRODUCTION

4.1 Meat animal status

In pastoral and subsistence farming societies of Chhattisgarh small animals, viz. sheep, goat, pigs and poultry, the meat animals, are kept as a source of investment and as an insurance against disasters. The scope for improvement of living standard of rural and per-urban poor, especially those below poverty line through development from meat animals is bright. Most tribal communities in the state have socio-religious sentiments to small animal coat colour, appendages over body etc. In Chhattisgarh, goats and sheep are primarily raised by community groups i.e. Gadarias, Rauts, Adivasis (scheduled tribes) and Debars. Other Backward Communities also rear these animals.



4.1.1 Sheep

Sheep population in Chhattisgarh is comparatively small; however, Bastar and Ambikapur districts have large number of sheep. Raipur, Raigarh, Jagdalpur (Bastar) and Durg are the only districts in Chhattisgarh with sizable sheep population (Map 4.1).

Sheep population in India = 61.47 million (2003—17th Livestock census)
Sheep per person in Chhattisgarh = 0.06
Human population Chhattisgarh = 26.6 million (2001 census)
Sheep population in Chhattisgarh = 0.121 million (2003)
Sheep per person in Chhattisgarh = 0.0045

Dantewada, Bilaspur, Ambikapur, Janjgir, Mahasamund, Jashpur and Rajnandgaon districts are with moderate number of sheep. Koriya, Dhamtari, Kawardha and Koriya had almost non-existent sheep population.

4.1.2 Goat

In Chhattisgarh, there are five districts with high goat density (Map 4.2), seven districts with moderate goat density and four districts with low-goat-density (Table 4.1a,b,c). Presence of lowest number of goats in areas like Dhamatari and Mahasamund could be attributed to irrigated high intensive cropping areas, consequently local community's low dependence on marginal livestock resources of goats. Ambikapur and Dantewada districts have low irrigated areas and have a large community who depend on goats for meeting their livelihood requirement.

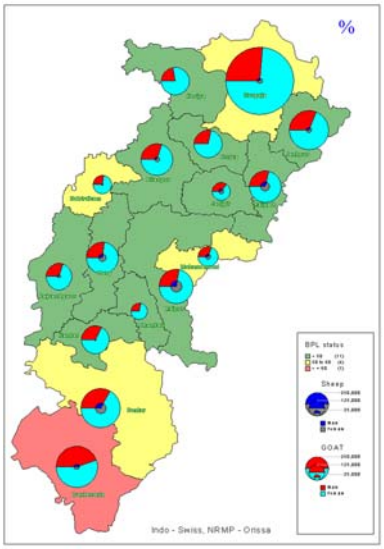
Goat population in India = 124.4 million (2003—17th Livestock census)
Goats per person in India = 0.12
Human population Chhattisgarh = 26.6 million (2001 census)
Goat population in Chhattisgarh = 2.34 million (2003)
Goat per person in Chhattisgarh = 0.09

Table 4.1a High goat density districts of Chhattisgarh

District	Population of goats
Ambikapur	506821
Dantewada	220838
Jashpur	202212
Jagdalpur	193289
Raipur	151635

Table 4.1b. Moderate goat density districts of Chhattisgarh

District	Population of goats
Raigarh	134830
Bilaspur	133935
Durg	130892
Koriya	115154
Kanker	114037
Korba	113157
Rajnandgaon	103371



The nomadic and pastoral sheep and goat herders, of raika and rebari castes of Rajasthan, Gujarat and Madhya Pradesh (small number of nomadic from Malwa-Nimar region) visit Chhattisgarh seasonally with their large flocks of sheep and goats. Some residents of Chhattisgarh buy sheep and goats from these peripatetic pastoralists. These pastoralists of neighboring states however, rarely go up to the Ambikapur and Bastar regions of Chhattisgarh.

Table 4.1c. Low goat density districts of Chhattisgarh

District	Population of goats
Mahasamund	64213
Kawardha(Kabirdham)	57576
Janjgir(Champa)	51677
Dhamtari	42086

The residual breeds of goats and sheep left out from Rajasthan and Gujarat flocks are found in all parts of Chhattisgarh except in Bastar and Ambikapur regions of the state.

4.1.3 Pigs

Pigs in Chhattisgarh are mostly native black, small and mostly non-descript ones. The genetic resources are yet to be identified. Pigs are in small number in Chhattisgarh and are located in tribal belts mostly (Map 4.3).

Comparative Study of Pigs in Chhattisgarh

Total World Population of Pigs (2003) = 956 Millions — Box-3

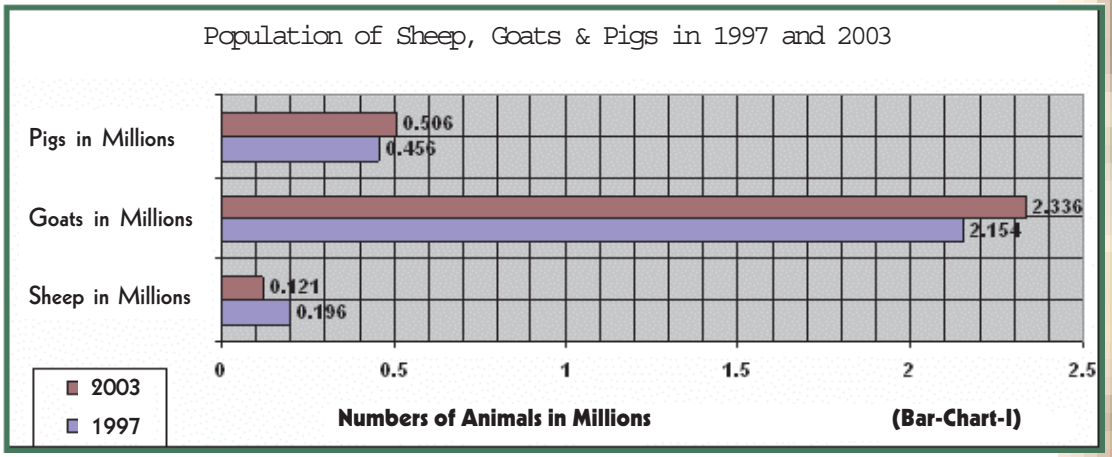
Country	China	EU-25	USA	Brazil	Canada	India	Chhattisgarh
Population (million people)	1,350	455	270	180	32.5	1028	26.6
Land mass (million km^2)	9.59	3.23	9.63	8.51	9.97	3.29	0.135
Pig population (million heads)	469.0	151.9	60.5	32.6	14.6	135.2	0.55
Pigs/km^2	48.9	47.0	6.3	3.8	1.4	41.09	4.07
Pigs/person	0.34	0.33	0.22	0.18	0.45	0.13	0.02

Source : L. Roppa, 2005. Census of India 2001 and 17th Livestock Census of India

Table 4.2 Four piggery major districts of Chhattisgarh

District	Population of pigs
Dantewada	132837
Jagdalpur	129559
Jashpur	69434
Kanker	65943

Dantewada, Jagdalpur, Jashpur and Kanker districts have high pig population (Table 4.2). No other district in Chhattisgarh has even as many as 15,000 pigs each.



The population of sheep in Chhattisgarh dropped abruptly in 2003, whereas, there was a moderate rise in the goat and pig population of Chhattisgarh.

4.2 Production of meat and meat products

Chhattisgarh animal husbandry sector contributed about 3.2% to state income and agriculture, horticulture and animal husbandry sectors are clubbed together Chhattisgarh (Technical Note to State Human Development Report of Madhya Pradesh, 2002, UNDP).

The share of AH sector was 3.2% and contributions was estimated about 1,075.7 crores (at current prices) in 2004-05. It is thus concluded that in Chhattisgarh state about 20% meat comes from goats, about 8% from pigs and about 5% from the sheep. Remaining 67% comes from poultry, fish and others. Goat meat is in second rank after poultry third rank after fish. (NSDP data by Directorate of Economics and Statistics of Chhattisgarh).The detailed calculation is given in Annexure I.

4.3 Meat consumption

The data for average meat consumption per day per person for the Chhattisgarh state are given in Table 4.3.Nearly 20 million inhabitants consume an average of 260 tonnes per day (Table 4.3). However, if one goes by the registered abattoir based data, assuming each animal yields 15 kg meat, then 1,500 animals slaughtered per day shall yield total of 22.5 tonnes of meat.

Table 4.3 Per capita consumption of meat in Chhattisgarh and India (kg/annum)

Commodity	Chhattisgarh	India	
	1999/2000	1999/2000	1983
Goat meat / mutton	0.25	1.0	1.1
Total meat	0.96	3.5	2.4

Consumption of meat is one-fourth of the country's average consumption of these products. There are considerable rural-urban disparities in the consumption pattern. Food basket of urban consumers includes more of animal products (Table 4.4). Per capita consumption of meat is 2.3 times-higher in urban areas.

Table 4.4 Per capita consumption of meat in rural and urban areas of Chhattisgarh, 1999/2000 (kg/annum).

Commodity	Rural	Urban
Goat meat and mutton	0.15	0.80
Poultry meat	0.60	0.98
Total meat	0.81	1.81

4.4 Infrastructure and existing policies

4.4.1 Situation analysis of slaughterhouses: There are four major slaughterhouses in Chhattisgarh. These are run by the local urban governance bodies or Municipal Corporations/ Municipal Committees. Raipur, Bhilai, Bilaspur and Durg based abattoirs meet the target of slaughtering about 8,000 small ruminants, every day. These abattoirs manage about four-fifths of total animals slaughtered. As per one estimate, about 15,000 sheep, goats and pigs are slaughtered in Chhattisgarh every day.

4.4.2 Trading and marketing: There are no organized markets for the trading of these sheep, goats and pigs. However, there are unorganized live animal bazaars or markets in about 30 locations in Chhattisgarh state. But most of the farmers prefer to sell their goats, sheep and pigs from their own homesteads. Actually, about 75% farmers in the state are subsistence farmers (who rear 3-4 meat group adult animals) and they are engaged in multiple subsistence livelihoods. They do not generally choose special markets or bazaars for selling their produce. Middlemen often purchase animals from the households of the farmers. Only the slightly bigger farmers, who rear between 10 to 20 adult sheep/goats or four to five adult sows, sell their produce in markets. As an organized livestock market does not exist, it is difficult to gather data for the actual number of meat animals sold quarter-wise or annually. Estimates could however be arrived at through field based sample study.

4.4.3 Animal health services: Chhattisgarh state has 19,720 inhabited villages. In recent years, 435 villages of the state are well organized within the ambient of ILD Project. Such intensive livestock assistance is required to all the remaining villages of Chhattisgarh state. The ILDP assisted villages receive the routine professional inputs from the veterinary department, which turns out to be about one VAS for every 60 villages and one AVFO for every 25 villages. An efficient animal health delivery system is the need of people, and it will boost the small animal production and productivity of meat in rural Chhattisgarh. Moreover, Chhattisgarh depends on Madhya Pradesh for High Security Epidemiological Laboratory assistance and Biological Products Division for animal vaccines and biological.

4.4.4 Grazing areas and availability of common lands: Biotic pressure on Chhattisgarh is relatively low due to sparse population density of Chhattisgarh. The density of meat-animals in Chhattisgarh is thin. This factor too allows a more land area per meat animal in the state. Villages in Chhattisgarh have some common lands and fallow lands. These lands also provide space for growing fodder and grazing. On 23% area, which is protected forest, the community based Joint Forest Management committees have been activated. The villagers look after these lands and grazing is allowed on such lands. Un-cultivable and cultivable wastelands also provide some area for bio-mass development and grazing by sheep and goats. Pigs in Chhattisgarh live on refuse, agro by-products and, residues of kitchen. In future, graded and quality pig production shall require additional and special feeding regimens.

4.4.5 Taxation, levy, cess and other charges: As of now no taxes or levies are charged from live animal market. With the promulgation of 'The Regulated Marketing of Live Animals Act' the local bodies are empowered to conduct animal fairs and, local bodies could levy tax for the same.

4.4.6 Laws and regulatory measures for meat sector: There are only three laws enacted for animal husbandry sector. But none of these is relevant to meat animals. Probably SPCA is the only relevant law to this group. Slaughtering the animals in the abattoirs would be the only provision that needs to be strictly followed. Improvement of abattoirs to provide safe and hygienic animal product shall be the future endeavour.

4.4.7 Breeding policy of meat animals in Chhattisgarh

4.4.7.1 Biodiversity: The biodiversity of sheep, goat, and pigs is awaiting studies and reporting. It is essential that the local population of animals is well evaluated to plan structured development in scientific lines. In long years of isolation and breeding, the people of Chhattisgarh especially the tribals, have developed groups of animals with homozygous characteristics, and these are to be identified.

4.4.7.2 Breeding: Two meat-type breeds of sheep got introduced. A large number of Nellore and Marwari breeds of sheep are found in Bastar and Raipur respectively. Nali, Bikaneri, Mehsana and other lesser-known sheep breeds also occur in the state. Jamunapari goat breed is the choice (under buck distribution and grade improvement scheme) to improve the local nondescript goats. Some scientists are suggesting introducing Surti, Beetal and Barbari goats in Chhattisgarh. The Boer goat (initially with funds under watershed projects and DPIP scheme) came to Madhya Pradesh and Chhattisgarh. Definite breeding tracts for the sheep, goats and pigs are yet to be identified. The genetic resources of small animals still need exploration and reporting.

Table 4.5.Annual distribution of graded bucks, boars and pigs units to farmers

Particulars	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Special Component scheme						
No. of Jamunapari graded bucks distributed	61	122	160	158	484	Nil
Graded Boars Distributed	106	160	123	128	406	Nil
Scheduled Tribes Livestock Inputs Scheme						
Triad Units of pigs (two sows and one boar) to scheduled tribes	130	16	55 Traids	82	1154	Nil
No. of Jamunapari graded bucks distributed	* No bucks but 37 boars	108	130	158	908	Nil

Source: Administrative Reports of Department of Veterinary Services and Animal Husbandry, Jan 2000 -Dec 2006, Government of Chhattisgarh.

Under special component scheme, 985 graded bucks and 923 graded boars were supplied to the goat and pig farmers of the state, respectively in 2000. And under the Scheduled Tribes Livestock Support and Inputs Scheme 1,437 triad units and 37 boars or 4,348 pigs were distributed for up gradation of their pig stock, Meanwhile, 1,304 graded bucks were also provided to them. In other words, since the formation of new state, the state government has distributed 2,397 exotic or graded exotic boars and 989 Jamunapari graded bucks to the adivasi community of the state (Table 4.5).

Large White Yorkshire (LWY), Middle White Yorkshire (YWS), Hampshire, Russian Chamukha (RC) and Krishnashire breeds of pigs were introduced. During the sixth and seventh Five Year-Plans two pig breeding farms were established in Chhattisgarh. The Jagdalpur Pig Breeding Farm has been producing 6:1:1:1 ratios of Large White Yorkshire, Hampshire, and Krishnashire (also called Jabalpur Black, developed through crossing large White Yorkshire with the native black pig – in Jabalpur Veterinary College). The Sakalo Pig Breeding Farm in Ambikapur district (started in 1987 – under 7th Plan Allotment) also has these four breeds of pigs. These two pig breeding farms of state government have been promoting the up gradation of native black mini-pigs since their inception.

4.5 Capacity building and consultative mechanisms available for effecting policy changes

Rural livestock in Chhattisgarh is under small holder and traditional subsistence farming system. The system has inbuilt risk coping mechanism for the communities. The transition from forest dependent and subsistence farming to improve farming system with modern technology needs structured approach keeping in situ the concept of subsistence risk mitigating mechanism and traditional wisdom. Adaptation of skills and knowledge to reduce losses of livestock will improve the family income and shall strengthen the confidence level of the farming families. The critical role of the government is to support the transition to maximize returns through the available resources and family labour.

Constraints the poor face to earn livelihood from livestock are:

1. Acquiring livestock
2. Maintaining and retaining livestock including high risk from infectious diseases.
3. Selling livestock and their products.

For poverty alleviation through small animal development the emphasis is to be laid on :–

- Species of livestock kept by the poor (small ruminants, village pigs and backyard poultry), and genetic improvement of local adopted, highly prolific indigenous breeds/ populations and more resistant breeds.
- Development of Goacher land (CPR) management system, and fodder packages that give high yield per hectare of high quality feed and dual purpose crop species including trees for marginal lands.
- Increasing the availability of animal health related products e.g. thermos table vaccines, low cost anthelmintics to control internal parasites; appropriate breeding techniques (such as Natural Service facilities and cheap, easily administrable drugs for controlled breeding), long shelf-life products such as dried meat, household processing of milk like ghee.

- Integrated farming system to develop technologies for low input farming systems, with maximum nutrient re-cycling, including improving low quality fodder and energy re-cycling through increased biomass production, reduction of nutrient losses and increased production efficiency.
- The smallholder farmers to become competitive in economic terms at cost of production to sustain the onslaught of commercial farming system and meet the future challenges.
- Selling livestock and their products so that gradually peri-urban poor small holder producing units change in livestock production practices. They will move from a local multi-purpose activity to one increasingly market oriented and vertically integrated business and influence the rural smallholders in Chhattisgarh.

4.6 Sheep, goat and pig development plan

The pig sector has to be given adequate attention as it suffers from lack of emphasis in policy support and development from policy makers.

4.6.1 Breeding

Sheep and goat: Small animal genetic resources of Chhattisgarh are to be explored for better utilization and conservation. The populations of small animals in Chhattisgarh may be having valuable germplasm, because the tribal farmers have bred them in isolation since ages. The small ruminant population in Chhattisgarh needs to be made more efficient in productivity traits like body weight, growth rate, FCR, meat quality and milk production. Open nucleus Breeding System (ONBS) may be established in developing the flocks of the participatory farmers.

The recommended breeding policy for sheep and goat is — selective breeding to gain early growth and body weight for marketing. The breeding strategy will be first to improve milk yield of dam to gain early growth followed by selection for carcass weight and multiple birth type. Early maturity, parasitic resistance, adoptability to local climate and feeding management will be considered for selection. The Chhattisgarh Veterinary College, Durg, will have technical programme for development and supply of breeding rams and bucks. Barbari, Surti ,Beetal, Jamunapari breeds can be utilized for goat improvement. Malpura, Nali, Marwari, Sonadi, Patanwadi, Edka and Ganjam sheep can be considered to improve local sheep.

The sheep and goat farmers shall be promoted through breeders associations, cooperatives and self help groups. They shall be trained in protecting their flocks against infectious diseases and marketing surplus at reasonable price. Artificial insemination centers meant for cattle are recommended to be strengthened for AI in goats using semen from superior breeding bucks.

Pigs: In most villages, there is shortage of breeding male pigs and a system to hire it or for its collective management is required. The crossbreeding of desi pigs with exotic breeds is to be continued where the community can afford to give additional feed and improved management conditions. Owing to 20 years of intervention by Sakalo Pig farm and 25 years of Jagdalpur Pig Farm's contribution, the state recorded total of about 13,500 pigs, 2.7% of the crossbred pigs (and about 5 lakh of native pigs), as on 2003 livestock census. The major steps to be taken for pig improvement are :

(a) Select the best characteristics-fit native pigs through intensive selection, and through promotion evolve a pure local breed from amongst the indigenous pigs – say Chhattisgarh Pig Breed-CPB;
(b) Cross this CPB dams with Krishna shires (with 75% Large White Yorkshire Blood) or with Large White Yorkshire, pure bred or preferably with the boars of Duroc breed;
(c) Find other suitable Asian or Latino breeds of pigs for pilot testing.

4.6.2 Nutrition

Sheep and goats: Multi-purpose fodder trees should be introduced in the state in consultation with silviculture specialists and Department of Forests. Indigenous knowledge in goat feeding should be incorporated. Farmers shall be encouraged to adopt stall feeding management in small ruminants production.

Feeding of fodder leaves of subabul (Leucaena leucocephala), babul (Acacia nilotica), safed kikkar (Acacia leucophloea), neem, and maha-neem (Ailanthus excelsa) to sheep and goats should be promoted. Mixed fodder based synergistic combinations should be recommended for each district, based on local prevalence of fodder yielding trees.

Grazing-based goat-sheep farming and forest policy of Government: Chhattisgarh State Forest Policy, 2001 was released on 22nd October 2001. Its objective is giving open access resources (OAR) into community controlled, prioritized, protected and managed resources and meeting the requirements of fuel wood, fodder, minor forest produce and small timber of the rural and tribal population with due regard to the carrying capacity of the forests. Carrying capacity of forests, lying within the vicinity of villages rearing goat and sheep should be calculated and strictly monitored to manage forests on long term and sustainable basis.

Pigs: The present pig farmers are in subsistence systems in which pigs are raised for local consumption, and maintenance of important socio-cultural values. The system has to be improved as dual-purpose systems where pigs shall be raised by smallholders for subsistence and commercial reasons, with emphasis on later. Balanced feed will be required for upgraded pigs for their better performance.

4.6.3 Health

Sheep and goats: High mortality in sheep and goat especially at early age, is of great concern to farmers. So an efficient animal health service system needs to be established at the village level to improve the survivability.

Pigs: An appropriate animal health service ,which provides veterinary aids in time to pig farmers has to be established. Swine fever through vaccination and endoparasites with effective and low cost anthelmintics are to be controlled on long term basis. The piglet mortality is high, which can be reduced through management practices and administration of iron to the new born.

4.6.4 Training

Sheep and goats: The small animal farmers should be given knowledge on basic aspects of small animal production, selection of breeding males, feeding, fodder tree production and their maintenance, and control of major killer diseases and confidence to demand animal health service. Each village need to have one Community Animal Health Worker so as to provide first aid treatment to animals on service charge basis.

Pigs: Women are responsible to raise pigs at home and they should have access to

information and training by extension staff in all aspects of pig production.

4.6.5 Market

Sheep and goats: Unlike the prevalent animal bazaars of Chhattisgarh, regulated species-wise animal fairs should be organized and for empowering these animal fairs Chhattisgarh – Animal Fairs Act of 2006 – a legislation should be enacted (on the lines of Rajasthan Animal Fairs' Acts – entrusting a series of a la Pushkar melas, across the state) and applied. It shall be very effective for systematizing and regulating the small ruminants' into an organized trade fair that help producers and buyers to negotiate and moderate once in a quarter kind of marketing face off. Marketing of small ruminants and pigs would have to work more like a commodity or a Bhindi market, coming every week, fortnight or month for seeking return to labor and profit. To promote these commodity meat markets 'Live Animals' Market Yards are to be developed across every 50 km in major production districts of these animals. These meat commodity markets may be developed in and around the traditional haat areas. Improvement of the market places with support of physical infrastructure is an essential factor in organizing markets.

Pigs: Smallholder pig farmers should be encouraged to organize themselves into self help groups so that their inputs are cheaper and more accessible; and they become price-makers rather than price-takers.

4.6.6 Slaughterhouses

Development of slaughterhouses on modern lines with strict hygiene measures is very crucial from the consumers health and safety point of view.

Annexure I

Chhattisgarh Net state Domestic Product (NSDP or state income) amounted to about Rs 15,710 crore at 1993-94 prices. However, the net state domestic product for the year 2003-2004 (at current prices) was estimated as Rs 32,620 crore compared to Rs 33,614 crore in 2004-2005. Whereas, the expected NSDP for Chhattisgarh state was expected at Rs 38,594 crores ((NSDP data by Directorate of Economics and Statistics of Chhattisgarh).

5. POULTRY DEVELOPMENT IN CHHATTISGARH

5.1 Introduction

Poultry sector has strong presence in Chhattisgah state. Backyard poultry and the commercial poultry are its two major sectors. The backyard poultry is mostly the indigenous variety poultry production base, which is auto generating in nature, low input and low out put based system, but is well adapted from centuries for the small holder. The poultry is for meat and male birds are for game purpose. The desi ducks and Muscovy ducks are also popular with tribal farmers in many districts of the state. The commercial poultry sector has layers and broilers, which are growing fast but the later has surpassed the growth in last decade. Chhattisgarh is competitive in this sector.

5.2 Poultry population

As per the 17th Livestock Census 2003, the poultry population is 8,004,859 fowls out of which 29.37% (23,51,004) is desi/nondescript poultry reared by village based smallholder livestock owners. (Map 5.1-5.6) Ducks and turkeys also exist in a small number (Table 5.1).Poultry farming in Chhattisgarh has shown an increasing trend (Table 5.2).

Table 5.1 Poultry population in Chhattisgarh

Species	Number
Fowl	8,004,859
Ducks	51,277
Turkey	2,876
Other Species	40,942
Total	81,81,324

Source: Indian Livestock Census 2003.

Table 5.2 Poultry growth rate in Chhatishgarh

Sl No.	2000-02	2002-03	2003-04	2004-05	2005-06
Broiler	11	14.22	16.1	16.57	16.5
Commercial layers	10.24	13.4	16.5	17.1	18.46
Coloured crosses	1.8	3	4.5	6.3	6.35
Non descript (desi)	34.2	37.62	42.9	40.58	40.5
Annual total	57.24 lakh	68.26 lakh	80.0 lakhs	80.55 lakhs	81.81 lakhs

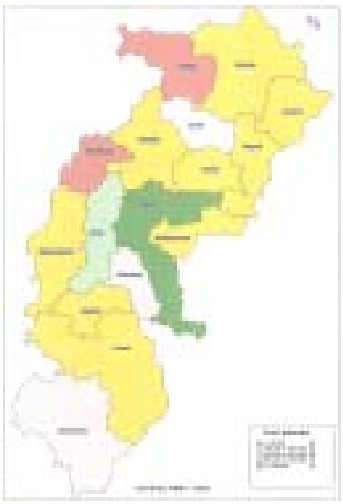
Source : Annual total from statistical cell directorate Raipur and variety-wise reports from above resources.

5.3 Poultry consumption

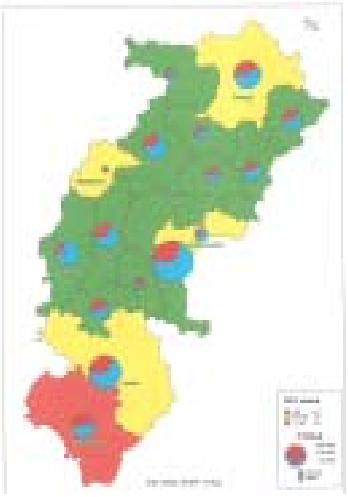
Egg consumption is 795 lakh per month in the state (Table 5.3).Eggs are being imported but still there is deficit of 147 lakh eggs per month. Chicken production is also low vis-à-vis monthly consumption in the state (Table 5.4).

Table 5.3 Status of egg production and consumption in state

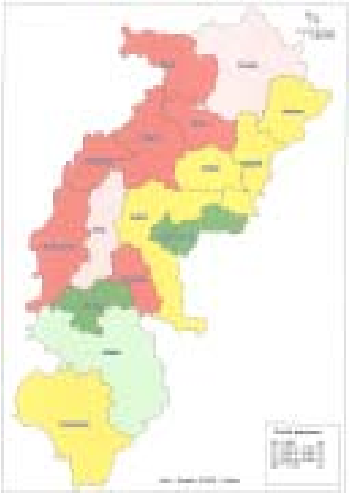
	Eggs produced (lakh)	Eggs import (lakh)	Total egg (lakh)	Egg consumed (lakh)		Eggs deficit/ month (lakh)
				Per day	Per month	
Total	17.45	4.9	26.5	26.5	795	147



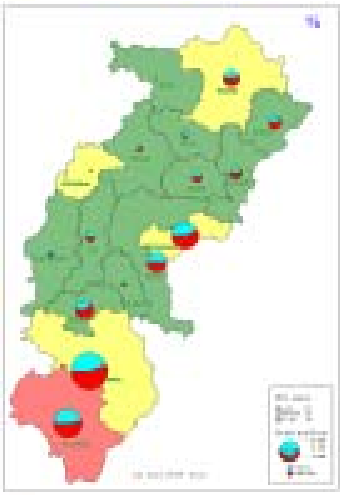
Districtwise fowl density per area



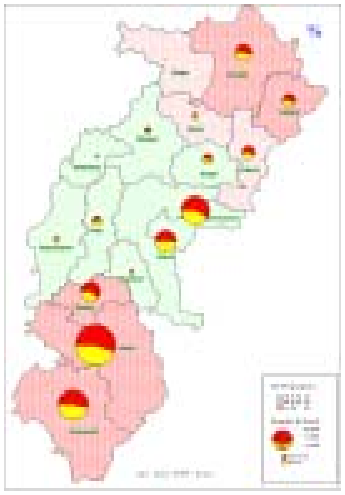
Districtwise BPL status and Fowls



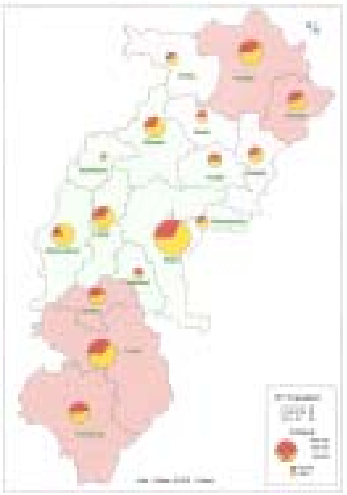
Districtwise duck density per area



Districtwise BPL status and Ducks



Districtwise ST population and Ducks



Districtwise ST population and Fowls

Table 5.4 State chicken production and consumption

State total blocks/Dist	Per month Chick production			T.P.D=Ton per day Chicken Import		Chicken consumption	
	Broiler	Layer	Total	Broiler	Layer	Broiler	Layers
State total (T.P.D)			1.15			1.21	
State total/year (LMT)			420			442	

5.4 Infrastructure

5.4.1Commercial poultry farming: The commercial poultry constitutes about 42% of total poultry population of the state.

5.4.1.1 Government Poultry Farms: There are 6 government poultry farms with total adult poultry holding capacity of 16,100 birds. These farms contribute to the 'backyard poultry unit distribution scheme' of the Animal Husbandry Department (AHD), supplying 55 number of 15-day-old chicks to selected village level beneficiaries. Annually they deliver poultry unit to about 15,000 beneficiaries where total government subsidy amount is in the tune of Rs 6,750,000. This yojana is in operation since 1998 and needs to be reviewed at this stage (Annexure 1).

Government poultry farms have poor infrastructure, aging machinery, inadequate HRM, irregular flow of funds, uncertain availability of replacement flock and shortage of skilled labour. All these reflect into having only 68% hatchability (average of all farms for past 5 years), higher mortality, poor feed conversion efficiency, lower culling rate and overall low output (Tables 5.5,5.6).

Table 5.5 Government poultry farm - Data year 2004-05

#	Government poultry farm	Farm capacity Adult	Growing	Chick	Chicks supplied	No. of beneficiaries
1	Raigarh	2,500	5,000	13,000	129,228	2,349
2	Baikunthpur	3,000	2,500	10,000	210,500	3,829
3	Jagdalpur	800	2,400	10,000	45,253	822
4	Kondagaon	800	1,600	6,000	23,000	460
5	Durg	6,000	3,000	30,000	183,676	3,340
6	Bilaspur	3,000	500	20,000	212,000	4,000
	Total	**16,100**	**15,000**	**89,000**	**803,657**	**14,800**

Table 5.6 Government poultry farm - Data year 2004-05

#	Government poultry farm	Adult bird capacity	Adult bird hatcher unit	No. of incubator unit	Hatchability % 5 year average
1	Raigarh	2,500	2	2	73
2	Baikunthpur	3,000	2	4	65
3	Jagdalpur	800	1	1	66
4	Kondagaon	800	0	1	65
5	Durg	6,000	2	4	68
6	Bilaspur	3,000	2	4	70
	Total	**16,100**	**9**	**16**	**67.83**

Backyard poultry supplied to the rural beneficiaries should be of colored varieties owing to local preferences and scientific reasoning. However, government poultry farms has 45% pure white variety as parent line resulting into poor acceptability and survivability under village free-range condition (Table 5.7).

Table 5.7. Breeds maintained in Government poultry farms (available data only)

#	Breed	Variety	Raigarh	Baikunthpur	Jagdalpur
1	White Leghorn	White	0	238	500
2	Australorp		229	0	200
3	White Rock		82	0	0
4	Kadaknath	Colored	65	0	0
5	RIR		634	295	200

5.4.1.2 Organized commercial poultry sector: The organized commercial poultry industry in the state owns about 70% of the total poultry population of the state, and is capable of all their development needs through the industry itself (Table 5.8). Suman Hatcheries Ltd. Sonapari Village Abhanpur District Raipur is indicative of the performance of these units (Table 5.9). In Chhattisgarh the annual requirement of layer chick in the organized sector is about 30-40 lakh whereas the current production is estimated to be about 8-10 lakh (Table 5.10). Similarly, broiler chick requirement is about 30 lakh and current production level is 5-7 lakh. The gap is currently met by inflows from neighboring states.

Table 5.8. Commercial poultry in Chhattisgarh, 2005-2006 (poultry population)

	Broiler (lakh)	Layers (lakh)	Coloured (lakh)	Desi (lakh)	Total (lakh)	Comm. poultry (lakh)	Rural poultry (Coloured)(lakh)
State total	16.57	17.1	6.3	40.58	80.55	33.67	46.88
State P.Pop%	20.60%	21.22%	7.80 %	50%		41.80%	58.20%

Source – Poultry Exchange Workshop 2006. State veterinary statstics, Vet consultant, chicks supplier, feed and medicine supplier.

Table 5.9. Suman Hatcheries Pvt. Ltd. - Abhanpur Raipur

#	Particulars	Numbers
1	Adult	20,000
2	Growing	10,000
3	Chicks	10,000
4	Hatcher	05
5	Incubator	18
6	Chicks Sold	2,37,000
7	Hatchability	86 %

Table 5.10. Commercial layer farms in Chhattisgarh

1:	Egg industries	2,50,000
2:	Jayshree poultry farm	1,25,000
3:	Sareena poultry farm	70,000
4:	Patel poultry farm	30,000
5:	Mahendra poultry farm	70,000
6:	Saini poultry farm	40,000
7:	Dhanlaxmi poultry farm	15,000
8:	Jaggi poultry farm	60,000
9:	Vishal poultry farm	20,000
10:	Punjab poultry farm	35,000
11:	H.N poultry farm	30,000
12:	Raipur poultry farm	35,000
13:	Happy poultry farm	35,000
14:	Royal poultry farm	1,50,000
15:	Mini poultry farm	70,000
16:	Rekha poultry farm	40,000
17:	Annapurna poultry farm	25,000
18:	Vishal poultry farm	30,000
19:	A one P poultry farm	15,000

20:	Hi Tech poultry farm	20,000
21:	Knoica poultry farm	12,000
22:	Plus poultry farm	10,000
23:	Prem Processing poultry farm	15,000
24:	Jeevan Mahindra poultry farm	15,000
25:	Sandhya poultry farm	10,000
26:	Mehul poultry farm	40,000
27:	Deshmuk poultry farm	20,000
28:	Shanti poultry farm	60,000
29:	Vivek poultry farm	30,000
30:	National poultry farm	40,000
31:	Khandwa poultry farm	25,000
32:	S.S. poultry farm	30,000
33:	Novel poultry farm	30,000
34:	Reddy poultry farm	1,00,000
35:	Kapoor poultry farm	40,000
36:	Irsad poultry farm	50,000
37:	Firoj poultry farm	20,000
38:	Kaku poultry farm	40,000
39:	Bhatia poultry farm	20,000
40:	Indian poultry farm	5,00,000
41:	Veash poultry farm	30,000

Commercial poultry has vast potential which has to be fully utilized for poverty alleviation (Table 5.11).

Table 5.11 Potential for commercial poultry production for egg and meat in Chhattisgarh

A: Layers	
Layers	21 lakh
Egg production	16.80 lakh /day
	6132.00 lakh /year
Import of eggs	1752.00 lakh /year (from Hyderabad and Orissa)
Eggs available	7874.00 lakh /year
Human population	210.00 lakh
Availability /person	37.5 eggs/year/person
B: Broilers	
Production	35 lakh × 12 = 423.00 lakh tonnes
Import	21.90 million tonnes
Total availability	441.90 million tonnes
Human population	210.00 lakh
Availability /person	2.20kg/year
C: Growth rate	
As per planning commission country growth rate = 4.3%	

5.4.2 Small holder rural poultry sector or backyard poultry - Situation analysis

About 30% of the state's poultry are from the rural area as about 70% of the rural households maintain small units in their backyard. Backyard poultry contributes 30% eggs and 35% poultry meat in the state. Backyard poultry is reared by landless, small and marginal farmers in villages of which a sizable population fall below poverty line. Poor farmers depend more on their poultry for supplementary income and liquid cash and any developmental efforts to strengthen rural household poultry production will have seminal effect on poverty reduction.

5.4.2.1.Characteristics of rural household poultry

Characteristics of backyard poultry are

- ❖ It ensures significant contribution to family household income.
- ❖ It lays focus on good nutrition and rural poverty in the form of liquid cash.
- ❖ High employment potential relative to investment.
- ❖ Role of women participation is relatively higher.
- ❖ Out of 176 million layers 73 million (41.5%) are maintained by small rural farmers.
- ❖ Small scale rural producers can be profit efficient.
- ❖ Country birds and their eggs fetch 25 – 30 % higher price than exotic hybrids.

5.4.2.2 Constraints in backyard poultry production

The constraints faced by backyard poultry farmers could be summarized as under:

- It is low input low output system.
- Flock sizes are highly variable and vary from as low as 2 hens to 10 hens per households.
- Mostly owned by women, and socio-culturally important with few religious taboos attached.
- Fowls with colored plumage are preferred.
- Color and sex of the bird is most important in many communities.
- Only indigenous scavenging poultry of local breeds are used.
- Scavenging poultry are good brooders, foragers and efficient mothers.

- They are more resistant to diseases and highly adapted to their environment.
- Feeding of the bird is through scavenging and use of locally available materials.
- Shelter is provided only during night.
- It makes significant contribution to family income.
- Most of the eggs produced are saved and hatched for production of poultry meat for home consumption, to meet socio-cultural demands and marginally for sale.
- Performance is highly variable due to wide variation in genetic potentiality and system of management including feeding conditions and health control measures.
- Meat and eggs of scavenging country fowls fetch higher price as compared to those procured from farm bred broilers/birds.
- Traditional, cultural and economic considerations lead to keeping poultry in small scale.
- Main input includes surplus household labor (mostly women), kitchen waste, agro-byproducts, and waste materials, insects etc.
- Broody hens are used for hatching of eggs.
- RD (Ranikhet discare) and fowl pox are the most important disease besides ecto- and endo- parasites.
- The system is auto generating, rural base, and forward and backward linkages are absent.

- Indigenous knowledge is mostly used for poultry care like — chick production, chick rearing, breeding of the stock, management of the flock etc.
- Birds are sold live.

Different types of poultry rearing systems are being practiced by backyard poultry farmers. Their strengths are discussed here.

Complete scavenging system: It is a zero input and low output system. It includes scavenging with no regular water or feed supply and a very little or poor night shelter.

Semi scavenging system: It is an improved backyard system. It includes regular water supply with supplementary feeding possessing improved shelter and care of chicks in the first week. The vaccination against RD and fowl pox is needed with treatment for ecto- and endo- parasites.

Semi intensive system: It is more or less similar to the second system but genetically improved chicks are used and nutritionally balanced feed is provided.

Small scale intensive system: It is similar to the third system with further improvement in husbandry practices. Here choice system is determined as per the availability of resources and inputs. Besides the level of inputs depend on socio-economic condition of the household. The poorer social strata of the local community mostly manage it.

Changes in the scenario have been brought by technical interventions (Table 5.12).

Table 5.12.Backyard poultry in BILDP villages based on the comparison to its pre and post condition

Before 1999	After 1999
Traditional scavenging	Semi-intensive system
Heavy mortality	Mortality below 10%
Stagnant population	Three - fold increase
Poor cold chain	Organized cold chain
Poor health coverage	Village based doctor
Poor feeding	Protein supplementation
Parasitic problem	Ethno veterinary practices
Predators attack	Bamboo made shelters

Given the present scenario, household rural poultry should be treated as one-of-the-many rather than the only livelihood option. The emphasis should be on increasing their income by improving the existing farming system rather than changing it. Making all poultry-rearing household, a commercial poultry farmer with semi-scavenging or intensive system of management is not advisable. However, routine healthcare facilities and basic management practices need to be made available to these smallholder farmers at their doorstep, and these practices have to be low cost, accountable and all-time accessible. This will ensure drastic reduction in production losses due to diseases, poor hatchability and threat from predators.

5.4.3 Poultry feed production

Feed is the most important input of poultry farming as nearly 70% expenditure is on feed. Balanced feed with mineral mixture have to be as per the standards.State imports poultry feed from other states (Table 5.13).

Table 5.13 Commercial feed production in Chhatishgarh, 2005-2006 (tonnes)

Names of feed mill	Production center	Feed sale %			Total feed (TPD)	
		Broiler	Layers	Total	Broiler	Layers
					MASH	MASH
State production		52%	35%	43.50%	26000	27300
From other states		48%	65%	56.50%	24000	50700
G. total		100%	100%	100%	50000	78000

5.4.4 Disease diagnostic facility

Major diseases encountered in the state are Ranikhet, fowl pox, bacillary white diarrhoea, coccidiosis and ecto- and endo-parasitic condition, which probably accounts for about 80% of the mortality in rural poultry. Data on epidemiology of the diseases, economic loss assessment, specific and sensitive diagnostic services are not easily accessible and disease warning system is nonexistent. There is acute shortage of skilled technicians and training facilities for continuous skill upgradation need to be arranged.

5.5 Improvement

The organized poultry industry in the state is self-sufficient, it needs only enabling policy support from the Government so that more small and medium commercial poultry farms come up to meet the huge gap in demand and supply of poultry meat, egg and products in the state. Animal Husbandry Department (AHD) of the State Government should laise with state's Poultry Farmers Association to address the needs and liabilities of the poultry farmers of the state with issue based perusals.

Infrastructure renovations, machinery upgradation, capacity building of manpower and financial autonomy should be completed in state owned six Government Poultry Farms. It is recommended to bring together the six farms under the umbrella of Chhattisgarh State Poultry Federation (CIPOLFED). The activities of federation should bring out necessary improvement in the poultry sector in the state. The federation will provide partially subsidized inputs (chicks, feed and vaccines) to rural small holder poultry farmers of the state. Emphasis will be on self help groups so that they may take-up poultry production as income generating activity. It will provide support for marketing desi fowls, organize farmers training / awareness programmes and strengthen vaccine cold chain management in rural areas.

Breeding: The overall breeding policy at the poultry farms has to be reviewed. Colour varieties of fowls suitable for backyard system should be increased. The non-descript breeds may be tested for improvement in laying capacity, FCR, meat quality and weight gain. Indian and exotic backyard breeds – Giriraja, Vanaraja, Sonali, Ganjam and Australian variety – should be tested for identifying the most suitable backyard breed in the state within 5 years. The breeding potential of farms will also be upgraded and maintenance of mother units up to grand parent level and regular replacement of grandparents has to be ensured. Special emphasis should be on preserving the local germplasm and biodiversity of Assel and its variants in Bastar region and on Kadaknath in Sarguja area. One of the best ways of preserving the local germplasm is by recognizing and promoting the existing rural household system of poultry. State owned Poultry Breeding Farms should be closed and alternate ways to utilize facilities may be found. Selected state poultry breeding farms may be retained to conserve and improve the genetic pool of indigenous breeds. Alternate use for loss making poultry farms like leasing to private sector, public-private joint ventures or use as farmers training centre, may be reviewed. The aim is conserving and developing indigenous poultry germplasm of the state along with appropriate breeding plans.

Diversification: Diversify the poultry enterprise of small holder group by promoting duck, quail, turkey, guinea fowl, geese and emu. The caste preferences for rearing these birds, like duck rearing is practiced exclusively among Dhakad community in Bastar, may be kept in mind before making changes.

Human resource development: Promotion of rural household poultry production under present scavenging / semis-scavenging system will be targeted. Following recommendations are made -

a. AHD staff to be trained on dynamics of rural poultry and extension. Paradigm shift is recommended from individual contact to group based extension. The Bastar Integrated Livestock Development Project can be identified as major service provider for this.
b. AHD staff be linked with the existing SHGs / exclusively poultry rearing SHGs in the rural areas and CIPOLFED so that the extension and follow-up support can be provided.
c. Paravets be trained, linked and supported by the department and cold chain facility strengthened so that the village level basic poultry health care needs be met with. It is strongly recommended here that paravets for exclusively poultry health care needs to be trained up to hamlet and SHG level (1 paravet for 1 hamlet/SHG).
d. Field level veterinary units will promote village level smallholder poultry farmers association and/or SHG federation at a later stage. The objective is to manage the marketing and risk coverage part of the enterprises.

AHD Diagnostic Centers: The rural household poultry farmers (as well as small scale commercial poultry farmers) should get poultry disease diagnostic support through existing departmental field network. Major recommendations are -

a. Epidemiological studies, to develop a Geographical Information System on poultry disease pattern in the state.
b. Development of disease forecasting and early warning system from the above information.
c. Monitoring disease outbreaks.
d. OIE recommended field test for Ranikhet Disease - HA/HI test, will be standardized for wide spread application.
e. Training of staff on epidemiology, diagnosis and other issue based themes eg bird flu.

Health: The major problem of the backyard poultry sector is high mortality. Ranikhet disease and fowl pox are to be controlled with regular vaccination, and villagers are be to be trained in identifying and preventing disease outbreak. Control of Ranikhet disease in poultry alone shall double the production of village poultry.

Feed: Appropriate agriculture production has to be planned in the state to meet the increase in demand of poultry feed ingredients like maize and soya.

Market: Village level small holder Poultry Farmers' Association should be promoted. Private sector poultry processing and marketing of safe healthy poultry products should be supported and for this, awareness has to be created to encourage people to use frozen poultry products. Indigenous poultry niche market should be developed and simultaneously encourage branding.

Policy: Government of Chhattisgarh needs to declare Poultry as Agriculture. The GOI has given directives and many states have declared the provision. It shall boost commercial sector to another new level. Government of Chhattisgarh has to frame a Contract Farming Law for the state to encourage contract farming and protect the interests of the farmers. Already, Suguna Poultry, a firm has made appreciable change in broiler production in Raigarh district etc. Its a good learning example.Clear guidelines on location of commercial farms and disposal of waste and control need to be framed.Government of CG and Veterinary universities and premier National Poultry Research Institutes to need to focus on backyard poultry development and reduce research where Private sector has an edge and an interest. Private and Public sector partnerships need to be promoted to develop the backyard poultry sector and reduce poverty.

A Concern : *The major challenge is to motivate AHD to make way for change management in the poultry sector. The AHD focus should be Backyard poultry based livelihoods and to provide monitoring and policy support to commercial poultry segment.*

ANNEXURE 1

Feedback on Backyard Poultry Unit Distribution Yojana Department of Animal Husbandry Government Chhattisgarh

Present Yojana Components:

1. The VAS/AVFO of Veterinary Hospitals and Outlet Dispensaries select beneficiaries randomly with participation of local public representatives.
2. Fifty-five chicks of 15 days age are given along with feed and a little medicine to selected beneficiaries.
3. The beneficiary has to pay Rs.150 and subsidy amount is Rs. 450. Thus the unit cost is Rs.330 for Chicks, Rs.250 for feed and medicine and Rs.20 for transportation.

Observed field outcome:

1. Chicks (say 20 to 25 out of 55 supplied) die due to adaptation problems (sudden change from farm condition to free range) within 1 to 3 weeks from date of supply in spite of field support by departmental staff. This goes unreported because of several reasons.
2. Out of remaining 25 to 30 chicks 10-15 are males (rest are females) of which 8 to 10 reach market / breeding stage after 8 to 10 months, valuing Rs.640 (@Rs80/bird) These mortalities are due to weather extremes, predators, thefts, worm infestation and diseases like ranikhet, fowlpox, coccidiosis, bacillary white diarrhea, and coryza. Of these first 2 have good vaccine and next two good medicines.
3. Thus out of say 10 – 15 surviving females only 8 - 10 reach laying stage, valuing Rs.640. The hens have potential to lay 250-300 eggs per year. Desi produces only 40 to 60 eggs per year. Here there are two major problems.
    a. The farm layers supplied to the villagers have been genetically selected by breeders for high laying (250 to 300) and better feed - conversion ratio. This has caused the improved breed to loose traits like broodiness and maternal instinct. Broodiness is the trait by which the hens sit on her laid eggs and provide ambient temperature and humidity for the eggs to hatch. Thus supplied hens tend to leave their eggs for longer duration and the hatchability becomes very poor. We have seen villagers to place the eggs from supplied hens, under their own desi broody hens. This is a very practical, though not always available, solution to the problem.
    b. The maternal instinct trait helps the desi birds to guide her 10-15 chicks in the villager's backyard providing food and security. This is critical for survivability of the chicks up to 1 to 3 weeks of age.

Suggestions for improvement:

1. Age of chicks should be raised from 15 days to 30 days and if required unit size may be reduced to accommodate this change within the present budget framework. Survivability of the supplied chicks in village condition will greatly improve. We have tried this in small pockets within our project and have found to work better.
2. The breed of the poultry supplied are crosses of White Leg Horn (WLH), Plymouth Rock and Rhode Island Red. Although attempts are made by government poultry farms to supply colored chicks a large number of white birds reach beneficiaries because WLH is purely white colored breed. There are two good reasons why exclusively colored birds should be supplied to villagers. One - The natural preference of the villagers is to rear colored desi looking birds, so that they fetch good price in the market. Two – The colored bird can effectively camouflage with the village surroundings and thus has greater chances of survivability from animal and sometimes-human predators in village condition. This means that the breeding policy in the poultry farms and the parent stock they keep, needs to be reviewed.
3. As discussed in the above sections we should make efforts to have a suitable backyard breed in our poultry farms to be supplied to the villagers. Bangladesh is recognized world over as very successful in promoting rural poultry, they have adopted breed 'Sonali', which has better laying capacity (180-240 eggs per annum) and has retained its maternal instinct trait and broodiness. In India, available breeds are Vanaraja and Giriraja in Andhra Pradesh and 'Cari nirbhik' Central Avian Research Institute, Izatnagar and Kalinga Brown by Central Proultry Breeding Organization Mumbai. Aseel crosses with standard farm breeds can also be attempted in Bastar area.
4. Regarding selection of beneficiaries, preference should be given to members of a particular SHG run by ICDS, Janpad Panchayat or NGO so that the beneficiaries see it as an income-generating source. More beneficiaries in selected village cluster should be selected so that there is proper follow-up.
5. The field level functionaries should see that the beneficiaries have low cost poultry house for night shelter, bamboo waterer and feeder for supplemental rations, and know the use of candler and little basic poultry medicines including deworming and antibiotic mixing in feed in the event of white diarrhea.

Potential of output if the Yojana is modified suitably: Out of 55 supplied chicks if 20 male and 20 females reach market/ breeding stage the value of the flock becomes Rs. 80 × 40 birds = Rs.3200. If 50% of these are kept for production of eggs/chicks this may well be a viable small-scale enterprise providing a steady income of about 2500 per annum. This will make the initial government subsidy of Rs.450 per unit meaningful.

6. FEEDS AND FODDER

Feeds and fodder are the most critical inputs in livestock production. The livestock in Chhattisgarh however suffers from a shortage of these inputs in terms of both quantity and quality. The probable reasons for poor feed status could be (i) huge livestock population in relation to available feed resources, (ii) frequent droughts leading to seasonal feed shortages, (iii) poor productivity of common grazing lands due to inappropriate management, and (iv) dominance of smallholdings mainly used for production of staple crops with almost negligible area allocated to fodder crops.

Despite shortage of feeds and fodder there is a huge wastage of fodder resources due to a lack of information on their potential uses as feed, production technologies and management. Adequate availability of quality feeds and fodder is central to improving animal productivity in the state. Besides, efficient utilization of feed and fodder resources is also important as the feed cost accounts to almost 60-70% of the total cost of rearing of the animals. This chapter examines the availability and requirement of different feeds and fodders in Chhatisgarh, and how to improve their quality and quantity.

6.1 Availability of feeds and fodders

Livestock in Chhattisgarh are raised as a component of mixed farming systems where both the crop and animal production systems are interdependent and contribute to the sustainability of each other through their backward and forward integration. Animals provide dung manure and draught power for crop production and in turn derive most of their feed requirement from crop residues and byproducts in addition to grazing on fallows, common lands and forests (Table 6.1). In terms of dry matter crop residues account for 47% of the total feed available in the state. Green fodder share is 44% and the rest comes from oilcakes and other byproducts of crops.

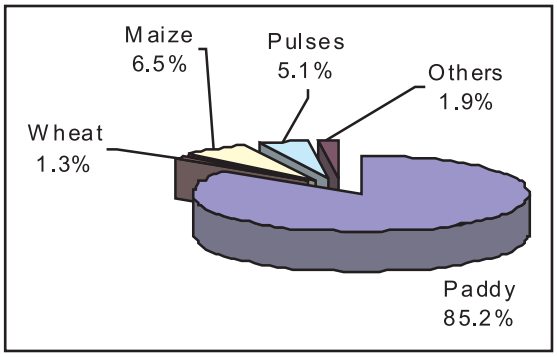
Table 6.1. Sources of feeds and fodders in Chhattisgarh, 2004-05

	Quantity (lakh tonnes)	Percent
Dry fodder/crop residues	64.59	47.2
Green fodder	60.53	44.2
Uncultivable lands	39.5	28.9
Cultivable lands	3.1	2.3
Forests	17.93	13.1
Concentrates	11.75	8.6
Oilcakes	2.21	1.6
Other byproducts	9.54	7.0
Total	136.87	100.0

6.1.1 Roughages

Crop residues are the most important roughages available for livestock in the state. Using standard straw-grain ratio for various crops grown in the state nearly 65 million tonnes of crop residues (dry matter equivalent) were available as feed. Most of the crop residue however comes from paddy straw (85%), followed by maize and wheat (Figure 6.1). Pulses contributes over 5% to total crop residue availability, and Lathyrus accounts for bulk of it.

Figure 6.1. Share (%) of different crops in crop residues



Green fodder comes from uncultivable lands (common grazing lands, pastures, fallows), forests and cultivated lands. Uncultivable lands however are the major source of green fodder in the state. In 2004-05 a total of 39.5 lakh tonnes of green fodder was made available from uncultivable lands. This comprised about two-third of the total green fodder availability. Forests with a contribution of 30% to total estimated green fodder availability was the next most important source of green fodder. Cultivated fodders contributed only about 5 % of the total green fodder availability. The estimated green fodder availability is underestimated as it does not include gathered grasses. Evidence indicates that gathered grasses account for as much half of the total green fodder available in India (Birthal and Taneja 2006). The Department of Animal Husbandry of the Ministry of Agriculture, Government of India puts green fodder availability from all sources in Chhattisgarh at 210 lakh tonnes.

The present status of grass lands is in a deteriorated condition due to decades of over-grazing and neglect in the state. Organized and scientific grass land farming systems are not being followed in Chhattisgarh. The area classified as permanent pasture and other grazing land is about 3 to 4 % of the total land area. The constraints in proper utilization of pasture are discussed here.

- Overall availability of these resources is decreasing while overall livestock numbers are still increasing. An increase in competition can result in a switch from communal grazing to mixed farming systems, most likely first to crop residues, followed by cut-and-carry, and feed from farm sub-systems.
- The crop encroachment disrupts pastoral areas, causing artificial local grazing pressure and an irregular overgrazing.
- Trees usable for browsing are cut to clear fields if they are not traditionally protected in agro-forestry parks.
- Rapid depletion of common property resources have seriously affected the poor, marginalized and landless people, especially women, who have depended on these resources for maintenance of their livestock and their own livelihood.

6.1.2 Concentrate feeds

The by-products obtained from grain processing (brans), oil seed processing (oil meals), pulses processing (chunni) are commonly fed to livestock as concentrate feeds. The brans and chuni constitute 81 % of the total concentrate feeds produced in the state. Oil meals constituting 19 % of the total concentrate feeds produced.

Feeds i.e., agro industrial byproducts and non-conventional feed resources, are to be categorized as per primary and secondary importance. Primary feedstuffs are the ingredients that form the main base in a feeding system. These constitute about 70 – 80 % in the diet. Secondary feedstuffs are minor ingredients as supplements in the diet and constitute up to 20 – 30 % in the diet

Table 6.2 Availability of concentrate feed in Chhattisgarh, 2004-05

	Quantity (000 tonnes)	Percent
Oilcakes	220.9	18.8
Groundnut	24.5	2.1
Soybean	20.9	1.8
Rapeseed-mustard	20.4	1.7
Nigerseed	91.0	7.7
Alsi	15.8	1.3
Others	48.2	4.1
Brans and chunnies	954.4	81.2
Deoiled rice bran	917.4	78.1
Pulses chunni	35.3	3.0
Others	1.7	0.1
Total concentrates	1175.2	100.0

6.1.3 Tree fodder

Leaf fodder is another source of feed especially during the lean period (October to June). Its contribution to the animal feed resource is very low but it has a potential for generating extra feed. Farmers have fodder trees and bushes around the homestead and forest either naturally growing or in a few cases transplanted.

Two important points that merit attention here are (i) not entire crop residues produced is available as feed because of their other uses such as thatching of houses, packaging material and paper production, (ii) the availability of crop residues or for that matter all feeds is dependent on rainfall and is expected to be characterized by considerable intra, and inter year seasonality (Table 6.3).

Table 6.3. Feed sources on mixed farms used for feeding buffaloes and cattle by season (kg/animal/day)

	Jan-April	May-July	Aug-Oct.	Nov-Dec.
Green fodder[1]	2.22	2.20	9.06	6.19
Dry fodder[2]	5.87	4.02	1.15	4.55
Purchased concentrates	0.89	0.19	0.40	0.44
House concentrates[3]	1.51	0.65	0.40	0.16
Other[4]	0.08	0.34	2.31	3.27
Pasture (h d-1)	3.31	3.40	3.23	3.46

[1]. Largely weeds removed from crops or re-growth of rice. [2]. Maize or sorghum Stover, wheat and rice straws. [3]. Brans from preparation of human food. [4]. Grasses harvested by women from footpaths, and neighbouring fields. [5]. Community grazing with realized intake of < 1 to 3 kg of dry matter per day.

6.1.4 Non-conventional feed resources

Non-traditional or non-conventional materials (Table 6.4) are available in abundance and can form potential source of feedstuffs for feeding livestock, if sufficient information on their suitability, nutritive quality, etc. is available. At present these materials are utilized for feeds in small extent. The nutritive quality and economic viability of these resources have to be estimated and demonstrated to farmers to make these acceptable. Adequate resources may be provided to evaluate the utility of NCFR as — these are present in abundant quality and underutilized; their use reduces cost of production,and dependence on imports, thus saving foreign exchange;and may help in further expansion in components of the animal industries.

Table 6.4 Non-conventional feed resources

Name	Botanical name	DCP (%)	TDN (%)
Mahua seed cake	*Bassia latifolia*	8.0	60.0
Mango seed kernel	*Mangifera indica*	4.7	70.0
Babul pod chunni	*Acacia nilotica*	5.8	62.3
Vilayati babul pods	*Prosopis juliflora*	7.0	75.2
Sal seed meal	*Shorea robusta*	1.6	61.0
Kuvadia seeds	*Cassia tora*	16.6	59.4
Ambadi cake	*Hibiscus cannabinus*	5.7	62.4
Kokam cake	*Garcinia indica*	9.3	70.0
Palas cake	*Butea frondosa*	6.6	63.5
Niger cake	*Guizotia abysbimicacass*	10.9	58.7
Kosem cake	*Scheilchera oleosa*	—	—
Karanj cake	*Pongamia globra*	25.5	62.0
Neem seed cake	*Azadirachta indica*	6.5	62.5
Kod husk	*Paspalum scorbiculum*	—	—
Poultry manure	—	—	—

6.1.5 Feed balance

Total nutrient requirements, by species and total nutrient availability by source for the years 2005-2006 are presented in Table 6.5. The current livestock population in the state requires 124 lakh tonnes of dry fodder, 372 lakh tonnes of green fodder and 37 lakh tonnes of concentrate feeds for meeting its maintenance and production requirements. This is much less compared to the available feed resources. The deficit is huge in green fodder. This is because farmers hardly put any area to green fodder crops in the state.

Table 6.5. Requirement and availability of different feed stuffs in Chhattisgarh, 2004-05 (lakh tonnes)

	Requirement	Availability	Deficit
Dry fodder	124.2	60.5	63.7
Green fodder	372.4	64.6	307.8
Concentrates	37.2	11.8	25.4
Adult cattle units (lakhs)	102.1		

District-wise availability and requirement of different feed stuffs is given in Appendix 1; showing underfeeding of livestock in most places, though the magnitude of deficit varies.

6.2 Methods to improve feed resources

Production and conservation of feedstuffs is essential for obtaining optimum output by feeding balanced rations to the superior stocks, crossbred and indigenous breeds and their followers. The low-producing, uneconomic stock and the unproductive animals can be maintained on subsistence allowance to save high quality feed and fodder. Necessary steps are to be taken for the popularization of feeding of balanced diets as this will reduce wastage of nutrients and ensure economy. An effective way of feed utilization is reduction and elimination of worm burden and shortening of dry periods.

6.2.1 Fodder improvement

The fodder production should be enhanced through farmers' participation. Bulk of the fodder should be mainly from the bio-mass production from improved traditional crops, and fodder trees. Conservation of available green and dry fodder should be promoted.

- Promote—duel purpose crops i.e. grain and biomass and by-products as animal feed, intercropping with cereal crops, intensive use of available crop residues, forage production on rice bunds, and fodder trees with multi-utility like fuel, timber, fruits and flower.

- ❖ Special emphasis should continue on rice straw utilization through improved technology and efficient utilization of other agriculture byproducts as animal feed.
- ❖ Enhance production of hybrid maize, soybean and other oil crops to meet the demand of the growing livestock industry.
- ❖ Improve — the access to new knowledge in fodder cultivation, availability of seeds of improved varieties in time and fodder conservation. Seed industry shall develop new varieties of fodder crops and meet the requirement of the growing seed market. Farmers should be encouraged to grow food-feed and fodder crops by demonstrating them the benefits of fodder. Feeding of chaffed fodder reduces wastage and improves palatability and digestibility. Farmers should be demonstrated the benefits of such technologies.
- ❖ Special emphasis should be laid to develop dairy in irrigated, peri-urban and vicinities of industry with an efficient fodder base that is sustainable.
- ❖ The indigenous knowledge based animal feeding and management shall be improved through simple technologies to support very low producing non-descript animals in a predominantly subsistence farming system.
- ❖ The macro- and micro- nutrient play crucial role in livestock nutrition, so state resource map on macro- and micro-nutrient status will be utilized to enhance production.

6.2.2 Crop residues improvement

Several low cost techniques are available to improve the utilization of crop residues. Intake may be increased about 20% by chopping residues. Maize or sorghum may be cut and stacked to reduce leaf loss. Stripping the lower leaves (below the ear on maize or the lower half of sorghum) increases feeding value. Topping maize after the grain has nearly matured preserves forage quality. Farmers' acceptance has been low because of low visibility of return to the extra labour required. Assembling or storing crop residues may be a necessity where cropland is highly fragmented. Preservation of crop residues is attractive if groundnut/ cake, soybean cake or grain brans are available at modest prices because their supplement increase intake of residues up to 20 to 30%. Farmers generally accept supplementation as an initial move to increase milk output or to fatten cattle or sheep.

Chemical treatment could be more attractive option. A number of technologies such as urea treamment, bypass protein etc. are available that could be utilized for improving feed conversion efficiency.

6.2.3 Improvement of non-conventional feed resources (NCFR)

There are many non-traditional or non-conventional materials, which are available in abundance and that can form potential source of feedstuffs for feeding livestock, if sufficient information regarding their suitability, nutritive quality, etc. is available. At present these materials are utilized for feeds but only to a small extent. Long-range studies have to be undertaken on the utility of these non-conventional feed resources, as most of these materials are not palatable when fed independently to livestock and contain some undesirable factors. Poor extension service, is another important factor limiting expanded and more efficient use of these non-traditional feedstuffs. There is a paucity of economic analysis and on-farm testing of these materials.

The NCFR are presently underutilized due to:

- Scattered production, and in some cases the quality produced is low, especially for commercial processing.
- High cost of collection of some of the NCFR.
- Non-competitive costs and nonremunerative prices.
- Difficult processing.
- Lack of managerial and technical skills to utilize the feeds in situ.
- Limitations in the end uses of the produced products.
- Inadequate demonstration of potential value in feeding systems because of low priority research.

Economic viability of residue utilization programmes involving NCFR also needs to be demonstrated. Small farmers who form the backbone of traditional agriculture have neither the resources and know-how nor the quantities of residue to take individual action, hence, public sector should take necessary steps for promotion of NCFR.

There exists a missing link between research and extension. Most of the research findings are often confined to libraries or academic institutions. The need to translate these into understandable language for use by the potential beneficiaries (farmers) is indeed realistic.

Wide variations also exist among pockets in the state in terms of level of technology, resource availability, and demand expansion potentials. In uniform manner, there is need to bridge the gap between research and extension across the regions, for there are numerous research finding already available and accumulated in other states that could be utilized by and shared among governments.

6.2.4 Improve access to land and feed-fodder resources: Poor livestock producers should have an adequate access to land for rearing animals. This includes following options.

- Strict enforcement of 'land ceiling act' to acquire surplus land and distribute it among the poor landless and sub-marginal farmers.
- Lease arrangements — Legalization of tenancy with long-term lease rights.
- Common lands to be managed by the Panchayats or users' associations to improve their quality. If needed, the State government should assist these organizations by providing financial assistance and technical backstopping.
- Clear policy support is required on access to forests for fodder collection for forest-dwelling villages but restrictions on grazing.
- Wider implementation of watershed programmes will help mitigate negative impacts of drought on livestock production. The fodder and improvement of livestock component should be addressed within the state livestock policy by all watersheds in the state.
- To develop an exhaustive inventory of feed resources available locally and for formulation of low cost livestock rations.
- Successful indigenous knowledge in feed and feeding need to be upscaled.

6.3 Infrastructure

6.3.1 Compound feed industry : The production of cattle feed by Compound Livestock Feed Manufacturers Association of India (CLFMA) members accounts for 60% of the total production of compound cattle feed by the organized feed industry sector. The aggregate quantum of cattle feed and poultry feed produced in the organized sectors for the years 2005-2006 would be about 76.96 lakh tonnes. Manufacturing units like farm mixing, custom mixing, etc. contribute about 30 % of the cattle feed production in the organized sector and 50 % in poultry feed. The production of formula feed is less than half the installed capacity. The low utilization of the installed capacity of the feed plants is mainly due to non-awareness of the importance of balanced feeds on the part of most farmers, low-productivity of the livestock, non-remunerative price for the livestock products and increasing costs of feed ingredients.

Cash compensatory support on export of extractions of rice bran, groundnut meal, etc. has increased domestic prices of these important feedstuffs. Non-availability of molasses due to its allocation to various industries by the Government, deprives feed industry from availability of molasses, a versatile raw material for animal feed.

6.3.2 Government feed policies : The issues in animal feed area are — production and import policies, i.e., food vs. feed crop production and domestic production vs. imports; price intervention and subsidy schemes; determination of appropriate technology; and research and extension functions.

6.3.2.1 Regulation of feed quality for safe food: There are serious concerns about safe food and environment associated with growth of intensive, commercial livestock and poultry. In the recent years, public concern about the safety of foods of animal origin has heightened due to problems like mad cow disease, bird flu etc. Animal feed production must therefore be subjected to, in the same way as human food production, quality assurance including safety systems on the principles of Hazard Analysis and Critical Control Point (HACCP) system. Applying HACCP principles ensures that all potential safety hazards are thoroughly analyzed, assessed, and effective systems for monitoring the critical control points are placed in order for adhering to the stringent parameters. The specifications formulated by BIS for cattle feeds serve only as guidelines and their use as standards is not followed compulsorily strictly and this is resulting in poor quality of feed. Most of the feed plant laboratories use conventional method of analysis, which is time consuming and less accurate; and several cattle feed plant laboratories do not have the facilities to check basic components of cattle feeds.

6.3.2.2 Ban on the use of animal origin feed ingredients for ruminants: Use of blood meal, meat meal, MCBM, FM, SWPM, PBP, DCP, BM etc. ingredients have been prohibited in cattle feed and mineral mixture.

6.3.3 Animal Nutrition Laboratory: The state needs to have one Animal Nutrition Laboratory to test feed quality and toxin levels like afflatoxin etc. The BIS standard for feed ingredient quality control shall be the basis of animal feeding and nutrition. It is to be notified.

6.3.4 Macro- and micro-nutrient mapping: Macro-and micro-nutrient mapping of Chhattisgarh shall be very useful to plan and reduce mineral deficiency in livestock.

6.4 Major problems and constraints affecting the development of feed resources

- Feed availability in terms of quality especially during winter is inadequate.
- Farmers depend on straws, stovers and bran, which are inadequate for high-producing animals.
- Grains used in balanced animal feed are usually deficient in energy and protein.
- Flush growth in monsoon season is of low quality feed with high moisture.
- Winter-feed (fodder) available is of low quality with mature stem and high fiber.
- Traditional animal raising relied on forest feed resources, ignoring fodder production on the farm. Forest resources depletion has affected the availability and quality and quantity of fodder.

- Adequate fodder production on small farm is difficult.
- In traditional farming system least importance is given to animal feed production.
- Inadequate knowledge of conservation, preservation and utilization of available feed and crop by-products caused an awful waste of energy and protein.
- Inadequate animal population planning has created extra burden on available feed resources.
- Inadequate distribution system of feed resources due to poor transport means has created shortage in certain areas.
- Inadequate investigation and research on available feed resources has affected the proper utilization of available resources.
- Ineffective control and protection of forest resource with inadequate laws have discouraged proper fodder plantation.
- Inadequate social consciousness to restrain loitering animals has discouraged innovative farmers from growing off-season fodder.

6.5 Lessons for the future

- Farmers should be encouraged to grow food-feed and fodder crops by demonstrating them the benefits of fodder and by providing in-kind inputs especially fodder seeds.
- Fodder scarcity is acute especially during summer. The state should implement the concept of 'fodder bank' at the village level where the farmers can store fodder or cut-grasses collected during the rainy season for use in lean periods.
- Paddy straw is the main dry fodder in the state, and is often fed without chaffing, resulting in some wastage. Feeding of chaffed fodder reduces wastage and improves palatability and digestibility. Besides, rice straw is a poor quality fodder. Urea treatment can improve its quality. Farmers should be demonstrated benefits of such technologies.
- Promote use of unconventional feeds and fodder trees, which are abundantly available in the state.
- The animal feed industry both the private sector and cooperative sector is growing. The possibility of forging PPP's is good.
- AHD in collaboration with the department of agriculture, should mount special efforts to enhance production of hybrid maize, soybean and other oil crops in the state to meet the demand of the growing livestock industry. The stratification of crops will help the state in improving the farmers' income.
- Government should improve the access to new knowledge in fodder cultivation, seeds of improved varieties in time and conservation.
- Special emphasis should be laid to develop dairy in irrigated, peri-urban and vicinities of industry with an efficient fodder base that is sustainable.
- Macronutrient and micronutrient play crucial role in livestock nutrition, so state resource map on macro-and micro-nutrient status should be developed to enhance production.

Appendix 1. Status of feed and fodder in districts of Chhattisgarh, 2004-05

District	Concentrate			Dry Fodder			Green fodder		
	Availability (Lakh t/y)	Requirement (Lakh t/y)	Deficit (Lakh t/y)	Availability (Lakh t/y)	Requirement (Lakh t/y)	Deficit (Lakh t/y)	Availability (Lakh t/y)	Requirement (Lakh t/y)	Deficit (Lakh t/y)
Raipur	1.3	4.37	_3.07	8.06	15.78	-7.72	5.26	47.34	-42.08
Mahasamund	6.47	1.578	4.892	3.95	5.24	-1.29	1.45	15.73	-14.28
Dhamtari	0.46	1.207	-0.747	2.37	4.03	-1.66	1.81	12.08	-10.27
Durg	1.52	4.032	-2.512	8.52	13.46	-4.94	3.96	40.37	-36.41
Rajnandgaon	1.62	2.67	-1.05	4.14	8.88	-4.74	3.2	26.64	-23.44
Kawardha	0.28	1.195	-0.915	1.5	3.99	-2.49	1.83	11.97	-10.14
Jagdalpur	0.7	2.618	-1.918	4.99	8.72	-3.73	7.03	26.17	-19.14
Kanker	0.51	1.472	-0.962	3.47	4.92	-1.45	2.79	14.75	-11.96
Dantewada	0.44	1.928	-1.488	34.87	6.42	28.45	7.49	19.27	-11.78
Bilaspur	0.96	3.343	-2.383	6.1	11.13	-5.03	3.36	33.4	-30.04
Janjgir	0.66	2.222	-1.562	3.99	7.4	-3.41	1.38	22.19	-20.81
Korba	0.23	1.265	-1.035	1.47	4.21	-2.74	3.31	12.63	-9.32
Sarguja	0.82	4.173	-3.353	5.69	13.89	-8.2	7.2	41.68	-34.48
Koriya	0.17	1.193	-1.023	1.33	3.95	-2.62	2.77	11.86	-9.09
Raigarh	0.6	1.457	-0.857	3.15	4.87	-1.72	2.9	14.6	-11.7
Jashpur	0.42	1.748	-1.328	2.45	5.8	-3.35	2.68	17.41	-14.73
Total	11.75	37.247	-25.497	64.59	124.15	-59.56			

7. ANIMAL HEALTH

Paradigm shift is required in animal health service sector with more emphasis on preventive and door delivery or services. There is lack of extension, training, skill enhancement for all stakeholders in this sector and the result is that information system linked to animal health is nearly missing. Livestock animal health workers are another real factor that is to be taken into consideration so that veterinary first aid can be made available at village level. It is contended that the traditional veterinary knowledge system based formulations that have significant degree of efficacy or potency, and low cost as well as easily available can be used effectively. Tribal communities of Baiga and Pahadi Korwas of Chhattisgarh state have their own Baiga-Korwa system of indigenous veterinary knowledge system, which is probably akin to Siddha-Dravidian system of ethno-veterinary, and need further research.

Box 1

In Chhattisagrh, traditional veterinary practitioners (TVP) could be called Baiga, because the word Baiga literally meant medicine-man. In fact these TVP-Baigas (not tribal-Baigas) were practitioners of two systems, one system had come from Orissa the second group of practitioners are those who either were Routs (Yadavs) themselves and had learnt it from their ancestors or from some other community (Gond, Sahu, Brahmin). Even some Sinhas were practicing TVPs who passed it on through their progeny to perpetuate it. In many places in the world, livestock raisers – settled and nomadic – use ethnoveterinary practices and remedies that they have learned from past generations.

7.1 Status

Prevalence of epizootics : The major mortality causing disease is haemorrahagic septicaemia (HS) followed by blackquarter (BQ); foot-and-mouth disease (FMD) is conspicuous by its absence since 2002-2003. Sporadic outbreaks of anthrax are also reported. Rinderpest (RP) outbreaks here never been reported since 2000-2001.Theileriosis is not reported in epidemic form. In small ruminants Peste de petits Ruminants (PPR) was reported during 2001 to 2004 (Table 7.1).

Table 7.1. Diseases recorded during 2000-2005

S. No.	Species	Diseases	Outbreaks					Attacks					Deaths				
			00-01	01-02	02-03	03-04	04-05	00-01	01-02	02-03	03-04	04-05	00-01	01-02	02-03	03-04	04-05
1	C&B	RP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2		FMD	3	5	-	-	-	51	649	-	-	-	-	-	-	-	-
3		HS	1	31	8	2	1	2	242	251	9	30	2	141	36	5	6
4		BQ	1	11	7	2	2	4	21	51	12	6	3	8	43	8	2
5		Anthrax	2	-	-	2	-	2	-	-	14	-	2	-	-	11	-
6		Theileriosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	S&G	PPR	-	1	3	8	-	-	127	267	117	-	-	25	45	11	-

C & B, cattle and buffalo; S & G, sheep and goat;RP, rinderpest; FMD,foot-and-mouth disease; HS, haemorrhagic septicaemia; BQ, blackquarter; PPR, Peste de petits ruminants.

Major epizootic diseases that strike livestock in Chhattisgarh with year-wise (%) mortality are presented in Table 7.2.

Table 7.2. Animal disease scenario of the state seizure (S), death (D) from contagious diseases

S. No.	Year	Diseases												Total		
		RP		HS		Anthrax		BQ		FMD		Others (PPR)				
		S	D	S	D	S	D	S	D	S	D	S	D	S	D	(%)
1	2001-02			2	2	2		4	3	51				159	7	11.9
2	2002-03			242	141			21	8	649		127	25	1039	174	16.7
3	2003-04			251	36			51	43			267	45	569	124	21.8
4	2004-05			9	5	14	11	12	8			117	11	152	35	23.0
5	2005-06			30	6			6	2					36	8	22.2
				534	190	16	13	94	64	700		511	81	1855	348	18.8

Total animal mortality hovers around 12-23% out of the reported outbreaks during the years under report. Highest seizures are observed in FMD followed by HS and PPR. Anthrax, BQ, HS and PPR are the important epizootic diseases causing deaths (Table 7.3). Proper veterinary care, both curative and preventive, possibly saved the affected animals from HS and PPR as revealed by the fairly low percentage of mortality of 35.6% and 15.8 %, respectively. Generally once the PPR infection is set in a population of sheep and goat, the

mortality is very high; thus it is essential that staff members are encouraged to report outbreaks systematically (Table 7.4). Though number of affected animals is highest in FMD followed by HS and PPR and as expected zero mortality is reported for FMD. Conversely, number of affected animals is lowest in anthrax while mortality is highest (80%) possibly because of acuteness of the disease resulting in immediate succumbing of animals before arrival of a veterinary officer.

Table 7.3. Number of deaths and % mortality due to various infectious diseases

Sl. No	Year	Number of deaths (% Mortality)					
		RP	HS	Anthrax	BQ	FMD	Others (PPR)
1	2000-01	-	2 (100.0)	2(100.0)	3 (75.0)	-	-
2	2001-02	-	141(58.3)	-	8 (38.1)	-	25 (19.7)
3	2002-03	-	36 (14.3)	-	43 (84.3)	-	45 (16.8)
4	2003-04	-	5 (55.5)	11 (78.6)	8 (66.7)	-	11 (9.4)
5	2004-05	-	6 (20.0)	-	2 (33.3)	-	-
Total			190 (35.6)	13 (81.2)	64 (68.1)	-	81 (15.8)

Table 7.4.Outbreak in Chhattisgarh during 2000-2005

SL. No.	Species	Disease	No. of O.B.	No. of Affected	No. of died	Mortality (%)
1	2	3	4	5	6	7
1.	Cattle and buffalo	RP				
		HS	43	534	190	35.5
		BQ	23	94	64	68
		Anthrax	4	16	13	80
		FMD	8	700		
2.	Sheep and goat	PPR	12	511	81	15.8

The common diseases encountered in the state are summarized in Table 7.5. Diseases tabulated here are in descending order of report.

Table 7.5. Common diseases encountered in livestock in Chhattisgarh

Species	Viral	Bacterial	Parasitic	Miscellaneous
Cattle and buffalo	Cow pox Ephemeral fever Rabies	Mastitis Pneumonia Brucellosis	Helminthis Strongylosis Amphistomosis Fasciolosis Ascariosis Stephanofilariosis Protozoan Babesiosis Trypanosomosis Coccidiosis Arthropod Ticks Lice Mange mites	Nutritional deficiency diseases Ketosis Hypocalcaemia Hypomagnaesemia
Sheep and goat	Sheep pox Foot-and-mouth diseases Rabies	Enterotoxaemia Pneumanoia Foot rot Mastitis Mycoplasmosis Anthrax Pastueurellosis Paratuberculosis Tetanus	Helminthic Facioliosis Strongylosis Oesophagostomosis Protozoan Coccidiosis Arthropod Nasal Bot	Toxicity Ipomia poisoning Lantana poisoning
Pig	Foot-and-mouth disease Rabies Swine fever	Pastueurellosis Swine erysipelas Anthrax	Helminthic Ascariosis Mange Stephaneuresis	Nutritiona Piglet anaemia Rickets
Poultry	Ranikhet disease, fowl pox, Marek's disease, Infectious bronchitis (IB), Infectious laryngiotracheitis (ILT), Gumboro disease (IBD), Avian leucosis complex (ALC), Duck hepatitis, Egg drop syndrome, Hydropericardium syndrome	Chronic respiratory disease (CRD), Fowl cholera, Salmonellosis, Infectious coryza, Mycoplasmosis	Helminthic Ascaridiosis Taeniosis Protozoan Coccidiosis Mycotic Aspergillosis	Nutritional deficiency diseases

#Rickettesia, was not observed.

Animal health care

Year-wise number of cases treated, vaccination performed and castration done by the skilled manpower are given in Table 7.6 and 7.7.

Table 7.6 Details of the treatment and vaccination done in the state (2000-2005)

Year	No. of Vet. Hosp. and Disp.	No. of Vet. Asst. Surgeon	No. of Livestock Aid Centres	No. of Livestock Inspectors		Number of	
					Case treated	Prev. vaccination done	Castration done
1	2	3	4	5	6	7	8
2000-01	911	275	385	1419	1984170	4598802	239450
2001-02	911	275	385	1419			
2002-03	911	275	385	1419	1822677	4177561	198183
2003-04	916	275	385	1419	2355695	5278418	196202
2004-05 Till Recent	916	275	385	1419	2174735	5839230	192074

Table 7.7. Animal disease control programme in Chhattisgarh

Year	No. of animals vaccinated	Doses purchased (lakh) *
1999	6224309	75
2000	6110720	70
2001	6011652	70
2002	7117242	80
2003	7762748	80
2004	6658304	80

* Excluding poultry vaccine.

7.3 Infrastructure

The veterinary institutions include 708 veterinary dispensaries, 208 veterinary hospitals and 385 AI centers and units (Table 7.8). These stationary institutions cover around 2.2 crores of livestock. Total animal coverage per institution comes to 16.7 thousands (Table 7.8).

Table 7.8 Veterinary Dispensaries/Hospitals in Chhattisgarh

Name of the State	No. of V.D/V.H./Poly Clinic/AI Centres and Units	Livestock population	No. of livestock per unit
Chhattisgarh	Veterinary Dispenesary=708 Vterinary Hospital=208 Artificial Insemination Centre & Unit=385 Total=1,301	Cattle & Others=13492954 Poultry=8181324 Total=21674278	16,660

A closer look provides a true picture, which is presented in Table 7.9.

Table 7.9. Veterinary institutions and manpower of animal health service

No. of veterinary institutions/Health service under the govt.		
1	Biological Products Institute	Nil
2	Animal Disease Research Institute	Nil
3	State Veterinary Laboratory	1
4	Clinical Investigation Laboratory	15
5	Veterinary Hospitals/Dispensaries	916
6	Livestock-Aid-Centres/AI Centres/Units	385
Under IGKV		
1	Chhattisgarh Veterinary College – Central Clinic	1
Human Resource Development Training Institutes		
1	Chhattisgarh Veterinary College	1
2	Veterinary Officers Training Institute	Nil
3	Livestock Inspector's Training Centre	2
4	Frozen Semen Technology Training Centre	1
MANPOWER		
OFFICERS (VETY. GRADUATES)		SANCTIONED/FILLED
Director 1 / 1l		
Additional Director		2/Nil
Joint Director		5/2
Deputy Director		20/5 Nil
		Nil
		Nil
		Nil
		Nil
		Nil
		Nil
Pathologist		Nil
Bacteriologist		Nil
Parasitologist		Nil
Range Investigation Officer		Nil
Veterinary Assistant Surgeons		589 / 276
		Nil
		Nil
PARA-VETERINARY STAFF		SANCTIONED/FILLED
		Nil
		Nil
AVFOs		1801/1419
LABORATORY STAFF		Nil
Chhattisgarh Biological Prduction Institute		Nil
Diagnostic Laboratory Technician		36 / 36

This speaks in itself about the burden carried forward by the technical manpower of the state dealing with animal health care services. Further in absence of Veterinary Officers Training Institute, services of the only Veterinary College in the state are available for skill enhancement and refresher courses for the veterinarians and 2 for livestock inspectors. Overall, there is an acute shortage of institutions dealing with technical empowerment of the available skilled manpower of the state. Non-plan budget on control of rinderpest and on RPE scheme are presented in Table 7.10.

Table 7.10. Disease control/prevention scheme

Five Year Plan	Non-Plan		Central Plan/State Plan/CSP			Total
	Control of rinder pest	Check post and immune zone	RP immune zone	RP Surveillance of containment programme	RPE Scheme	
10th Plan						
2001	11,61,000					11,61,000
2002	37,61,600				1,28,000	38,89,700
2003	39,61,700				85,000	40,46,000
2004	36,19,900				1,50,000	37,69,900
2005	45,07,000				2,47,000	47,54,000

Year-wise budget allocation and expenditure on medicines and vaccines during 10th plan period is given in Table 7.11. It appears that expenditure on curative medicines far exceeds that on preventive vaccines.

Table 7.11. Year-wise budget allocation and expenditure (in thousand Rs) on medicines and vaccines during 10th Plan Period

Year in 10th plan	Non-plan budget	Plan budget	Expenditure on medicines	Expenditure on vaccines
2001	9825	4594	14,419	14,900
2002	12904	6849	19,753	1,485
2003	4749	9808	14,557	5,000
2004	2973	12346	15,319	9,000
2004	374	2495	13,048	14,600

User appraisal

A survey was conducted in Raipur district to understand priority of animal diseases among farmers and veterinarians coming under the jurisdiction of 17 veterinary hospitals of the district. Results are summarized in Table 7.12. Help of pasu-vaids can also be taken in low cost treatment of diseases (Box 2).

Table 7.12. Priority of animal diseases in Raipur district

Disease	No. of areas in ranking of disease							
	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8
HS	13	2	-	-	2	-	-	-
Blood protozoa	4	9	2	-	-	2	-	-
BQ	2	-	11	1	1	2	-	-
FMD	-	-	6	10	1	-	-	-
Anthrax	-	-	-	-	6	4	6	1
Mastitis	-	2	-	1	5	4	5	-
Diarrhoea	-	-	-	5	3	4	5	-
String halt	-	-	-	-	-	-	-	17

Box 2

Ethno-veterinary is neither a myth nor a bundle of falsehoods

The era of treating ethnoveterinary medicine and any other ethno-knowledge system with suspicion and labeling it as myth, superstition and witchcraft, is long gone. The role of ethnoveterinary medicine in livestock development is beyond dispute. Professionals from varied fields have over the past 26 years recognised, valued, documented and ethnocentrically studied the potential effectiveness of the traditional animal health care practices embodied in native and local communities. The studies focused on a holistic evaluation of the traditional and non-traditional knowledge, which hold some beneficial aspects relevant to the improvement and development of world's poorest rural communities. China and USA governments have already taken steps to introduce indigenous knowledge based veterinary science as a part of curriculum for under graduate veterinary science students. Veterinary Acupuncture, Veterinary Hemeopathy and Ethno-veterinary, all three merit inclusion as basic approaches to treat diseases. Ethno-veterinary knowledge (EVK) continues to be recognized at a global level as a resource and boon that reflects people's total commitment and experience in life, from origin through evolutionary stages to current situation. In total global alternate medical system's market of about 80 billion dollars fifty percent of it is spent in the orient and the Occident is also catching up fast on to it (WHO Report). Till date this knowledge was sketchily recorded in books and was stored in the culturally popular fashion, as it is the best genre to transmit through meaningful cultural nuances or practices or in the form of solemn anecdotes or artifacts, handed from father to son or from mother to daughter. The storage of the knowledge has solely depended on the collective memory of just a few entrusted persons within communities for it is just not common 'knowledge' for every body. Etnno-veterinary is good as it has so much robust and meaningful presence. Its strengths are undeniable, yet it has some limited relevance and that is why it is a special resource to our society.

Limitations of Chhattisgarhi Ethno-veterinary Knowledge

The available traditional remedies for common ailments are documented here.

Serial No.	System	Ailment/ Symptom	Availability of traditional medicine/ remedy
1	Respiratory system	Haemorhhagic Septecemia (gal-ghotu)	Yes, Available
2		Pneumonia	Yes, Available
3		Cough	Yes, Available
4	Gastro-intestinal System	Stomatitis (Wound in oral cavity)	Yes, Available
5		Impaction/ constipation/ Anorexia	Yes, Available
6		Diarhoea	Yes, Available
		Worms	Yes, Available
7	Reproductive System	Abortions	Yes, Available
8		Retained placenta	Yes, Available
9		Anestrus (no symptoms of heat)	Yes, Available
10		Repeat breeding (comes in heat but not conceiving)	Not Available
11	Skin and Nervous System Related	Ataxia and giddiness	Yes, Available
12		Alopecia (loss of hair)	Yes, Available
13	Ophthalmic Conditions Urinary	Corneal opacity	Yes, Available
14	System	Coffee colored urine	Yes, Available
15		Retention of urine	Yes, Available
16	Bones, Skeleta, Muscular System	Fracture of bone	Yes, Available
17		Dislocation of the Joint	Yes
18		Contusions (internal injury)	Yes
19		Tail-gangrene	Yes
20	Circulatory and Lymphatic System	Black quarter (Ek tangia)	Yes, Available
21		Bleeding	Yes Available
22		Mastitis and thalitis	Yes Available
23		Actinomycetes Infection (wound on face)	Yes Available
24		Blood parasites	Yes Available
25	Toxicological Conditions	Poisoning	Yes, Available
26		Snakebite	Yes, Available
27		Rabies	Yes, Available
28	Other Ailments	White Scour	Yes Available
29		Hernia	Not Available
30		String Halt	Not Available
31		Minor surgical conditions	Yes Available

7.4 Methods to Improve

Animal health services

- Animal health service, be it preventive or curative, should be made mobile to deliver the services at the doorstep of end users on charge basis.
- Veterinary animal health care services need now to be charged from the users.
- Educational reform in Veterinary College and other training institutions must look animal health as herd health or flock health instead of individual health. The capital grants required to equip the veterinarians and re-equipping these institutions to handle the changed system.
- Due emphasis should be given for animal health insurance coverage.

Diagnostic laboratories

All the 15 clinical investigation laboratories and one State Veterinary Laboratory would be suitably strengthened to take up challenges of emerging diseases with advance bio-technological methods where appropriate. Veterinary College, Anjora, and the State Veterinary Laboratory, Raipur, would act as referral laboratories of the state. Linkages would be established with other disease diagnostic laboratories operating under National Agricultural Research System (NARS).

Control of epizootics

- Public fund should increasingly be directed towards prevention of diseases.
- Vaccines against diseases of sheep, goat and poultry will be stocked in distributed storage points in the districts and delivered to the village technicians for timely vaccinations.
- **Biologicals production Unit:** There is a tremendous scope of a public-private partnership in this area of operation and the private entrepreneurs producing quality livestock and poultry vaccines.

Animal health information system

- An active and responsive disease reporting system should be put in place for upcoming State Animal Production and Health Information System (SAPHIS) and National Animal Production and Health Information System (NAPHIS).

Disease free zone

- Creation of disease-free zones and organic animal farming in selected developed areas having enterprising farmers, and this should form a focus of activity in the years to come.
- Organic animal farming would form a small arm in ensuring ecological and environmental sustainability of livestock production in the state.

HID initiatives

- Institutions and human resources already existing need to be revamped and restructured and new institutions are to be set up so far as veterinary health care is concerned.
- An integrated mental and operational approach is required from a veterinarian when he approaches an animal.
- Veterinary and Animal Husbandry extension should be redesigned to help the farmers to solve their problems. Livestock development is linked with the development of the producers who keep the animals, particularly the economically backward persons and women. After all, people are responsible for development of livestock. The main stakeholder, women, should get their due importance. They must have greater access to information, technology and overall decision making. In other words, the system should be proactive and gender-friendly.

8. INSTITUTIONAL DEVELOPMENT STRATEGY FOR THE ANIMAL HUSBANDRY DEPARTMENT

The State's Vision 2010 has identified livestock and livestock products as one of the thrust sectors for improving local livelihoods and generating employment. The animal husbandry sector is likely to enjoy increased policy attention, and possibly greater private and public investments as one of the key elements of capitalizing on the primary sector resources – hence, it is an opportune juncture to formulate a coherent policy and investment plan for the livestock sector.

8.1 Present status

The Animal Husbandry Department (AHD) of GoC is mandated with providing veterinary health services, improving breed of livestock, preservation and development of indigenous species; and extending the benefits of livestock cultivation to the poorer sections in the state. Allied functions of AHD include research and development, development of fodder and other inputs, promotion of dairy development, monitoring and evaluation, regulation and supervision of the sector (including implementation of key Animal Husbandry related laws), and human capacity development of the sector.

8.1.1. Organizational structure

The AHD is a part of the State's Department of Agriculture, Cooperation, Fisheries and Animal Husbandry, headed by the Agriculture Production Commissioner (APC) of the State (Fig 8.1). The APC is assisted by a Secretary who also holds multiple-charge of Agriculture, Fisheries and Animal Husbandry portfolios. These two offices constitute the government-level policy and decision-making apparatus under the Minister for Agriculture, Animal Husbandry, Fisheries, and Forests[1].

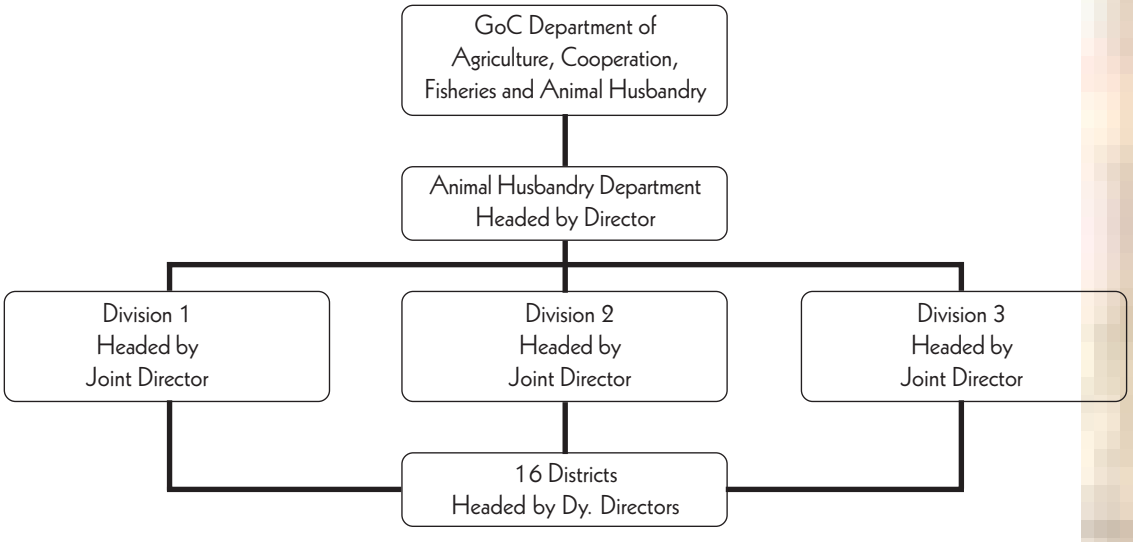


Figure 8.1 Organizational structure of Animal Husbandry Department of Chhattisgarh

The, AHD is led by a full-time Director, and this Directorate of Animal Husbandry (DAH) is the key implementation arm of the state, for all animal health services and dairy development. The full-time Director[2]

[1] Multiple departmental responsibilities are in line with rationalization of the number of departments after the formation of new State in 2000, whereby 51 departments of undivided Madhya Pradesh, were reduced to 18 in the new Chhattisgarh Government (GoC, 2003). The state also decided not to set up 30 Public Sector Undertakings of erstwhile MP and chose instead to create financial mechanisms to liquidate its share of financial liabilities (including pension funds and retirement schemes for personnel).

of DAH is assisted by Milk Commissioners, Joint and Deputy Directors, Veterinary surgeons, finance and administrative personnel, and other support staff at Raipur.

At the field level, the AHD is divided into three revenue divisions; which are structured into 16 district level units, with Joint and Deputy Directors for managing department's schemes and services. The Joint Directors, the regional heads, supervise and guide district level offices, and manage veterinary hospitals/dispensaries, research laboratories, mobile units, specialised facilities (e.g. semen storage unit, LN_2 plant, breeding centre, etc.), AI centres and sub-centres etc. District level Deputy Directors have similar jurisdiction and cover matters and functions relating to establishment, budget and accounts, animal health, animal husbandry, monitoring and planning, statistics and evaluation, extension services including training, and publicity and propaganda.

8.1.2 Department Infrastructure

The infrastructure of the AHD is presented in Table 8.1.

Table 8.1. Veterinary hospitals / dispensaries in state (As on 31 September 2005)

No.	Particulars	Numbers
1.	District Veterinary Hospitals	208
2.	Veterinary Dispensaries	708
3.	Mobile Veterinary Dispensaries	25
4.	Deep program for Live Stock Development	5
5.	AI Centre	22
6.	AI Sub-centre	253
7.	Cattle Breeding Farm	4
8.	Goatery Farm	1
9.	Piggery Breeding Farm	2
10.	Poultry Farm	7
11.	Duck Farm	2
12.	Turkey Farm	1
13.	Program for removal of Mata Mahamari in animals	5
14.	Centre for checking Mata Mahamari in animals	8
15.	AVFO Training Centre	2
16.	Disease Investigation Lab	7
17.	Key Village/Block Scheme	10
18.	Key Village/Block Centre	100
19.	Milk Technology College Chakra Nala (Raipur)	1

Note: Many of the above facilities are under the direct control of the Directorate at Raipur.
Source: Human and Institutional Sub-Group report, 2006.

The district level offices are sub-divided into block level establishments, manned by Veterinary Assistant Surgeons (VAS) and Veterinary Extension Officers (VEOs). They are responsible for animal health and disease control, breed improvement, and implementation of government schemes. Assistant Veterinary Field Officers (AVFOs) and support staff, form the key frontline interface of the department with client and beneficiary households at the village level. Posted in dispensaries, sub-centres and outreach centres,

[2] The APC, the Secretary, and the Director of Animal Husbandry are generalist bureaucrats from the Administrative (Indian Administrative Service) cadres (hence, transferable across departments) whereas the rest of the departmental professional officers are technical specialists from within the department belonging to one cadre, and categorized into two broad service grades for compensation and promotion.

they provide primary curative services, preventive vaccination, castration, and breed improvement services.

There are 1,301 veterinary institutions in the state, for more than 20 million heads of livestock. The department is heavily under-resourced (livestock per veterinary institution) compared to norms of satisfactory practice, and require considerable improvements (quality of physical infrastructure, procedures, and personnel) and augmentation (specialised facilities and training facilities) to cater to the livestock management needs. At present the organizational structure is in pyramid shape, which has to be decentralized for effective functioning. Promotional avenues have to be opened for better human resource development.

8.1.3 Personnel

There are about 300 veterinary professionals and more than 1,400 frontline veterinary staff catering to the needs of the whole state (Table 8.2).

Table 8.2: Human Resources in Chhattisgarh Animal Husbandry Department

No.	Position	Sanctioned Positions	Filled Positions
1	Director	1	1
2	Additional Directors	2	Nil
3	Joint Directors	5	2
4	Deputy Directors	20	5
5	Veterinary Assistant Surgeons (VASs)	589	276
6	Livestock Inspectors (Assistant Veterinary Field Officers or AVFOs)	1801	1419
7	Diagnostic Laboratory Technicians	36	36

Source : Animal Health Sub-Group Report, n.d. (2006).
Note 1 : The Human and Institutional Sub-Group Report estimated 302 VASs and 1,437 AVFOs, possibly because data in this report pertains to 2003.
Note 2 : The estimate above appears to be restricted to veterinary and managerial positions. Details of administrative support and ministerial personnel are not available; and are likely to be a significant addition, taking the total personnel between three and four thousand.

As per estimation, for about 13,000 animals and birds there is one skilled person (VASs, deputy, and joint directors are at least graduates in Veterinary Sciences, whereas AVFOs are diploma-holders). This suggests a high work-load especially in the context of weak household capacities, undeveloped private market for livestock services, and the wide-spread transformation by breed improvement that the sector is witnessing currently. The GOC submission to the Twelfth Finance Commission estimated that there were 319 vacant sanctioned positions in the AHD. In view of such constraints, considerable re-organization and restructuring would be necessary to enable the department to function as effectively as earlier (i.e. with full staffing) – this also provides an opportunity for the AHD to revisit what business processes and service delivery methods it adopts, thereby improving its performance in the future.To provide the veterinary services to farmers, Village Facilitators (VFs) from villages were trained under the BILDP, in basic livestock management, and allied agricultural skills, providing more than a hundred "barefoot" extension workers. Training was also given to village youth in AI and related primary veterinary services, and about 4,000 such cow-care workers ("go-sevaks") are working in different parts of the state, providing services for a fee, signalling the start of development of a basic services market, outside the direct ambit of the AHD.

8.1.4. Specialized institutions of AHD and other stakeholders

Chhattisgarh State Livestock Development Agency (CSLDA): An autonomous and professional agency under the "National Project for Cattle and Buffalo Breeding" (NPCBB) for breed improvement of cows

and buffaloes (using AI and Natural Service or NS by pedigreed bulls) and providing these services at the doorstep of the farmer. The AHD is the administrative department for the CSLDA.

Bastar Integrated Livestock Development Project: This project was implemented with DANIDA assistance over 1996-2004 period. This has been the testing ground of several technical and extension management related innovations — promotion of self-help groups, Village Facilitators (para-veterinary extension workers in villages), and Project Village Committees. Currently it is working in about 435 villages. In 2006, the BILDP was designated as the State's Training Institute to train personnel for extension management as per needs of AHD and allied departments.

Raipur Milk Union (RMU): The RMU was handed over to NDDB to turn it around and develop the cooperative dairy sector in the state (since 2003). Long-term plans include setting up of more than ten integrated dairy plants, and developing the respective milk-sheds and cooperative societies.

Veterinary College at Anjora, Durg: It is the premier veterinary research and educational institution of the state. Steps to set up a State Veterinary Council have also been initiated.

Cattle Service Commission: Pursuant to passing of the Go-Seva Adhiniyam, the State has set up a Go-seva Aayog (Cattle Service Commission) about an year ago, to provide care for old unproductive cattle. Eleven go-shalas (cattle shelters) have been recognized by the state, and are housing more than 5,000 cows.

NGOs and private sector: JK Trust, an NGO, has been contracted by the AHD, to promote AI on a mass scale in selected districts of the state.

Organised private sector: This sector has become active in dairying and poultry sub-sectors in the last couple of years. Informal private sector ranges from the itinerant traders of meat livestock (pigs, goat, sheep, poultry, ducks, etc.), milk traders especially near urban areas, to the traditional pashu vaids (traditional animal doctors/healers). Four abattoirs are functioning under AHD. The private sector however remains under-developed as the state is a net importer of dairy and poultry products.

Other state government departments: Several schemes for agricultural and rural development are implemented by other state government departments that have linkages with the livestock sector, The state has recently set up an Administrative Training Institute in Raipur to provide basic and refresher courses to functionaries from all Government departments.

8.1.5. AHD finances

The Revenue expenditure of the AHD has increased from Rs 18 crore in 2000-01 to Rs 65 crore in 2003-04, or about 5% of the total revenue expenditure on Agriculture sector of Rs 1,370 crore (Birthal and Raju, forthcoming). The department reported a financial throughput of about Rs 89 crore (2005-2006) including different establishment, direction and administration, and other plan and non-plan expenditure (Table 8.3).

Table 8.3. Animal Husbandry Department: Budget allocations and expenditure during 2005-06 (Rs '000)

No.	Budget item/Demand No.	Allocation	Actual till March 2006	Balance	% to Total Expenditure
1	AH Non-Plan (14-2403)	495,804	500,794	(4,990)	56.4%
	Of which "Charged"	211	235	(24)	
2	AH Plan General (14-2403)	80,705	74,200	6,505	8.4%
3	AH Plan Centrally Sponsored Scheme (14-2403)	102,211	34,046	68,165	3.8%
4	AH Tribal Sub Plan (41-2403)	348,613	228,262	120,351	25.7%
5	AH SC Special Component Plan (64-2403)	21,736	19,916	1,820	2.2%
6	AH Assistance to PRIs Non-Plan (80-2403)	13,420	14,750	(1,330)	1.7%
7	AH Assistance to PRIs Plan (80-2403)	14,020	13,032	988	1.5%
8	AH Assistance to PRIs under Tribal Sub Plan (82-2403)	1,800	1,471	329	0.2%
	Grand Total	1,078,309	886,471	191,862	99.9%
9	AH General (67-2403) 800 - Other Expenditure (Non-Plan); 2553 - AH and Animal Health Program	1,000	840	(6,345)	0.1%
	Grand Total	1,079,309	887,311	191,998	100.0%
	Of which "Charged"	211	235	(24)	
10	AH Receipts 0403		24,995		2.8%

Note: Shaded rows indicate Non-Plan heads fully or partially, as in case of Row No. 9.
Source: Directorate of Veterinary Services, May 2006

The utilization of allocations under different heads of account appears variable probably indicating constraints on institutional capacity to implement schemes – utilization of Centrally Sponsored Scheme Plan resources fell short by two-thirds of the allocation, and that under Tribal Sub Plan by nearly one-third. Non-plan heads – overheads and administration – account for the majority of the departmental expenditure (between 55 and 60 %). Many items of expenditure within plan items pertain to departmental overheads.

8.1.5.1 Receipts

The reported receipts are of Rs 2.5 crore in 2005-06, or about 2.8% of total expenditure. About 47 % of receipts were from poultry development activities, followed by 39 % from cattle and buffalo development. It shows that the department does provide a range of economic services for which people are willing to pay. The proceeds remain low as also reported to be diverted as informal payments thus apparently under-stating the unrealized revenue potential. The high contribution of poultry to revenues, in comparison to spending on this sub-sector is also notable.

8.1.5.2 Plan expenditure and utilization

The provisional estimates (Table 8.4) of the Plan expenditure aggregated to about Rs 34 crore in 2005-06. The main expenditure was on cattle and breed development. Poultry (less than 5%), small animals (7.4%) and Research, Training and Extension (6.8%) together accounted for a fifth of Plan expenditure. Animal care services had a less than 10% share (most in this category probably being booked under non-plan categories).

Table 8.4 Animal Husbandry Department: Plan outlay and expenditure by Scheme 2005-06

No.	Scheme	Outlay (2005-06) *(Rs. Lakh)*	Expenditure (2005-06) *(Rs. Lakh)*
A	**Cattle development and breed improvement**	3,651.04	2,429.68
	1 Special Livestock Program	15	14.71
	2 Intensive Dairy Cattle Production Project	167.41	145.86
	3 Distribution of Breeding Bull	45	44.83
	4 Go-vansh Project a) Distribution of Milch Cows	1000	997.04
	5 Go-vansh Project b) Distribution of Bullock Pairs	2000	845
	6 Grants in Aid to JK Trust (NGO) for AI	231.63	231.63
	7 Cattle Camp	10	4.3
	8 Cattle development in Bastar District	182	146.31
B	**Animal Health Care Services**	317.9	279.15
	1 Establishment of New Dispensaries and Vet Hospitals	32.5	22.36
	2 Continuation of Vet Hospitals & Dispensaries; and Upgrade of Dispensaries	285.4	256.79
C	**Poultry**	175.5	156.98
	1 Additional Inputs/ Strengthening of Poultry Farms/Quail and Duck Projects	48	42.36
	2 Distribution of Backyard Poultry Units	127.5	114.62
D	**Small Animals**	252.7	249.24
	1 Strengthening of Pig Farms	10	8.7
	2 Distribution of Pig Trios and Pig units on exchange basis	156	155.49
	3 Strengthening of Goat Farms	0	0
	4 Distribution of Bucks on exchange basis	81	80.39
	5 Continuation of Goat Breeding Centres in Hospitals and Dispensaries	3.5	2.47
	6 Rabbit Farming	2.2	2.19
E	**Research, Training and Extension/Demand Generation**	227.6	227.22
	1 Grants in Aid to Veterinary College Anjora	219.6	219.6
	2 Establishment of AT Centre at Pankariya	5	5
	3 Establishment of Veterinary University	0	0
	4 Training of Para-veterinary Farmers	0	0
	5 Mass Communication and Publicity Propaganda	3	2.62
F	**Fodder and Feed**	24	23.93
	1 Distribution of Fodder Tree Plantation on 100% subsidy	24	23.93
	2 Feed Fodder Development	0	0
G	**Dairy and Dairy Unions**	20	0
	1 District building of dairy milk plant and infrastructure	20	0
	2 Dairy Development Programme	0	0
	Grand Total	**4668.74**	**3366.2**

The following tentative inferences can be drawn from the nature of allocations and spending:

Sectoral under-investment: The livestock sector suffers from a severe lack of public investment, which is not commensurate with its current economic contribution and potential to create livelihoods and employment leading to poverty alleviation / reduction.

Major cattle development thrust: At present the thrust is on promoting milch cows, buffaloes and bullocks. The AHD have sought to further continue this strategy in XI Plan. This suggests that the department needs to implement measures for the full and sustainable fruition of benefits from such breed improvement (linked to dairy development as profitable economic activities); as also ramp-up in the funding for poultry and small animal development, given that these sectors promise good revenues for the government, and major livelihood gains for the bulk of small livestock owners.

Ability and willingness to pay for economic services: The receipts of the AHD do demonstrate that many farmers are able and willing to pay for livestock improvement and management services. Poultry and small animal sub-sectors have considerable economic potential, especially in the tribal Bastar region – AHD receipts, ownership patterns, and household benefits confirm this – and suggest a case for proportionate or substantial strategic investments in these sub-sectors as well.

SWOT ANALYSIS

Box 1

Strengths

- Data show a good number of establishments of Hospitals and Dispensaries.
- Good program on distribution of bulls, birds, ducks, male pigs, drios and trios.
- Good response on AI work.
- Organizing of Kissan Mela, Exhibition,Radio/TV shows etc.
- Short term training to Go-sewaks and cultivators.
- Visit of cultivators are made to various farms so that they can adopt new technique etc.
- Choupal program,Krishak Clubs, Krishak Sangosthies.
- Good vaccination and medicine program.
- Establishment of Central Semen Station.
- Effective Disease Control program of blue print for soil-borne diseases.
- Animal insurance schemes.
- Publishing Veterinary Bulletin (But it is extended to only staff and not to cultivators which is a negative aspect).
- Feed subsidy by Government for rearing female calf (of age 3-32 months) of poor people.
- 50% sharing on cost of FMD vaccination by Government.
- Organizing cattle camps at village/block/district.
- Treatment of "Para" (straw) and making it nutritious by mixing urea, etc. Also efforts are made to popularize this scheme. (Good aspect is that the all the cost in this field will be borne by Government of India[3])
- Castration of bulls. (Here public participation is very low)
- Subsidy given to Goshala
- Government objectives are very clear for poverty reduction by A.H.
- Sufficient staff with good knowledge and skill.
- Due to introduction of Panchyati Raj communication network system improved.
- Use of farm plan cultivator for government scheme.
- Disease outbreak in the state is under control due to good vaccination and immunization program.

Weaknesses

- Lack of proper monitoring.
- Lack of extension activities.
- Only roadside villages got proper attention.
- Less budget.
- Lack of interest of beneficiaries in animal husbandry.
- Non-existence of competitive system among beneficiaries.
- Level of co-ordination with other departments is not up to the mark.
- Deployment of staff on other duties.
- Inadequate training centre in field or village level.
- No follow-up or recovery program.
- Very less participation of the farmers in implementing programs related with AH development.
- No motivational practices.
- Aim of government scheme is good but results are poor.
- Proper use of available talent is not made (Among PG degree holders.)
- Choosing the beneficiary under pressure (may be local or political)
- Non-existence of parallel communication.
- Very less awareness among public.
- State is non sufficient in fodder production.
- There is no control on quality of AH products.

Opportunities

- As there are surplus qualified veterinary doctors available in the state and if they are given chance it will be helpful for public/private service.
- Quality product in the field of milk/meat both can be exported to other states/countries as per demand.
- Agro climatic, geographic and other resource conditions of Chhattisgarh are good and helpful for good health of livestock
- C.G. is having favorable condition for agriculture and livestock development but these conditions have not been utilized properly for betterment of livestock. Land holding size is reducing day by day due to increasing population so people can only depend on animal husbandry rather than agriculture.

Threats

- In case of a sudden natural calamity or incidence of epidemic whole livestock development program will get severely damaged.
- Due to very high operational cost on livestock sector, a time will come when Chhattisgarh will import things from outsourcers instead of exporting.
- Non-availability of proper employment opportunity, may force talented animal husbandry professionals from Chhattisgarh to migrate to other places in search of better jobs.
- Most of the area of State is rainfed and dependant only on one season of rain. Most animals are fed paddy straw, leading to loss of productivity. Therefore if proper irrigation facility is not provided then there are chances of failure of livestock sector policies.

[3] Under Assistance to States for Feed and Fodder Development, GoI assistance is given to the farmers to enrich the quality of straw used for livestock, by treatment with urea and molasses.

Under-allocated functionalities of department: Research and development, awareness generation (among current and potential livestock owners), training and extension management receive low plan allocations[4]. Similarly, demand generation and product market development is yet to receive investments in the state.

Poor institutional credit: Livestock owners' access to institutional credit in the state remains low (less than 6 % of long-term institutional credit, the bulk being credit for crops) indicating that households in the state are capital constrained. Small livestock owners have further problems of operational expenses for which affordable short-term credit is not available (Birthal and Raju, forthcoming).

8.2 Key Institutional issues in the livestock sector in Chhattisgarh

8.2.1.SWOT analysis

The SWOT analysis of the sub-group is given in Box 1.

AHD staff: Conflicting lines of command and control of personnel; poor communication and co-ordination vertically and horizontally; weak extension services; poor linkage and coordination with other departments; non-delegation of financial powers: mismatch with assignment of responsibilities are other issues of HRD. Management and communication practices need attention.

The human and institutional development has to be done to solve the following issues—

Animal health: Overall shortage of competent personnel; poor awareness of clients' needs; poor levels of skill, and facilities for training; desk-bound work-profile leading to poor service delivery

Fodder and feed: Low availability of land for fodder development; higher attention required to formulate strategy for off-farm research and development.

Breed improvement: Huge challenge of capacity to efficiently and effectively deliver AI and breed improvement services through government and non-government channels.

Dairy development: Capacity building for dairy development for procurement, processing and marketing of milk and milk-products; development of inputs for dairying, as well as for successful organisation of dairy cooperatives.

Meat animals: Strengthening promotion capacities with competence in meat animal production and business economics; technical knowledge and service delivery for meat animal extension services.

Poultry: Corporatization of state-owned poultry farms for increased production efficiencies; capacity building for extension services to small-holder backyard poultry enterprises via SHGs and other collectives; capacities to diversify poultry into duck, quail, turkey, guinea-fowl etc. high niche value sub-segments; capacity development research and training infrastructure for poultry development.

The department must gear up itself to fulfil its mandate in the sector.

[4] While departmental overheads in non-plan heads of expenditure, do defray costs of personnel and departmental operations including development (e.g. breed improvement), preventive and curative services, it is not clear from available data that research, training, awareness and demand generation, enjoy budgetary priority therein too (with the sole exception of funding to BILDP). Besides many if not most of these functions require start-up and regular investments under Plan budget outlays given the limited development of the sector in the state.

8.2.2 Human and institutional development: challenges and opportunities

The human and institutional dimensions of the livestock development vis-à-vis challenges and opportunities that the sector and department/government is presenting within policy formulation and implementation are discussed here.

Low economic vibrancy of sector and poor stock: Huge financial, technical and managerial investments are required on the input side (availability of animals of good breed, fodder, and feed), animal health services management (preventive and curative), or product markets.

This will demand

- long-gestation investments from the state budget (e.g. veterinary education, R&D)
- effective demonstration to livestock owners of economic benefits from improved/new methods and breed
- reorientation of human and institutional capacities in the sector to cater to the long-term development mission of sector
- In parallel, there is need for such capacities that enable livestock owners to learning and applying new methods of livestock management that accrue them immediate economic benefits (and avoid failures of lapse-back and stagnation in the early stages).

Service delivery: Livestock owners demand door delivery of veterinary services[5]. Provision of services from fixed service centres (AH hospitals and dispensaries) requires a change to respond to this demand. At present, the livestock owner pays for purchase of medicines (availability of medicines with veterinary hospitals and centres is limited), transportation, and veterinary worker. Therefore, there is already an effective demand, i.e. people paying for an economic service received. The AHD has recently started initiatives to provide mobile services but the demand is far more than what the department is able to deliver at the doorstep.

With increased distribution of cattle, and exchange of animal/poultry livestock with improved breed, the effective demand for management and health care services is likely to increase manifold in the future. Efficient and accountable services delivery will become a key area of attention and strengthening. Livestock owners have to be treated as customers.

Public sector capacity deficit: Chhattisgarh lacks specialized institutions for research, training and development of the public sector as a whole. The state also decided to keep its government apparatus lean, hence quality of its human resources is to be upgraded with a streamlined systems of service delivery keeping the principle of economy and efficiency in view. The state have more than 25,000 state level personnel (apart from thousands of Class III and IV employees) but no training facility. The resultant capacity deficit

[5] A 2004 Mission had reported that more than half the cases treated and AI services delivered by AHD in a study cluster were at the door of the livestock owner. This report also estimated an expenditure of Rs. 300 per case for the livestock owner if treated at home (Rs 150 if taken by the owner to the centre) including her costs of transport, medicines, and what was paid to the government veterinarian informally as a token of gratitude (CALPI Sensing Mission, 2004).

is visible for AHD also. Only the BILDP (limited to a small region and group of officers) and CALPI (select personnel from different departments) helped in training and capacity building.

The gap between what the department and sector need to deliver, and existing personnel and systems capacities, is huge and likely to grow, especially in view of increased investments in the sector. Innovative ways are required to address the capacity deficit over the short and medium term. The government may fill the gap either through its own people and institutions (e.g. by enhancing human and process capacity), or facilitate crowding in of community groups, and formal and informal private sector agents.

Resources and structural constraints: (i) Greater budgetary allocation may be expected for the sector owing to its contribution to the economy and the state's vision, but it is likely that competing priorities (e.g. roads, forestry) will spell absolute constraints on resources for the sector[6]. (ii) The sector is in poor state but it fulfils multiple roles of setting policy and determining investment programmes, carrying out developmental activities (education, R&D, livestock improvement, etc.), implementation of programs and services delivery[7], and monitoring and regulation of the sector. (iii) The government departments are bound by rules and procedures that are difficult to change for specific departments— service conditions (incentive for good work and disincentives for less than desired performance on part of personnel) and lack of opportunities and incentives to utilize improved skills. This constraint on public sector change poses possibly the biggest obstacle for the sector to transform itself at the present juncture as the department has the pre-eminent position in the sector.

Steps for removing these constraints are :–

- Increasing investments in the sector
- Proper utilization of resources
- Greater public investments on sector and knowledge development
- Judicious use of scarce public resources to create markets and basic investments to trigger service delivery by community groups and private agents (in preference to keeping economic services within government domain). A rudimentary start has been in this direction and further strategy development will be necessary.
- Differentiating the role of the government (GoC), AHD and other sector stakeholder.
- This will also result in reduction of conflict of interest posed by multiple roles being reposed in the same agency. This step has to be done in phases – one way is to spin-off private economic services while retaining public goods and services delivery within government; another step could be devolution of service delivery resources and responsibilities over time to districts and local community groups; another would be involving community groups in monitoring program progress.
- Experience from public services reforms shows that while the state does need to take the lead in developing the sector, given inherent strengths and weaknesses of departments being a part of the government, it may be beneficial to lay out a roadmap and attendant transformation of roles over

[6] The proposed four-fold increase in XI Plan spending for instance needs the institutional wherewithal to reasonably implement. While constrained by GoI and State Government finances, internal limitations of the department also limit the sector's ability in making a jump-shift of capacities in short period of time.

[7] Marginal role differentiation has been customary in the department by way of the Government deciding upon policies, programs, financing, monitoring and regulatory mechanisms (Cabinet, Minister, APC, and the Secretary) and the Directorate charged with taking care of implementation and operational monitoring. However, the practice points to a more unitary form of hierarchical functioning in keeping with the priority to retaining close control over implementation.

time (hence, institutional structures and competencies) of the government agency and other sector stakeholders.

8.3 Human and institution development strategy

8.3.1. Human resources development strategy and interventions

Human and institutional development (HID) is a systematic process geared towards developing people, process, systems, structures, and institutions that enable effective, efficient and sustainable provision of services to the beneficiaries or user group with their active involvement at every stage.

Availability of an appropriate HID strategy, policy and programs ensures achievement of the purported objectives. Such attempts in themselves may not be enough unless certain other administrative, financial, and political imperatives are aligned with the vision and mission. It is important to note that

- goodness of vision, mission, goals and objectives remain on paper if all are not realized in actuality;
- worth of a policy and plan, howsoever good it might be is determined by its implementation process and actions;
- critical element of any action and its quality are the attributes and competency sets that people possess – this also needs a good set of incentives;
- the potential of the individuals in the system is contingent upon the knowledge-skills-attitudes (KSA) that defines and determines their performance on the job;
- people and their performance are critical elements in any system yet their contribution to the system hinges upon a number of other elements in the system, viz. the policy structure, processes, resources and leadership in the organization.

Areas of HRD and training have been identified for the development of livestock sector of Chhattisgarh.

8.3.2 Areas of HRD and Training Interventions

KNOWLEDGE areas

User group : (i) Needs and demand analysis; (ii) Awareness building about various livestock schemes and benefits thereof;(iii)Awareness about related schemes of GoC towards their socio-economic up-lift; (iv) Information and education on better usage of the schemes etc.;

AHD Functionaries : (i) Awareness about the LSRPD Vision, policy, plans, goals, and objectives; (ii) Information and education on the inter-linkages with other similar policies of the GoC; (iii) New tools and techniques vis-à-vis livestock; (iv) Best practices followed and success stories at other places related with livestock; (v) Tools and techniques for knowing needs and wants of the user group.

SKILL areas

User group : (i) Techniques of fodder and feed development; (ii) Techniques for preventive health management of their livestock; (iii) Techniques for curative health management of their livestock; (iv) Techniques of simple commercial exploitation of their assets.

AHD Functionaries : Technical skills—(i) Tools and techniques for preventive health management; (ii) Tools and techniques for curative health management; (iii) Tools and techniques for breed management and artificial insemination; (iv) Cost-benefit analysis of their efforts.

Interpersonal Skills — Understanding self and others, building self confidence and discipline. SWOT; Communication skills; Team work and collaboration; Conflict resolution; Leadership, supervision, and influence skills; Environment management.

Conceptual Skills— (i) Envisioning and seeing the big picture; (ii) Foresight and action planning; (iii) Creative problem solving; (iv) Innovating and creating on the job.

ATTITUDE areas

User group: (i) Developing positive orientation towards various GoC schemes; (ii) Developing positive orientation towards new methodologies, tools and techniques of lifestyle and socio-economic uplift.

AHD functionaries : (i) Commitment towards work; (ii) Positive orientation; (iii) Self confidence; (iv) Self discipline;(v) Initiative; (vi) Self motivation.

8.3.2 Strengthening special institutions

The BILDP, Veterinary College, and the CSLDA were identified as institution for improving human and institutional capacities for the sector. The strengthening of these institutions therefore gains paramount importance in the short term. These institutions are strengthened in the first phase for providing capacity support to the select areas of the sector needing immediate strengthening.

BILDP

The BILDP has grown into becoming an excellent extension management institution grounded in actual practice at the field level. BILDP has core training facilities and a faculty drawn from trainers and practitioners that has received considerable capacity development inputs under the LSRPD process. In 2006, the BILDP has been designated as the state's training institute to cater to the training needs of AHD and allied departments' personnel for extension management.

In the LSRPD process the following expectations have been articulated:

- Bulk basic and refresher training to AHD personnel on a regular basis (with the long-term aim of reducing training interlude to less than a year).
- Testing and development of alternate approaches and models of service delivery (from extension to beneficiary, to services to customers) for different regions and situations – and delivery of training on these approaches to relevant personnel.
- Anchoring and managing the delivery of demand-based specialized training to AHD personnel.
- Possible anchoring of development of IEC strategy and materials for the sector, and its implementation.
- Possible housing of the department's HID cell.
- Other emergent demands as may come about over time.

Other functions that can be included for consideration in BILDP's mandate are:

- Monitoring progress in implementation of various programs.
- Generating incisive and objective reports on issues in program implementation.
- Creating extension material (posters, pamphlets, and other communication material) for building awareness related with livestock management.
- Identifying training needs of AHD field staff and implement it on a pre-scheduled basis.
- Coordinating with AHD Directorate and field staff of AHD and act as linking pin between the two.
- Coordinating with Veterinary College, Anjora, and other institution related with animal husbandry for conducting applied research, training of faculty in the field, internship/training of students, and training of AHD operatives on various livestock issues.
- Coordinating with other agencies in Chhattisgarh, and elsewhere for generation of extension/awareness and education material, and also conduction of various training programs.
- Certain VAS and AVFOs should be posted at BILDP to help BILDP achieve its mandate so as not to come in the way of GoCs freeze of fresh recruitments.
- BILDP should be the sole agency in the Bastar region to identify training needs, develop training programs, generate training material, workout training calendar, invite nominations, conduct training programs, and finally assess transfer of learning from class-room to the field.

This is a long list for the BILDP and considering its current resources, indeed an ambitious one to accomplish. The government and AHD recognize the importance and past accomplishments of BILDP, and appear to be willing to provide full support in shoring up human capacities in the sector. Since, the challenges before BILDP are considerable, the following points of departure from normal convention, may be worthy of consideration in formulating its strategy:

(a) Demand-based training services
(b) The BILDP and AHD could enter into an MoU or "compact" setting out AHD support to it, and BILDP's minimum training throughput in different categories for AHD personnel; and other services (in terms of measurable deliverables). This is recommended to be set out in six-monthly deliverables in three-year framework to improve predictability and monitoring.
(c) The BILDP must set targets for revenue generation on annual basis – and ensure that by end of say year 2, more than say 40 % of its costs are earned out of fee-based training and other advisory services to government (non-AHD i.e.) and non-government/private organizations within and outside the state. (Exact time frame and cost/revenue figures will need to be determined).
(d) AHD grants to support infrastructure development could be linked to increase in revenues (above) as a proportion of expenditure.
(e) BILDP may be permitted to source expertise on open market terms and conditions (not bound by government scales), so that bright and dynamic talent can be attracted to serve on full-time or visiting faculty positions.
(f) Developing practice bases in other locations in Chhattisgarh.
(g) Change in role to Training and Capacity Building Program Management Organization.
(h) Depending on the success of BILDP in the initial phase (first two years), it could be spun off into an autonomous institution.

Anjora Veterinary College

The Veterinary Sciences College, Anjora, has 17 departments and faculty strength of 18 Professors and other faculty adding to a total of about 100. About 45 graduates pass out annually. The College is currently expanding its infrastructure that will lead to increased faculty strength and student throughput capacity following the norms of the Veterinary Council of India (VCI). The College is the premier Veterinary education, research, and development institution of the state, and has competencies in line with the high standards set by the VCI. The Veterinary College is a key educational and research resource in the livestock development efforts of the state. In line with the Visioning proposals, the Veterinary College will require continued budgetary support to augment its physical and knowledge infrastructure. For HID in the sector, the college can consider playing the following major roles: (i) participating in the development of service delivery models for the state; (ii) carrying out concurrent studies on emerging experiences from adoption and management of new/improved livestock by households, and conducting field and applied research on fodder development, extension services, curative health care, preventive healthcare of livestock; (iii) experimenting with involving students in innovative schemes for supporting livestock sector activities in the state; (iv) the college may consider designing a Service Delivery and Extension Management course in discussion with VCI. The college is in a position to bring the latest developments to BILDP trainers, and work in partnership with the latter. The college may also consider deploying its vast resources to augment the training capability of the state. The faculty of Veterinary College can be helped in developing —modern teaching / pedagogic methodology and techniques; techniques of writing research proposals; communication skills; other support needs to be identified.

CSLDA

The CSLDA is a key agency undertaking breed improvement. The areas of strengthening include specialized training, training of trainers, as well as mass-training of AI workers within and outside the AHD. Assistance

may be provided to CSLDA in developing the enterprise and livestock management training package for farmers to successfully adopt new/improved livestock. The Veterinary College will need to work with CSLDA in carrying out concurrent monitoring of adoption and management. These measures will maximize the impact of investments being made, as well as utilize knowledge of practice to other breed improvement initiatives (poultry, small ruminants, etc.)

NGOs and other institutions (e.g. Administrative Training Institute, SIRD, etc.)

Administrative Training Institute: The ATI was established in 2004 at Raipur, to design and conduct short training programmes, workshops, and seminars for government personnel. These courses are for (a) foundation at recruitment, (b) in-service refresher courses, (c) training of trainers, and (d) specialized courses e.g. computers, accounting, etc. The institute is also expected to grow into a nodal agency for coordinating training initiatives in the state, and to maintain a centralized database of employees' capacities. At present, ATI is in the process of being built up, it may go through a strengthening process in future. This will provide an additional channel to increase the throughput of basic training modules for AHD – the training modules delivered by BILDP may be instituted in the basic course offered by ATI for the sector. On the other hand, ATI training material and trainers may be used when useful, for departmental training programmes.

State Institute of Rural Development and network of DIETs : These facilities at the very minimum provide locations and venues for holding training programmes (by BILDP, CSLDA, etc.). Further discussions are recommended to explore areas where SIRD can add value to AHD's work – potentially areas are in adapting and using curricula and resource material/persons for rural development program delivery, mobilization of SHGs (e.g. experience of the state in implementing the poverty reduction project), IEC, etc.

Externally Assisted Projects: Chhattisgarh is implementing a number of externally assisted projects including the Sericulture Development Project (IFAD, WFP, DFID); the Tribal Development Programme; Development of visioning for new states (UNDP); Chhattisgarh District Rural Poverty Programme (WB-assisted); etc. Important projects in the pipeline include State Partnership with EC (sector budget support and technical assistance to the Government's reform processes in education, health and forest-based tribal livelihoods sectors); and ADB-assisted irrigation sector strengthening. Although these projects pertain to other realms and sectors of activity, some of the common threads include: emphasis on mobilizing and strengthening community groups (including IEC); support to decentralized governance; services delivery improvements; and a whole gamut of general and specialized training and capacity building activities. It will be beneficial for the training and capacity building institutions of the livestock sector to forge partnerships and utilize the available experiences, resources, and expertise in strengthening the livestock management sector.

9. POLICY DEVELOPMENT

9.1. Introduction

Livestock in India has always been treated as subsidiary to agriculture, and so is the livestock policy. Livestock rarely received a high priority in agricultural policy documents despite that — it is growing faster than agriculture, is more equitably distributed and has considerable potential to reduce rural poverty and it is evident from magnitude of public spending in livestock sector (Table 9.1). In TE 2002/03 livestock received 8% of the total agricultural expenditure of Rs 277 billion, down from 14% in TE1982/83. As proportion of value of output of livestock it works out to be only 2.4%. This is much less compared to livestock's contribution to agricultural GDP. Agriculture including animal husbandry is a state subject, hence most of the spending comes from state governments. The central government provides considerable financial support to states for agricultural development, but most of it is meant for activities other than animal husbandry and dairy development. And in fact, the central government's support to livestock sector has declined considerably.

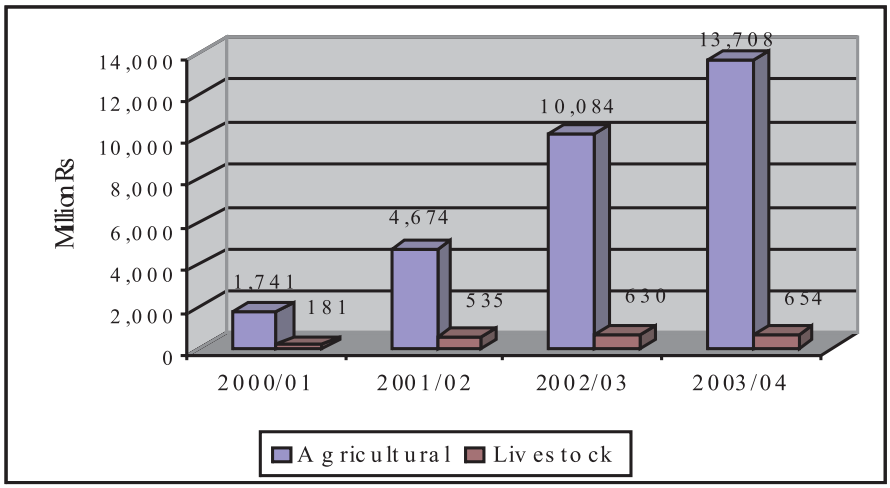
Table 9.1 Expenditure (revenue + capital) on animal husbandry and dairy development in India (at 1993-94 prices)

	TE 1982/83	TE1992/93	TE2002-03
Agricultural sector (Rs billion)	93.2	171.3	276.6
% share of central government		43.9	57.0
Livestock (Rs billion)	12.8	19.5	21.9
% share of central government		14.8	5.0
% of livestock in total agricultural expenditure	13.6	11.4	7.9
Value of livestock output (Rs billion)	387.9	612.3	896.2
Livestock expenditure as % of livestock output	3.3	3.2	2.4
Livestock expenditure /cattle equivalent unit (Rs)	41.3	62.7	71.1

Source: GOI: Reports of the Auditor General and Comptroller of India.

The situation in Chhattisgarh is not much different (Figure 9.1). In 2003/04, the State government spent Rs 654 million, which is about 5% of the total spending on agricultural sector (Rs13,708 million). Capital expenditure in livestock sector is meager. The livestock comprised 3.5% of the value of livestock sector output.

Figure 9.1 Revenue expenditure in animal husbandry and dairy development in Chhattisgarh.



9.2 Policy initiatives

To develop livestock sector in the country some policy initiatives were taken after Independence.

Operation flood programme: Major policy initiative was launching of 'Operation Flood Programme' with the objective to create market linkages between rural production and urban consumption by establishing a network of dairy cooperatives. To foster growth of dairy cooperatives entry of the private sector was restricted in the formal sector and imports were curbed through high tariffs and licensing and quotas. Milk imports were largely the monopoly of the National Dairy Development Board. Besides, the government provided substantial financial support to dairy development activities. In early 1980s, dairy development received as much as 58% of the livestock sector expenses, and still continues to be the main priority with 41%.

Animal health: Development of animal health system was given high priority. The share of animal health services in livestock sector expenditure increased to 23% in 2003 from 13 % in 1981. The emphasis of animal health, however, has largely been curative rather than preventive. Recently, the central government has launched a programme in 100 districts of the country to make them FMD free. Another important initiative to protect farmers from suffering from loss of animals (due to mortality, theft, etc) is to improve coverage of livestock insurance scheme by bringing about 100 districts under the scheme in 2005/06 and 2006/07. The scheme though has been in operation for over last two decades but did not yield desired results. At present only about 6% of the animals (excluding poultry) are covered under insurance. Under the new scheme the central government will share 50% of the premium. The scheme is open for private sector participation.

Economic liberalization: Government of India initiated the process of economic liberalization in 1991, which involved trade policy reforms, market reforms and privatization. Liberalization has significant implications for dairy sector. To comply with the GATT and WTO India has reduced tariffs, removed restrictions on dairy imports and ended the canalization of dairy imports through NDDB. The Government, however, continues to monitor imports of dairy products. Different aspects of liberalization have been discussed here.

- The liberalization process included opening of the formal dairy market to private (non-cooperative) players. The dairy industry was delicensed in 1991 allowing private companies to enter the dairy sector. Delicensing, however, was made conditional through introduction of Milk and Milk Products Order (MMPO), making it mandatory for the new entrants to develop their own milk sheds. This was primarily to protect the dairy cooperatives and other existing actors from the encroachment on their milk sheds by the new entrants. The competition in milk markets though increased but the new milk shed areas in many cases were less attractive or uneconomic. The concept of milk sheds, however, was phased out with amendments in MMPO in 2001 and 2003. To improve processing of livestock products, which at present is limited to 20% of milk and 25% of meat, the Government of India from time to time has reduced excise duties on processed produce.
- Liberalization increased competition in milk markets. In many states cooperatives face considerable state controls and intervention, which adversely affect the performance of cooperatives vis-à-vis private companies which are professionally managed. Some state governments like Andhra Pradesh and Orissa have amended their cooperative law to minimize state controls and interventions in the functioning of the cooperatives.

Contract farming : Another significant policy development for agricultural sector in general is the development of a modal agricultural produce market act, which allows direct transaction between the producers and the processors through institutions like contract farming, which hitherto were not permitted under the old Act. The Reserve Bank of India has also allowed institutional credit agencies to finance contract farming schemes. Much of the poultry sector in the southern states is now under integration through contract farming. An important intervention in the poultry sector is the procurement of eggs by the National Egg Coordination Committee when the prices fall below a minimum level. The central government has also launched a scheme that provides financial incentives to the companies promoting backward linkages in the farming sector.

Support for meat market: Exports of buffalo meat has shown significant rise especially since late 1980s, primarily due to removal of minimum export price condition. India has significant potential to produce and export buffalo meat and to harness this potential, the central government has been providing subsidized financial assistance for modernization of the slaughterhouses.

Fodder bank: Improvement in the feed security has to be given due attention. The feed scarcity is local and largely confined to low rainfall areas. The concept of establishment of 'fodder banks' though has been discussed widely but is yet to take a shape. The central and state governments have made sporadic efforts to improve feed and fodder situation by increasing area under green fodder through distribution of mini-kits, but the effort has not brought any significant improvement in area under fodder crops. Common grazing lands that provide sustenance to a majority of livestock population especially to sheep and goats have been deteriorating quantitatively as well as qualitatively. The area under permanent pastures and grazing lands has declined from 3.6% of the geographical area in 1980/81 to 3.3% in 2002/03. The main reasons being, encroachment on common lands by the influential sections of the rural society and redistribution of common land under poverty alleviation programmes, when the governments failed to procure surplus land under land ceiling act.

9.3 Evolving a pro-poor livestock policy

Several strategies related to technology, markets and institutions are being suggested. These can enhance livestock production and productivity and contribute to improving livelihood of the poor on the assumption that one of objectives of policy-makers is reducing poverty through livestock development.

9.4 Visioning for 2020 for the livestock sector

The following issues or thematic areas were identified for designing pragmatic strategies to reach goals and vision for 2020:

Strengthening of education and extension: Strengthening university veterinary education; AHD staff training; farmers' needs analysis; extension approaches, awareness generation and crafting community based approaches.

Service delivery mechanisms and marketing: Improving doorstep and demand-based services, developing non-government services providers (local youth, PPP, etc.), and associated training and capacity building.

Strengthening and upgrading department systems: Organizational administration; employee development, job satisfaction, career development, and training and education facilities.

Breeding, information management, piloting and appropriate technology and research: A phased approach to breed improvement management including infrastructure and personnel development; drawing in of private and non-governmental actors; greater use of IT and information systems development; and attention to appropriate technology research and dissemination.

Visioning and Opportunities for Human and Institutional Development: The identification of the four clusters of issues or themes respond in varying degrees, to the diagnoses and challenges of the sector. From a human and institutional development perspective, two strategic issues are worthy of consideration.

1. The government to lead in the development of specific sub-sets of action areas and over a period of time, gradually vacating those built spaces for communities and private sector to fill in. This is especially true of private economic services. Over time in parallel, the government's capacities to deliver public goods and services delivery are strengthened (while the actual implementation of these activities could also involve considerable co-production and delivery by the community groups and private sector) apart from enhancing its competencies in policy-making and regulation.
2. A comprehensive set of actions have already been identified in the visioning. Additional suggestions

are provided in the section below – these are to bolster the approaches already suggested to lending greater institutional sustainability, whereas in a few rare cases these are to supplement current proposals with strategic inputs where gains could be potentially significant.

9.5 Risks and evaluation

The above visualization of human capacity building and institutional change depends on the key leadership of the state's AHD to harness and mobilize the community and private sector's potential to lend vibrancy to the sector. The limited resources and capacities of the department thus imbue the enterprise with considerable risk of selective performance. But special initiatives like the BILDP and more recently CALPI's partnering through the LSRPD, have demonstrated that there is a core set of constituents in the department who are willing and capable of leading and executing a moderately risk-aware but ambitious sector policy and implementation plan, given continued facilitation by and engagement with state's leadership.

Nevertheless, the following actions seem high-risk and need close monitoring, and additional resourcing, in the short term:

1. High expectation placed on BILDP, CSLDA, and Veterinary College in crafting and delivering a number of multi-faceted capacity development inputs targeted to para-veterinarians, students, AHD personnel, and current and potential livestock owners.

Mitigation measures possible are :

- ❖ Early collaborative work leading to delineation of complementary roles between these institutions, and joint monitoring of progress. In the absence of effective cooperation and collaboration, and synergetic relation between these institutions, the critical element of availability of competent human resources to take the sector forward will be compromised.
- ❖ Operational autonomy for these institutions from mainstream work of the department.
- ❖ Strengthening and capacity building of these institutions will be necessary to start immediately.

2. Considerable dependence is placed on the AHD to innovate on its own e.g. in service delivery approaches, refining business processes, and initiating and sustaining changes in the work environment. Failure will result in considerable opportunity lost, as also loss of departmental credibility, and morale among department personnel.

- ❖ Creation of small HID cell and top-level monitoring and support to the directorate will be the first mitigation measure.
- ❖ External assistance (donor and technical assistance partners, specialist expertise) will play a key role in registering successes in innovations and bringing visible benefits to client groups.
- ❖ Strengthening and operational autonomy of the capacity building institutions (above) is finally a risk-allocation measure.

3. Awareness building and community mobilization; demand-generation and market development are traditionally not core competencies of the public sector (albeit some AHD personnel have taken training to learn the potential of these strategies). This can substantially mute the result of departmental investments – poor community mobilization may only permit incremental gains in improving service delivery, market development and value-addition may take a route that does not bring multipliers for the state and its people, and the sector developments could remain restricted within the public sector.

- ❖ Learning from other sectors and states (public sector) on IEC/communications, and demand generation; and working with community collectives will be an important task – external facilitation may be required for this whereas the lead could be taken by the research and training institutions in implementing these actions.

- External assistance need to be deployed to carry out specialized tasks of attracting private investments and participation in value-addition and processing, and marketing of livestock products.
- Sector policy development process could itself be utilized to spell out the broad directions – wide consultations on the draft and popularization of the policy will be good opportunities to attract participation of communities, private sector and other (government and non-governmental) institutions in and outside the state, leading to a shared vision (not merely a departmental mandate).

Government systems with considerable institutional and political settlement historically can become major structural barriers to change. These structures become more inflexible as several private and community interest groups become aligned to government structures feeding each other to strengthen formal and informal (e.g. patronage) relationships. Chhattisgarh enjoys the unique new-state advantage. The government decision to keep itself lean may appear to deprive the sector of resources to fulfill its mission. However, this is a boon to change since a lean department has to leverage community and private sector for achieving any significant breakthroughs.

Visualization seems to be moderate in its risk of failure and key areas identified amenable to control provided commitment to sector development persists across top management and government. Reducing some of the negotiated positions to policy pronouncements will ensure against major reversals, whereas instituting mechanisms at the community level, will perhaps be the most robust route to capacity development and sector changes. Critical in implementing the change process will of course be strengthening the research, training and capacity building.

9.6 Goals of policy

The proposed policy envisions livestock sector as an engine of agricultural growth with a human face. It has a renewed focus on improving the livelihood and self-reliance of the poor and other underprivileged sections of the rural society through promotion of sustainable development of livestock. The over-arching goals of the new livestock policy therefore shall be to:

- Enhance growth of the livestock sector by improving efficiency in production, service delivery systems, marketing and processing to build a self-sustained livestock economy that enhances income and employment opportunities, and food and nutrition security of the large masses and absorbs the risks of crop failure.
- Utilize livestock as a tool to reduce poverty, economic and social inequalities by enabling the underprivileged and resource poor rural households to participate in the livestock development process and help them improve their competitiveness to face challenges of market liberalization and globalization.
- Promote the existing scope, potential of livestock as per the needs and requirements of the different agro-climates keeping in focus the livestock practices, climate, rainfall and soil types.
- Minimize negative externalities of modernization of livestock sector to environment through appropriate technological, institutional and policy intervention and constantly monitoring the environment while conserving the animal bio-diversity.
- Ensure that the process of modernization takes place within the confines of the cultural and religious ethos imbedded in the society.

The policy will be implemented through a 10 year perspective plan. The plan will cover all species of livestock. The proposed plan will be implemented in the state by a consortium of implementing agencies like State Department of Animal Husbandry and Veterinary Services, Chhattisgarh Livestock Resources Development Society, the Raipur Milk Union and other agencies like JK NGOs/ Bi-lateral Assistance Project etc. Funding for the implementation of the plan will be from two major sources viz. State Plan/ Non-Plan budget and Central Plan Assistance.

9.7 Policy framework

Livestock production in Chhattisgarh is by and large in the domain of smallholders and is subsistence-oriented. The proposed livestock policy has a pro-poor focus and identifies the following thrust areas for government intervention:

1. **Improve feed-fodder security**
   - Acquire surplus land, re-distribute it to the poor landless and sub-marginal farmers, Legalization of tenancy with long-term lease rights will also enable the poor to own and maintain livestock.
   - Promote dual-purpose crops, leguminous fodder crops as intercrops and forage production on rice bunds and multi-utility fodder trees.
   - Encourage farmers to intensively use available rice straw by improving its quality.
   - Improve management of common grazing lands to enhance their productivity.
   - Promote 'community fodder banks'.
   - Improve villagers' access to forests for fodder collection.

2. **Animal health services**
   - Disease management programs.
   - Develop a cadre of trained para veterinarians. Encourage participation of women as trainers to enhance their social development and knowledge potential.
   - Promote low cost disease treatment and control strategies including ethno-veterinary practices.
   - Re-organise input service delivery system under the public sector.
   - Emphasize usage and availability of preventive vaccination.
   - Introduce cost-recovery for public animal health services.
   - Initiate the process of privatization of those services that do not fall in the category of public goods.
   - Promote mobility of veterinarians and auxiliary staff.
   - Introduce and strengthen disease surveillance, monitoring and reporting system.
   - Develop disease free zones.
   - Encourage public-private partnership in production of low-cost vaccines and biologicals.
   - Establish new frameworks of demand-responsive service delivery framework, treating livestock owners and managers as customers of services.
   - Enforce the Indian Veterinary Council Act with proper interpretation of the legal and regulatory measures essential for effective delivery of veterinary services.

3. **Enhance capacity of the breeding system**
   - Explore the potential of the existing animal genetic resources.
   - Promote artificial insemination to improve quality of the existing stock.
   - Initially provide support towards the maintenance of high level genetics and when the breed improvement system starts working efficiently, introduce cost recovery for the breeding inputs and services.
   - Encourage transparent private sector participation in conservation, maintenance and distribution of breeding inputs.
   - Encourage development of specialized breeders amongst progressive farmers for commercial breeding of sheep, goat, pigs and poultry.
   - Introduce high-producing breeds and breed improvement programs.
   - Establish a 'Livestock Development Board' to cover all species of livestock to coordinate and monitor genetic conservation and breed improvement programs.

4. **Improve livestock producers' access to financial services**

   The poor need credit backing for the acquisition of animals and then for their management.
   - Influence lending institutions to correct lending biases against livestock.

- Explore flexi credit arrangements.
- Up-scale credit schemes like Self Help Groups (SHGs) and Kisan Credit Cards.
- Target credit activities towards women's groups, cooperatives and federations.
- Increase awareness and knowledge to enhance banking activities in rural areas.
- Promote livestock insurance schemes.
- Encourage evolution of community planned and community based risk-coping mechanisms
- Upscale watershed programs.

5. **Link livestock producers to output markets**
   - Promote commodity specific or multi-commodity livestock cooperatives.
   - Revive defunct cooperatives.
   - Provide more autonomy to cooperatives and promote decentralization.
   - Amend and implement the 'Agriculture Produce Market Committee' Act on the lines of the 'Model Marketing Act' of the Government of India.
   - Encourage investment from agro-processors to expand processing facilities.
   - Encourage livestock owners to form 'Producers' Associations' at the grassroot level.
   - Strengthen the scope and potential of women's involvement in livestock marketing.
   - Develop local markets for live animals.
   - Strengthen market information system and enhance information flow to livestock producers.
   - Develop slaughterhouse act, encourage establishment of modern slaughterhouses.
   - Develop roads and storage to promote livestock based industries.

6. **Ensure ecological and environmental sustainability while promoting modernization of livestock sector through appropriate programs**
   - Create awareness about the costs and benefits of livestock to environment.
   - Develop livestock production systems as per livestock carrying capacity of different agro-ecologies.
   - Promote environment friendly crop livestock integrated mixed farming systems.
   - Promote low cost animal-drawn machines and equipments.
   - Discourage industrial production system in urban/ peri-urban areas and devise efficient means for disposal of animal waste through regulations.

7. **Special emphasis on poor and underprivileged sections especially in the underdeveloped regions to ensure that they benefit from livestock development interventions**
   - Develop and promote need based livelihood intensive efficient systems/models of livestock production befitting resource endowments and preferences of the poor keeping in focus the local conditions.
   - Balance specie-wise budget outlay.
   - Enhance capability of the poor producers.
   - Initiate special credit and insurance schemes for the poor and underprivileged.
   - Encourage marginalized sections to organize themselves into 'Producers' Associations'.
   - Ensure that agribusiness firms sourcing raw material through institutions, such as contract farming, do not exclude smallholders.
   - Encourage women to increasingly participate in livestock production.

8. **Strengthen livestock research and its linkages with extension system**

   Continuous generation and dissemination of technologies is central to sustain growth in livestock production. The state has enormous plant and animal biodiversity that can be gainfully utilized for livestock development through research.
   - Increase investment in animal science research.
   - Prioritize livestock research.

- Promote need-based participatory research.
- Integrate traditional and modern approaches to improve livestock productivity.
- Develop, update, standardize and disseminate husbandry practices especially.
- Develop an exhaustive inventory of feed resources available locally.
- Develop thermostable poultry (Ranikhet disease and fowl pox), pig (swine fever), sheep and goat (Peste de Petits ruminants and contagious ecthyma) viral disease vaccines.
- Development of a cost effective polyvalent bluetongue vaccine and anthelmintics.
- Encourage multi-disciplinary research and collaboration among research institutions.
- Follow a bottom-up rather a top-down approach for technology dissemination.
- Promote new models of information dissemination.

9. Restructure and re-energize existing organizational, human and institutional set-up in the livestock sector

Organizational level

- Establish functional linkages and forge synergy through a supportive administrative framework with departments like Panchayati Raj, Rural Development, Health Care and Agriculture down to the village level.
- Generate awareness and demand for livestock management

Personnel

- Enhance efficiency and improve staff skills on a regular basis on planning and management, organizational skill development, working with communities, knowledge of participatory tools and appropriate technology. Increase staff capacity to handle pilots and innovative programmes. Capacitate staff on effective monitoring especially MIS, reporting, documentation and media management
- Set up an HID cell within the directorate to review staff capacities, maintain staff database and plan and execute need based trainings :
- Lay emphasis on:
  (i) Restructuring AHD without reducing existing positions.
  (ii) Moving the department away from delivery of services; both veterinary care and artificial insemination.
  (iii) Decentralization of trainings and extension.
  (iv) Modernizing/Computerizing activities like MIS, Documentation and public liaison system etc.

Institutional level

- Strengthen processes of decentralization and promote private sector participation.
- Develop and promote functional institutional designs to promote livestock specific to the needs of the small farmer.
- Consolidate all breed development and AI operations within the Chhattisgarh State Livestock Development Agency (CSLDA).
- Strengthen dairy development programmes through development of enterprises of producer members through state Milk Co-operatives and Raipur Dugdha Sangha.
- Establish functional linkages with Veterinary College, Anjora, and Dairy Technology College, Raipur, for technical inputs and guidance. Strengthen BILDP as the knowledge and technical centre for small animals.
- Facilitate formation of District Level Committee's on livestock resource development and establish functional linkages with the AH District Training and Extension for convergence and joint action.
- Under the Go-seva Ayog, strengthen the capacities of Goshalas as centers for cattle improvement.

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