

Potential for livelihood improvement through livestock development in Jharkhand



Potential for livelihood improvement through livestock development in Jharkhand

Rameswar Deka¹ and Iain A Wright²

1. Scientific Officer, ILRI-Guwahati

2. Regional Representative, Asia ILRI-Delhi and corresponding author: i.wright@cgiar.org

International Livestock Research Institute (ILRI), Asia Office, NASC Complex, DPS Marg,
New Delhi-110012, INDIA

January 2011

Sponsored by: Sir Ratan Tata Trust (SRTT), Mumbai, India

ILRI




INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE

ILRI works with partners worldwide to help poor people keep their farm animals alive and productive, increase and sustain their livestock and farm productivity, and find profitable markets for their animal products. ILRI's headquarters are in Nairobi, Kenya; we have a second principal campus in Addis Ababa, Ethiopia, and 14 offices in other regions of Africa and Asia. ILRI is part of the Consultative Group on International Agricultural Research (www.cgiar.org), which works to reduce hunger, poverty and environmental degradation in developing countries by generating and sharing relevant agricultural knowledge, technologies and policies.

© 2011 ILRI (International Livestock Research Institute).



This publication is copyrighted by the International Livestock Research Institute (ILRI). It is licensed for use under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported License. To view this license, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>. Unless otherwise noted, you are free to copy, duplicate, or reproduce, and distribute, display, or transmit any part of this publication or portions thereof without permission, and to make translations, adaptations, or other derivative works under the following conditions:

-  **ATTRIBUTION.** The work must be attributed, but not in any way that suggests endorsement by ILRI or the author(s).
-  **NON-COMMERCIAL.** This work may not be used for commercial purposes.
-  **SHARE ALIKE.** If this work is altered, transformed, or built upon, the resulting work must be distributed only under the same or similar license to this one.

NOTICE:

For any reuse or distribution, the license terms of this work must be made clear to others. Any of the above conditions can be waived if permission is obtained from the copyright holder. Nothing in this license impairs or restricts the author's moral rights. Fair dealing and other rights are in no way affected by the above. The parts used must not misrepresent the meaning of the publication. ILRI would appreciate being sent a copy of any materials in which text, photos etc. have been used.

Cover photograph courtesy of BAIF.

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Citation: Deka, R. and Wright, I.A. 2011. Potential for livelihood improvement through livestock development in Jharkhand. Nairobi, Kenya, ILRI.

International Livestock Research Institute

P O Box 30709, Nairobi 00100, Kenya
Phone + 254 20 422 3000
Email ILRI-Kenya@cgiar.org

P O Box 5689, Addis Ababa, Ethiopia
Phone + 251 11 617 2000
Email ILRI-Ethiopia@cgiar.org

www.ilri.org

Table of Contents

List of Tables	v
List of Figures	vii
Abbreviations	viii
Foreword	x
Acknowledgements	xi
1 Introduction	1
1.1 Background to the study	1
1.2 Objectives	1
1.3 Approach and methods	2
1.4 Expected outputs	4
2 Historical and demographic overview	6
2.1 Jharkhand and its people	6
2.2 Rural economy	8
2.3 The livestock sector and its contribution to livelihoods	10
3 Marketing and consumption of livestock products	16
3.1 Demand and supply scenario of livestock products	16
3.2 Current livestock marketing channels and their efficiency	21
3.3 Consumption of, and preferences for, livestock products	26
3.4 Sources of procurement of livestock products	28
3.5 Attributes looked for when buying livestock products	28
3.6 Seasonality of consumption of livestock products	30
3.7 Efficiency of livestock product marketing	31
3.8 Input marketing	32
3.9 Market trends and marketing behaviour	34
3.10 Prices and prices trend of livestock products	35
3.11 Food safety and human nutrition issues	37

4	Livestock production systems	38
4.1	Distribution of livestock and livestock management systems	38
4.2	Management systems	39
4.3	Herd and flock sizes	42
4.4	Reasons for keeping livestock	42
4.5	Estimated levels of performance	44
4.6	Breeding and reproductive management	45
4.7	Feeding management and its seasonality	50
4.8	Health management	54
4.9	Veterinary services	55
4.10	Risk management	56
5	Policy and institutional issues	58
5.1	Delivery of livestock services	58
5.2	Policy and regulatory environment	64
5.3	Institutional linkages	65
5.4	Entry barriers for livestock sector development	65
5.5	Research and information gaps	66
6	Recommendations and conclusion	67
6.1	General issues	67
6.2	Marketing	68
6.3	Production issues	70
6.4	Policy and institutions	72
6.5	Summary and conclusion	73
	Bibliography	75
Appendix 1	List of key informants/resource persons interviewed	77
Appendix 2	Definition of agro-climatic zones	79

List of Tables

Table 1	Selected attributes of surveyed districts	2
Table 2	Districts, blocks, villages and markets covered by the appraisal	4
Table 3	Basic statistics for the four surveyed districts Ranchi, East Singhbhum, Godda and Palamu, and for Jharkhand state	6
Table 4	Distribution of ethnic groups in surveyed districts and blocks	7
Table 5	Land use in Jharkhand and the four surveyed districts ($\times 10^3$ ha)	8
Table 6	Area (ha), yield (kg/ha), and total production (t) of major crops in the four surveyed districts during 2005–06	9
Table 7	Important livelihood activities of the rural population in the study districts	10
Table 8	Livestock population in the four surveyed districts and in Jharkhand	11
Table 9	Household to livestock ratio	12
Table 10	Livestock population ($\times 10^3$) in 1997 and 2003	12
Table 11	Estimates of the contribution of livestock to household livelihood	14
Table 12	Demand and supply of milk, meat and eggs (2007–08)	16
Table 13	Daily consumption of livestock products in Jharkhand and in the four surveyed districts	16
Table 14	Approximate percentage of milk sold in different market chains	21
Table 15	Approximate percentages of slaughter goat/mutton sold in different market chains	22
Table 16	Approximate percentages of broilers sold in different market chains	24
Table 17	Approximate percentages of pork sold in different market chains	25
Table 18	Approximate percentages of eggs sold in different market	25
Table 19	Approximate percentages of slaughter cattle and buffalo sold	26
Table 20	Estimates of the frequency of consumption of livestock products by consuming households (% of households)	27
Table 21	Per capita expenditure per month on milk and meat products (2004–05)	28
Table 22	Attributes looked for when buying livestock products	28
Table 23	Attributes looked for by traders when purchasing their stock	30
Table 24	Seasonality in consumption of livestock products	31
Table 25	Approximate distribution of costs in marketing of livestock products (INR)	32

Table 26	Prices (INR) of farm inputs in the four surveyed districts	33
Table 27	Characteristics of the market for livestock and livestock products	34
Table 28	Prices (INR) of livestock products in the four surveyed districts (September–October 2008)	35
Table 29	Changes in price of milk during the last 10 years (INR per litre)	35
Table 30	Changes in prices of mutton during the last 10 years (INR per kg)	36
Table 31	Changes in prices of broiler during the last 10 years (INR per kg)	36
Table 32	Changes in prices of pork during the last 10 years (INR per kg)	36
Table 33	Changes in prices of eggs during the last 10 years (INR per dozen)	36
Table 34	Changes in prices of beef during the last 10 years (per kg)	36
Table 35	Estimated percentage of households and their ethnic groups with livestock in the rural areas of the four surveyed districts	38
Table 36	Approximate percentages of livestock rearing households by management system	39
Table 37	Common herd/flock sizes (numbers of animals per household)	43
Table 38	Reasons for keeping livestock	43
Table 39	Performance estimate of livestock	44
Table 40	Main livestock breeds in Jharkhand	46
Table 41	Breeding practices of livestock	46
Table 42	Feed resources used for different livestock species	50
Table 43	Calendar of seasonal availability of feeds and fodder	53
Table 44	Common livestock diseases (most important shown in bold) and associated risks reported in the four surveyed districts	54
Table 45	Services used by the producer households (%) to treat their animals	56
Table 46	Farmers' perceptions about the risks associated with keeping livestock	57
Table 47	Government infrastructure and support services	58

List of Figures

Figure 1	Map of Jharkhand showing the four sample districts and within each, the blocks that were surveyed	3
Figure 2	ILRI staff with the local animal husbandry officer gathering information from the villagers	5
Figure 3	A group of women participated in an FGD	5
Figure 4	A pair of bullocks with cart used for transporting goods	13
Figure 5	Paneer imported from Bihar is sold at the road side in Jamshedpur	18
Figure 6	A broiler wholesaler from Ranchi with his truck used for carrying broilers from West Bengal	20
Figure 7	Livestock market at Haldi Pokar	29
Figure 8	Goats carried in public vehicle from the market	29
Figure 9	Babulal Sarada, a cowboy (aged 12 years) with his herd of livestock	40
Figure 10	A Khatal in Jamshedpur	40
Figure 11	A shed used for keeping goats	41
Figure 12	A tethered crossbred pig	42
Figure 13	A breeding bull (Shar) roaming in the city street	48
Figure 14	A buck used for breeding by TSRD	48
Figure 15	A herd of pigs managed by Birsa Agricultural University for producing T&D breed	49
Figure 16	A tribal lady at her fodder plot grown under the initiative of PRADAN	51
Figure 17	A stack of paddy straw stored for feeding to cattle	52
Figure 18	A BAIF run AI centre in Godda	60
Figure 19	A tribal lady supported by PRADAN for cattle rearing in Godda	62

Abbreviations

AgBDS	Agri-Business Development Services
AHFD	Animal Husbandry and Fisheries Department
AI	Artificial Insemination
AICRP	All India Coordinated Research Project on Pig
BAIF	BAIF Research Development Foundation
BASICS	Bharatiya Samruddhi Investments and Consulting Services
BAHO	Block Animal Husbandry Officer
BAO	Block Agriculture Officer
BMC	bulk milk coolers
BQ	Black Quarter
BSFL	Bharatiya Sambridhi Finance Ltd
CAPART	Council of Advancement for People's Action and Rural Development
CB	Cross Breed
CEO	Chief Executive Officer
COMFED	Co-operative Milk Federation
CPR	common property resources
CRD	Chronic Respiratory Disease
DAHf	Department of Animal Husbandry and Fisheries
DAHO	District Animal Husbandry Officer
DCS	Dairy Cooperative Society
DRDA	District Rural Development Agencies
FCR	Feed Conversion Ratio
FMD	Foot and Mouth Disease
FGD	Focus Group Discussion
HS	Haemorrhagic Septicemia
IBD	Infectious Bursal Disease
IDS	Institutional Development Services
IGS	Indian Gramin Services
ILRI	International Livestock Research Institute
INR	Indian rupees
KVK	Krishi Vigyan Kendra
KVO	Key Village Officer
LFS	Livelihood Financial Services
MPG	Milk Producers Group
NBFC	Non Banking Finance Company
NDDB	National Dairy Development Board
NGO	Non Governmental Organization
OBC	Other Backward Classes
PPR	Peste-des-Petits Ruminants
PRADAN	Professional Assistance for Development Action
RD	Ranikhet disease
RVC	Ranchi Veterinary College
SC	Scheduled Caste
SF	Swine fever
SHGs	Self Help Groups
SRTT	Sir Ratan Tata Trust
ST	Scheduled Tribe

T&D	Tamworth and Desi cross
TSRD	Tagore Society for Rural Development
TWC	Tribal Welfare Commission
USD	United States dollar

Foreword

This report presents the results of an appraisal study of the livestock sector in the state of Jharkhand, India. In particular it summarizes the opportunities for livelihood improvement and employment generation through livestock development based on information collected in four districts, Ranchi, Godda, East Singhbhum and Palamu, and presents some recommendations for research and development interventions.

Acknowledgements

The study on the 'Potential of livelihood improvement through livestock development in Jharkhand' is sponsored by the Sir Ratan Tata Trust (SRTT) under its Central India Initiative (CInI). Nevertheless, the views expressed in this report are those of the individual scientists and do not necessarily reflect the views of SRTT, ILRI or the other organizations associated with the study. The study would not have been possible without the participation of many individuals and organizations. The oversight and review provided by Mr Ganesh Neelam, SRTT, Jharkhand was indispensable to the design of the study and to the drafting of the recommendations. We extend our sincere thanks to Mr Satyabrata Acharya from PRADAN and Mr Samir Bhattacharjee from BASIX for their contribution in designing the study. We are also thankful to the officials of Department of Animal Husbandry and Fisheries, Birsa Agricultural University, Department of Agriculture, District Rural Development Agencies (DRDA) and Municipal Councils for sharing some of the valuable information with us. We thankfully acknowledge the help and support received from several NGOs and developmental organizations including NDDDB, PRADAN, BASIX, BAIF, Tagore Society for Rural Development (TSRD) in the four districts and in the sample villages. Our immense gratitude also goes to many livestock producers and their families, traders, butchers and their associates who shared their knowledge, experiences and insights with us without which it would not have been possible to write this report. We also thank Mr Abhishek Chand for research assistance. Finally, the study would not have been possible without the advice, commitment and continual support of Mr Arun Pandhi, SRTT, Mumbai to whom we express our gratitude.

1 Introduction

1.1 Background to the study

Central and eastern India are home to some of the most disadvantaged communities in the country, with high tribal populations (more than 20%, Census 2001) in Madhya Pradesh, Chhattisgarh, Orissa and Jharkhand and development indicators well below the national average. The livelihoods of the tribal people depend on forest resources, agriculture, livestock, petty trading and casual labour. Degradation of forests and increasing state control over the use of forest resources are severely limiting access of many communities to traditional resources while agricultural and livestock productivity are low as a result of undulating topography, limited irrigation, lack of access to extension services, farm inputs and poor market access. Weak institutional capacity, poor infrastructure development and lack of rural opportunities are binding constraints to growth and development in Jharkhand (World Bank 2007). These factors are resulting in increased indebtedness, poverty traps, poor family planning, poor literacy, increased migration from Jharkhand and the degradation of the state's natural resources.

The Central India Initiative, supported by the Sir Ratan Tata Trust (SRTT) was established to create a broad alliance of researchers and practitioners for learning and documentation of some proven approaches to land and water interventions for improving tribal livelihoods. SRTT also supports a number of development initiatives in the region, including in Jharkhand. Some of these development activities and projects are focused on livelihood improvement through livestock development including dairying and poultry. There is an increasing demand for livestock products, including meat and milk, from urban centres and local towns which offers significant scope for enhanced income from livestock, but there are a number of constraints to the improvement of livestock productivity and marketing that limit local people's ability to take advantage of these market opportunities. These constraints include lack of feed and fodder for livestock, poor quality animals and poor provision of animal health services. While the market for milk, for example, is accessible to some, especially those near to towns, this is not universal. Development activities to date have concentrated on dairy and poultry, but small ruminants and pigs are important livestock species for some of the most marginal communities. To date there has not been a systematic appraisal of the livestock sector in Jharkhand and in particular the potential role of livestock development as a contributor to livelihood improvement and poverty reduction.

1.2 Objectives

This appraisal was carried out with a view to informing decisions on how the livestock sector can contribute to the improvement of livelihoods and employment generation, especially amongst the tribal communities in the state. Its aim was to build a shared understanding amongst the key public and private sector stakeholders about current livestock production and marketing systems, their constraints and the opportunities for improvement.

The specific objectives of the study were to:

1. Evaluate the current contribution of livestock to the livelihoods of tribal and other marginal communities in Jharkhand.
2. Evaluate the current production and marketing systems of livestock.
3. Describe the programs and projects aimed at livelihood improvement through livestock and the prevailing institutional and policy issues.
4. Identify potential entry points for livelihood improvement through the improvement of livestock production and marketing in Jharkhand, including the target communities, livestock species of focus, the potential roles of different stakeholders, taking into account the sustainable use of the natural resources.
5. Identify information and research gaps.

1.3 Approach and methods

A small advisory committee was constituted to provide advice and guidance to the research team on the approach and methods. Two complementary research methods were applied: a comprehensive review of secondary information relevant to Jharkhand and the collection of primary data through semi-structured interviews in selected districts at district, block, village and household levels. The interviews, which drew on checklists prepared for consumers, market agents and producers (field surveys), gathered information on the population and income groups practising livestock (cattle and buffalo, pigs, goats and poultry) production and marketing; the relative importance of livestock products in livelihood strategies; production practices (feeds, breeds, disease control and reproduction); livestock productivity and profitability; market chains and the actors involved; consumer demand and preferences; support services; an approximate timeline of changes over the past 5–10 years (i.e. the dynamics of the system) and the interviewees' perspectives on constraints and opportunities (i.e. scope for improving the productivity and profitability of livestock systems).

To ensure that the results reflected the variation observed in Jharkhand for livestock production and marketing, four contrasting yet complementary districts were selected from the state's 24 districts (as in 2008). The sample districts—Ranchi, East Singhbhum, Godda and Palamu—were selected based on their diversities of ethnic groups, geographical location, agro-climatic zone, production system, access to market and farm inputs, demand and supply situation for livestock products, potential for growth of livestock and how these factors were thought to influence the variability of livestock systems in the state. The choices of sample districts were guided by the information available from secondary sources and the field knowledge of the advisory committee members and key stakeholders (see Table 1, Figure 1 and Appendix I).

Table 1. Selected attributes of surveyed districts

Characteristics	Ranchi	East Singhbhum	Godda	Palamu
Geographical location	Central	South, (bordering West Bengal and Orissa)	Northeast (bordering Bihar)	Northwest (bordering Chhattisgarh and Orissa)
Agro-climatic zone ¹	Zones I and II	Zone-III	Zone-I	Zone-II
Tribal/non-tribal region	Tribal Sub Plan (TSP)	Tribal Sub Plan (TSP)	Outside Sub Plan (OSP)	Outside Sub Plan (OSP)
Region	South Chotnagpur	South Chotnagpur	Santhal Pargana	North West
Status of livestock production system	Transformation stage (from traditional to commercial)	Transformation stage	Traditional	Traditional
Available land for grazing	Less	Less	More	More
Access to market	Good	Good	Poor	Average
Access to farm inputs and other services	Good	Good	Poor	Poor

1. See Appendix 2 for definitions.

Source: Secondary information and key resource persons' expert opinions about the districts.

In consultation with key resource persons from the Animal Husbandry and Fisheries Department, Agriculture Department, Municipal Councils, NGOs and some district-level market agents, two blocks were identified for surveying within each sample district. Within each block, two villages were identified after detailed discussions with the Block Animal Husbandry Officer and other staff about the demographic and livelihood patterns, the roles of crop agriculture and livestock, the concentration of livestock species, the variation in ethnic groups and the proximity to markets. Generally within a block, one village was selected to be nearer markets and other one further away from the market. Semi-structured interviews were

carried out in two households in each village for each livestock species (cattle and buffalo, goats, pigs and poultry). Semi-structured interviews were also carried out with a number of market agents and traders. Information from household interviews was cross-checked and validated with information collected through conducting Focus Group Discussions (FGD) in each surveyed village and market, and reviewing various secondary information. During the market survey about 50 consumers were interviewed in each surveyed district to understand both their current preferences and their changes of behaviour over time. The latter gave an indication of past and future trends in the markets for livestock and livestock products. The surveyed districts and blocks are highlighted in Figure 1.

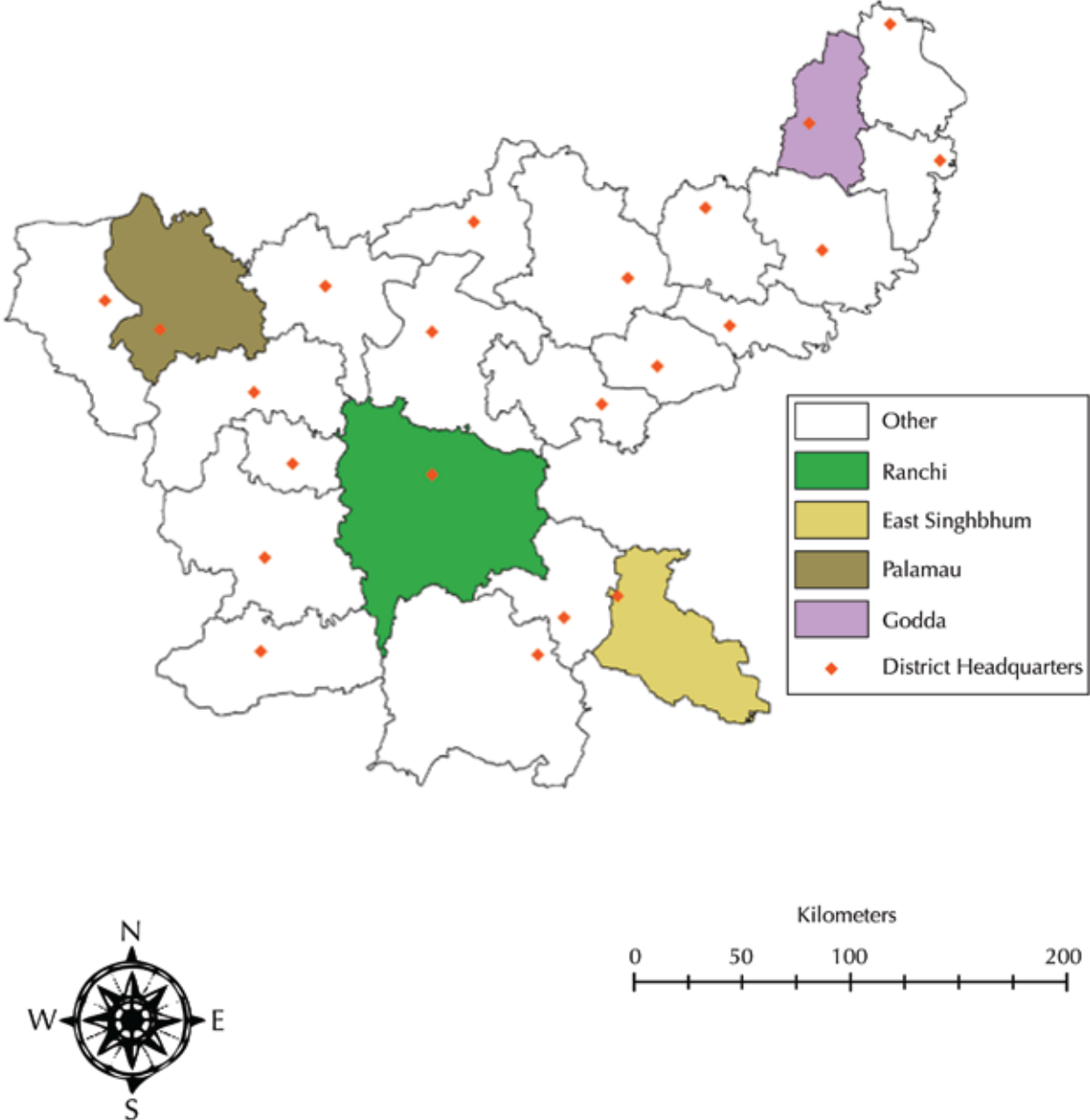


Figure 1. Map of Jharkhand showing the four sample districts and within each, the blocks that were surveyed.

Table 2 lists the villages and markets that were surveyed in each of the blocks in the four sample districts. The field survey began in Ranchi district in late August 2008 and continued till the surveys were completed in Palamu in late November 2008.

Table 2. *Districts, blocks, villages and markets covered by the appraisal*

Districts	Blocks	Villages	Daily markets	Weekly markets	
Ranchi	Kanke	Boriya	Namkum	Dhurva Market	
		Orguttu	Bahu Bajar	Orguttu Market	
	Arki	Gamharia	Moradabad	Morahabadi Market	
		Ollihatu	Medical Chowk	Tamar Market	
			Bada Talab		
			Kanta Toli		
			Booty More		
			Arki Market		
	East Singhbhum	Potka	Bhumrih	Sackchi Market	Haldi pokhar
			Roshan Chopra	Bistupur Market	Jugsalai
Ghatsila		Gopalpur	Railway Station Market	Haata Market	
		Burudi	Mango market	Ghatsila market	
			Bhuiadih	Musabani market	
Godda	Porriyahaat	Pasoi	Main Market	Dumaria haat	
		Danre	Chandini Chowk market	Mahagama haat	
	Sunderpahadi	Chandana		Banka haat	
		Teso bathan		Gangawara haat	
Palamu	Satbarwa	Bari	Hospital chowk	Satbarwa market	
		Punchi	Sadik manjil chowk	Garwah Market	
	Bishrampur	Majholi	Lal Building chowk		
		Khuchri	Panch mukhi chowk		

By its very nature, an appraisal does not set out to provide definitive answers, but rather to identify key issues that are likely to be responsive to development interventions or that require research to fill gaps in knowledge. To achieve these objectives, this report draws together the field data collected in the four districts and the secondary information gathered during the literature review and through visits to the major research and development organizations. It provides a description of the livestock production and marketing systems in Jharkhand and an analysis of the constraints to, and opportunities for improving, their contribution to livelihoods and generating employment opportunities, especially for poor and marginalized communities.

1.4 Expected outputs

Based upon the plans for the appraisal drawn up prior to its implementation, the expected outputs were as follows:

A better understanding of current livestock production and marketing systems in Jharkhand and the constraints to, and opportunities for, improving the systems productivity and profitability especially amongst the tribal communities.

Specific recommendations to overcome technical, institutional and policy constraints and to exploit the opportunities for improving productivity and profitability.

A sound basis for the development of new programs or projects by SRTT and its partners, for interventions in support of improved livelihood through livestock production and marketing.

The basis for others to develop needs-based projects and/or commercial ventures.

These outputs are derived in the context of Jharkhand’s current economy and resources (Chapter 2), marketing of livestock products (Chapter 3) and production systems (Chapter 4) and related service delivery, policy and institutional issues (Chapter 5). Finally, Chapter 6 presents the report’s conclusions and recommendations.



Figure 2. ILRI staff with the local animal husbandry officer gathering information from the villagers.



Figure 3. A group of women participated in an FGD.

2 Historical and demographic overview

2.1 Jharkhand and its people

The State of Jharkhand, came into being as the 28th state of India on 14th November 2000. Jharkhand was part of Bihar, but after Indian independence the demand for a separate state grew and as a result Government of India created Jharkhand under the Bihar Reorganization Act. It is located in eastern India and is surrounded by Bihar to the north, Uttar Pradesh and Chhattisgarh to the west, Orissa to the south and West Bengal to the east. Geographically, Jharkhand is part of the Chottanagpur Plateau, which was the home of racially and linguistically different tribal groups, mainly the Munda, Ho, Santhal, Kharia and Oraon.

Jharkhand has a population of 26.9 million which is nearly 2.6% of India's population. About 78% of the population lives in villages (Office of the Registrar General and Census Commission 2001). The State has immense diversity in ethnicity, languages, community, religion and race with 26% of the population from Scheduled Tribes (ST) and 12% from Schedule Castes (SC) comprising a tenth of the country's tribal population. The percentage of the population that is tribal ranges from 4% in Chatra district to 70% in Simdega district. Similar to the rest of India (933:1000, female to male ratio), the female population is lower than the male population (941:1000). Population density ranges from 148/km² in Gumla to 1167/km² in Dhanbad district with an average population density of 338 people per km². The major language is Hindi with a number of dialects, although several tribes speak their own language too. In the districts neighbouring to West Bengal, Bengali is also a major language.

A large majority of the people (68.5%) follow Hinduism followed by Islam (13.8%), Animistic Sarna religion (13%), Christianity (4.1%). Jainism, Buddhism and Sikhism are also practised, but together they account for less than 1%. Table 3 depicts some basic data for the state and the four study districts.

Table 3. Basic statistics for the four surveyed districts: Ranchi, East Singhbhum, Godda and Palamu, and for Jharkhand state

	Ranchi	East Singhbhum	Godda	Palamu	Jharkhand State
Area ($\times 10^3$ ha)	758	557	232	525	7970
Population (2001)	2,785,064	1,978,671	1,047,000	1,533,173	26,945,829
SC population (%)	5.2	4.7	8.6	27.6	11.8
ST population (%)	41.8	27.8	23.6	9.0	26.3
Hindu population (%)	50	66	71	83	69
Muslim population (%)	13	9	20	12	14
Christian population (%)	9	1	2	2	4
No. of blocks	20	9	8	12	211
No. of villages	2076	1770	2310	1918	32,615
No. of households	505,508	374,772	192,649	252,319	4,799,081
Population density (per km ²)	362	560	496	296	338
Main municipality	Ranchi	Jamshedpur	Godda	Daltonganj	Ranchi
Municipal population	847,093	573,096	37,008	71,422	847,093
Urban population (%)	35	55	4	6	22
Literacy rate (%)	64.6	68.8	43.1	46.5	53.6
Annual rainfall, 2005 (mm)	879	1293	1119	617	1001

Source: Directorate of Statistics and Evaluation, Jharkhand.

Jharkhand is home to about 31 tribal groups who have been living there for thousands of years with few changes in their life and culture over the years. The Santhals are the largest tribe (Singh 2006), accounting for about 35% of the tribal population. They are settled in the districts of Dumka, Godda, Pakur, Sahebganj and Deoghar. The Oraons are the second largest tribe in the state with roughly 18% of the tribal populations. This is followed by the Mundas (14%), the Hos (9%), the Bhumij, the Kharia, the Sauria Pahariya, the Mahli, the Lohra, the Bedia, the Chikbaraik, the Gonds, the Chero, the Kora, the Korwa, the Karmali, the Parahiya, the Gorait etc. Ranchi district has the highest concentration of tribes while Giridih has the highest concentration of Scheduled Caste population. There are some Primitive Tribal Groups (PTGs), which are defined on the basis of three criteria, (i) pre-agricultural level of technology, (ii) low level of literacy and (iii) stagnant or diminishing population, which include the Mal Pahariya, the Korwa, the Paharia, the Savar, the Birhor etc. which account for about 200,000 people. All the ethnic groups have their own traditions, culture and livelihood strategy and the majority of them consider agriculture, forestry and livestock as major sources of livelihood generation. The distribution of ethnic groups in the surveyed districts and blocks are given in Table 4.

Table 4. *Distribution of ethnic groups in surveyed districts and blocks*

District	Ethnic groups in district	Block	Ethnic groups in block
Ranchi	Munda, Oraon, Bhumij, Teli-baniya, Kharia, Kurmi, Gope, Bania, Bedia, Mahli, Lohri, General, Muslim	Kanke	Oraon more in number
		Arki	Munda more in number
East Singhbhum	Munda, Ho, Santhal, Mahto, Bhumij, Kharia, Mandals, Gope, Kurmi, Bedia, Savara, OBC, Oriya, Bengali, General, Muslim	Potka	Bhumij, Santhal, Ho, Savar, Kurmi, Mondal
		Ghatsila	Santhal, Mahato, Bhumij, Ho, Mandal, Savar, Oriya, Bengali
Godda	Santhal, Ho, Yadav, Munda, Kumhar, Baniya, Thakur, Rajput, Mal Pahariya, General, Muslim	Poreya	Santhal more in number
		Sundarpahar	Munda and Ho more in number
Palamu	Oraon, Mochi, Paswan, Koeri, Yadav, Kurmi, Lohri, Thakur, Brahmin, Harijan, Parahiya, General, Muslim	Satbarwa	Yadav, Brahmin, Harizan, Muslim, Kumar
		Bishrampur	Almost all communities, Mochi and Paswan more in number

Source: Key informants of the surveyed districts.

Jharkhand's topography is undulating with altitude ranging from 120 metres above sea level (masl) to over 1000 masl. Uplands and Medium Upland areas are covered with coarse gravelly and sandy soil with some forest cover while the lower areas have cultivable land. Because of undulation, the flow of water depends on the amount of rainfall and diversity of terrain. Considerable slope leads to quick passage of water and limits accumulation of water in water bodies, leaving upland areas dry and eroded.

The climate is generally tropical with hot summers and cold winters. Jharkhand has a different climate from that of Bihar and other neighbouring states. The average temperature of the state is lower than in the Ganges plain, mainly because one-third of the area has an altitude of over 400 masl. There are regional variations and some parts of the state like Ranchi, Netarhat, and Parasnath have a pleasant climate even during summer. For example, Ranchi which is at a higher altitude, has a maximum temperature of around 35–36°C whereas in winters the minimum temperature dips to 5°C. About 90% of the rain falls during the months of June to September. Some districts like Dumka, Jamtara, Pakur, Sahebganj receive good rainfall (annual rainfall 1200–2000 mm) while Palamu, Garhwa, for example, are declared drought-prone almost every other year (annual rainfall 600–1000 mm). The major rivers flowing through the state are Damodar, Mayurakshi, Barakar, Koyal, Sankh, Son, Auranga, More, Karo, Bansloi, South Koel, Kharkai, Swarna Rekha, Ganga, Gumani and Batane.

Jharkhand is known for its mineral resources. Some of the country's highly industrialized cities such as Jamshedpur, Ranchi, Bokaro and Dhanbad are located in Jharkhand, based on these mineral resources. The state ranks nationally first in iron, copper, mica, granite, asbestos and uranium production, second in chromite production, third in coal, bauxite and thorium production and sixth in gold production. In addition, silver and several other minerals are also found in the state. The nation's first steel plant is in the state. Yet, this industrial development has had little impact on livelihoods outside the industrial enclaves, with only 2.4% the proportion of main workers engaged in mining and industry (Census 1991). Even in the most industrialized districts, such as East Singhbhum, Bokaro, Ranchi and Dhanbad, the proportion is less than 3%.

2.2 Rural economy

The rural economy is dominated by smallholder rain-fed farming—mainly rice cropping with livestock—and extensive common property resources, mainly forests. Of the total land area in the state the net sown area is only about 22% which is less than half of the national average (47%). Of the net sown area, only 3% is sown more than once a year with the remainder used only for mono-cropping. Paddy occupies almost 72% of the sown area (Directorate of Agriculture 2006). Large tracts of land are left uncultivated by poor farmers due to lack of capital and irrigation. Only about 9% of the net sown area is irrigated (about 157,457 ha). As can be seen in Table 5, Ranchi and Godda districts have greater net sown areas than the other two surveyed districts. Forests in Jharkhand cover about 28% of the total geographical area of the state of which 82% are protected forest and 17.5% are reserve forest with a small area of unclassed forests (33.49/km²). Of the surveyed districts, Palamu has the highest forest cover (45%) followed by East Singhbhum (25%), Ranchi (23%) and Godda (18%) (Table 5).

Table 5. Land use in Jharkhand and the four surveyed districts ($\times 10^3$ ha)

District	Total area	Forest area	Land in non-agricultural uses	Permanent pasture and other grazing land	Net sown area	Area sown more than once	Irrigated area
Jharkhand state	7970	2334 (28%)	688 (9%)	87 (1%)	1762 (22%)	263 (3%)	157 (9%)
Ranchi	758	159 (23%)	74	2	256 (34%)	17	6
East Singhbhum	557	123 (25%)	155	3	83 (15%)	64	5
Godda	232	31 (18%)	18	6.	78 (34%)	6	14
Palamu	525	227 (45%)	20	2	98 (19%)	21	

Sources: Directorate of Statistics and Evaluation (2006), Jharkhand, Ranchi; and www.jharkhand.nic.in.

Small and marginal farmers dominate the rural economy of the state. Nearly 56% of the land holdings in Jharkhand are less than 1 ha in size (Singh 2006). About 16% are 1–2 ha and about 15% are 2–4 ha. Only about 2.5% of holdings are more than 10 ha. The rural economy of Jharkhand is dependent on rain-fed agriculture and livestock. Paddy dominates the present cropping pattern with more than 72% of gross crop area under this single crop followed by pulses (7%), maize (6%), wheat (3%) and oil seeds (3%). Due to lack of irrigation infrastructure, small land holdings, lack of extension services with regard to input management and package of practices, the yield from these crops is extremely low, e.g. rice yields per hectare of less than a tonne (Table 6). The majority of farmers cultivate only one crop in a year resulting in poor income level.

Table 6. Area (ha), yield (kg/ha), and total production (t) of major crops in the four surveyed districts during 2005–06

Crops	Ranchi	East Singhbhum	Godda	Palamu
Maize				
Area	2850	597	6926	6803
Yield	1051	1162	1152	857
Production	2996	694	7978	5830
Paddy				
Area	107,993	86,438	36,095	26,965
Yield	703	785	1802	231
Production	57,919	67,854	65,043	6228
Wheat				
Area	2391	301	5409	6562
Yield	1112	824	1350	664
Production	2658	248	7302	4357
Gram				
Area	582	75	1478	3021
Yield	699	1055	808	621
Production	407	80	1194	1876
Mustard				
Area	231	4	814	590
Yield	670	931	612	519
Production	155	4	498	306

Source: Directorate of Statistics and Evaluation (2006), Jharkhand.

Of the four surveyed districts, Godda district, which has more irrigated land, has by far the highest yields of rice and wheat whereas yields in Palamu are very low because of low rainfall and poor irrigation. Land use practices and cropping patterns vary according to ethnic group, soils, climatic conditions and access to markets and infrastructure. For instance, maize is more popular in Palamu and East Singhbhum districts whereas vegetable cultivation is popular in Ranchi district from where vegetables and fruits are exported to other parts of the state.

Forests continue to be an important supplemental source of livelihoods for Scheduled Castes (SC) and Scheduled Tribes (ST). Some important forest products, especially non-timber forest products, include mahua flower/seed, firewood, sal leaf, mal seeds, shellac, bamboo, kendu leaf, haheera, and tussar silk with several small-scale industries based on these forest products. People residing in and around forests are partly dependent on these forest products for their livelihood. Declining forest area and increasingly stringent forest policies are rapidly marginalizing this once important source of livelihoods for the SC and ST people.

In addition to crop agriculture and forestry, rural households depend on livestock. The majority of rural households keep bovines (cattle and buffalo), goats and chicken and most tribal households have pigs. These livestock not only contribute to livelihoods in the form of cash and kind, they also provide companionship for young and old people. For many of Jharkhand's people, livestock are part of their family, they live in the house and the family spends a significant portion of their time (2–4 hours/day) looking after its livestock. For the tribal communities, livestock have traditionally played an important role in their livelihood. Table 7 summarizes the main livelihood activities of the rural people in the four surveyed districts and the major livestock types.

Table 7. *Important livelihood activities of the rural population in the study districts*

Particulars	Ranchi	East Singhbhum	Godda	Palamu
Livelihood activities	Agriculture	Agriculture	Agriculture	Agriculture
	Vegetable cultivation	Wage labour	Livestock rearing	Livestock rearing
	Wage labour	Livestock rearing	Wage labour	Wage labour
	Livestock rearing	Petty trading	Selling of coal	Selling of Mera
	Petty trading	Selling of Mera	Petty trading	
	Selling of residue of country liquor (Mera)	Selling of Mahua	Selling of Mera	
Major livestock species	Cattle	Cattle	Cattle	Cattle
	Buffalo	Goats	Buffalo	Buffalo
	Goats, sheep	Chickens	Goats	Goats, sheep
	Pigs		Pigs	Pigs
	Chickens		Chickens	

Source: Field reports of producers and other stakeholders.

The state is reasonably well connected with other states in India by rail and road. Migration of labour from Jharkhand to other parts of India has been occurring for the several decades due to the lack of local employment opportunities. Because of the small land holdings and the low productivity of the agricultural sector, only about 16% of workers in agriculture have classified it as their main occupation while 34% are marginal workers; in other sectors 41% are classified as main workers and 34% as marginal workers (Office of the Registrar General and Census Commission 2001). This indicates the increasing dependence of workers on sectors other than agriculture for earning their livelihood.

The total Gross State Domestic Product (GSDP) in the year 2005–06 was Indian rupees (INR)¹ 471 billion at current prices; per capita GSDP was INR 16,163. The contribution of agriculture and animal husbandry to GSDP is about 20%, much lower than the national average. The contribution of the manufacturing sector to the state exchequer is about 33% and mining and quarrying contribute about 14% of the GSDP indicating the large dependence of the state's economy on these sectors. According to the National Sample Survey of 2000–01, Jharkhand had a per capita income of INR 8749 as compared to the national average of INR 16,555. About 43% of the population in Jharkhand is below the poverty line, much higher than the national average of 26% and higher than almost all other states except Orissa (47%) (Planning Commission estimate, Sample Registration System Bulletin 2002).

2.3 The livestock sector and its contribution to livelihoods

As shown in Table 7, livestock are important to rural livelihoods. The type of livestock reared is location- and ethnic-group specific but one generality is the important role of bovines in providing draught power for crop agriculture. General community households mainly rear cattle, goats and poultry while tribals and Dalits/Harijans rear pigs and poultry. Except for the livestock kept by a small number of peri-urban and urban dairies and broiler farms, the majority of the livestock and poultry are indigenous breeds or their crosses that are managed using traditional practices. Generally only a small number of animals are kept and few external inputs are purchased, that is these are traditional low-input, low-output systems in which common property resources (CPR) like roadsides, playgrounds, school fields, river banks and forest lands are major sources of feed and fodder. However, available grazing land is being reduced by construction, industrialization and deforestation. This has implications for the management and maintenance of the ruminant population, and particularly the cattle.

1. Indian rupees (INR). In November 2009, USD 1 = INR 46.31.

The livestock populations of the state and in the surveyed districts are shown in Table 8. Of the surveyed districts, Ranchi has more of all livestock species than the other three districts. Although East Singhbhum has relatively small numbers of livestock, it has a higher proportion of improved/crossbred animals, possibly because of better access to markets and farm input services. Godda and Palamu districts have extremely low numbers of improved animals, possibly because both these districts are remote, have limited access to markets and input services and are poorer. Although the census data show that Ranchi has a much higher population of goats than the other three surveyed districts, the field study revealed that it has a large deficit in goat production, while Palamu and Godda are surplus in goat production. This could partly be explained by the fact that in Ranchi, goat consumption is much higher than Godda or Palamu. Such deficits and surpluses of livestock have important implications for livestock's potential role in rural development.

Table 8. *Livestock population in the four surveyed districts and in Jharkhand*

Livestock species	Ranchi	East Singhbhum	Godda	Palamu	Jharkhand state
Cattle (indigenous)	1,066,152	427,292	476,782	769,252	11,839,507
Cattle (crossbred)	36,901	19,618	1656	3627	174,785
Buffalo	260,444	56,483	81,588	117,928	7,087,000
Goat	642,752	230,301	185,234	231,661	5,031,016
Sheep	81,403	55,413	4432	49,554	1,062,000
Pig (indigenous)	1,678,279	622,696	625,835	934,082	15,826,342
Pig (crossbred)	6683	1271	129	236	18,261
Poultry (desi)	935,940	416,538	208,607	166,786	6,199,618
Poultry (improved)	38,547	30,315	6818	22,696	434,465

Source: Seventeenth Quinquennial Livestock Census (2003), Department of Animal Husbandry and Fisheries, Government of Jharkhand.

Table 9 presents the ratio of household to livestock, derived from the human and animal census figures. At state level, pigs have the highest ratio (1:3.29) followed by indigenous cattle (1:2.47), poultry (1:29) and goats (1:1.04). However these indicators, based on the available government statistics, have to be viewed with caution. The primary survey data suggest that it is unlikely that there are more pigs per household in Jharkhand than other livestock species, because pigs are reared only by the tribal communities which accounts for a quarter of the total population and the average pig herd size per household observed in the field survey did not exceed 1–3 pigs. In the same way the state-level household to buffalo ratio, 1:1.48 (Table 9) seems high. The results of the field surveys (Chapter 4) suggest that in the four surveyed districts 70–90% households, irrespective of caste or creed, rear cattle, goats and poultry and therefore the expected ratio should have been higher in the case of cattle, goats and poultry than for pigs or buffalo.

When considering the potential for livestock to contribute more to rural development, changes in its past and projected population will be an important consideration. Table 10 presents the changes in population calculated from the government's livestock census in 1997 and 2003. Given the possible unreliability of these data that was discussed above, these estimates of change should be viewed with some caution. Nevertheless the fall in indigenous cattle population is striking, as is the increase on crossbred (dairy) cattle. The fall in total cattle numbers may be the result of decreasing grazing land, realization of poor profitability of indigenous livestock compared to other livelihood options, increased farm mechanization and, perhaps, the increased market price of indigenous cattle for beef and other purposes both inside and outside Jharkhand. In contrast to the declining numbers of indigenous cattle, the number of buffalo increased (by 20%), in line with the general trend in India. This probably reflects a response to the increased demand for milk and higher prices for higher fat content. Nevertheless the

estimated increase in buffalo numbers did not compensate for the reduction in the numbers of cattle so the total decline in the bovine population was 16%. It is also noteworthy that the livestock census data suggest that the small ruminant population fell markedly: sheep and goat numbers decreased by 46% and 28% respectively (Table 10). On the other hand the pig population was estimated to have almost doubled, possibly because of greater market demand for pork and the opportunity to earn more income. While the decreasing numbers of indigenous cattle and goats is alarming, the primary survey data do not suggest such significant falls in these ruminant populations.

Table 9. Household to livestock ratio

Livestock species	Ranchi	East Singhbhum	Godda	Palamu	Jharkhand
Cattle (indigenous)	3.16	1.14	2.47	3.04	2.47
Cattle (crossbred)	0.07	0.05	<0.01	0.01	0.04
Buffalo (indigenous)	0.51	0.15	0.42	0.47	1.48
Goat	1.27	0.61	0.96	0.91	1.04
Sheep	0.16	0.15	0.02	0.20	0.22
Pig (indigenous)	3.32	1.66	3.25	3.70	3.29
Poultry (indigenous)	1.85	1.11	1.08	0.66	1.29
Poultry (hybrid)	0.08	0.08	0.03	0.09	0.09

Source: Based on Seventeenth Livestock Census and Human Census (2001), Government of Jharkhand.

Table 10. Livestock population ($\times 10^3$) in 1997 and 2003

Livestock species	1997	2003	% increase/decrease
Crossbred cattle	232	1420	512
Indigenous cattle	24,366	16,968	-30
Total cattle	24,598	18,388	-25
Buffalo	5897	7087	21
Total bovine	30,477	25,475	-16
Sheep	1956	1062	-46
Goat	20,229	14,521	-28
Pig	924	1780	93
Chicken	16,602	26,285	58
Duck etc.	3288	2055	-38
Others	156	152	-3
Total livestock	53,742	42,990	-20

Source: Seventeenth Quinquennial Livestock Census (2003), Department of Animal Husbandry and Fisheries, Government of Jharkhand.

An important conclusion, therefore, is the need for more reliable census data at block, district and state levels and for a better understanding of the dynamics of these populations, the factors resulting in these changes and their implications for investments in the programs and projects to improve rural livelihoods. Well-designed sample surveys can provide at reasonable cost the reliable information that is required.

Table 7 presented an overview of the main livestock species that are kept by the households in the four sample districts. However, it is important to note the different preferences of communities, e.g. general-community households mainly rear cattle, goats and poultry. In urban and peri-urban areas improved cattle are reared for milk production, especially by Bihari communities under the popular system locally called *Khatal* (a stall-fed/enclosure system of milch cattle or buffalo rearing). These higher yielding

animals (cattle and buffalo) are kept because of a ready market for milk and easy access to inputs. This might be the reason behind the increased numbers of crossbred cattle and buffalo in Jharkhand. Among tribal communities there is no tradition of milk consumption and so keeping cows or buffalo for milk production is not common. Cattle provide draught power, especially for the majority of small and marginal farmers, and manure which is applied to cropping land. At the time of economic crises families sell the livestock to meet their cash needs; therefore livestock are important beyond their contribution as income. Tribals and Dalits/Harijans tend to rear pigs and poultry. A survey by the Central Avian Research Institute indicated that most tribal communities have special interest in backyard poultry which provides them with subsidiary income and food security.



Figure 4. A pair of bullocks with cart used for transporting goods.

Although livestock generally do not serve as a primary source of livelihood, livestock play an integral role in supporting the livelihood of the rural poor. This is especially the case amongst the landless and marginal farmers where its contribution is greater. For many households, livestock and wage labour are the only or the major sources of cash earnings (Table 7). Almost all the surveyed households (about 90%) reported that they could not maintain their family without the income from livestock: livestock serve as savings and insurance as they can be sold as and when the household needs cash, especially for marriages, deaths, festivals, treatment for disease, expenses for schooling, repairing of houses or purchasing of agricultural inputs. These essential livelihood functions of livestock are well-documented for India and in developing countries generally (see, e.g. Moll 2005; Rangnekar 2006). A specific example for India is reported by Das et al. (1999) who found that around Bareilly 52% of households sold a goat when money was needed for an emergency. Small livestock (and cattle) kept in these traditional low-input systems accumulate capital over several months with little or no investment and generate cash at the end of the production cycle or at the point of an 'emergency' sale. Generally a part of the income (e.g. from the sale of a fattened pig) is used for purchasing another animal or batch of livestock in order to recycle the activity.

Women and children take an active part in the management of small livestock and poultry and also contribute to managing cattle and buffalo, especially feeding and cleaning. Males play an active role in outdoor activities, namely collecting feed and fodder and herding animals during grazing. Research in Kerala shows that in dairy farming families, knowledge level of husbands is significantly higher than that of wives for aspects like selection, housing and treatment of dairy cattle while in case of feeding, milking and breeding there are no significant difference (Anil and Pushkaran 1993). In the present study it was

found that about 3–4 person hours were spent by each household each day for management of livestock. Rustagi and Agarwal (2000) in a study in Mathura district, Uttar Pradesh, found that of the total time spent on goat keeping, 34% is accounted for by men, 21% by women, and 45% by children. Seventy-six percent of the total labour input was taken up by tending grazing animals. They also found that family labour contributes about 66% of the gross cost in maintaining goats. Decisions regarding the sale of animals are generally taken by both male and female, while decisions related to use of money generated from livestock sales is generally taken by men. Information of this type is required for each of the major communities in Jharkhand in order that project interventions and extension messages are well designed and that they are delivered to the appropriate target clients.

In order to quantify in financial terms the contribution of livestock to the livelihoods of average poor families in Jharkhand, Table 11 presents some estimates of returns from different livestock options. Data from the primary surveys indicate that the annual household income of an average family is approximately INR 25,000. The estimates in Table 11 show that livestock options examined here can contribute 20 to 60% of household income. These estimates are consistent with the information provided by the surveyed households who indicated that the contribution of livestock to their livelihood varies from 20–60% depending on the species and the income level of the household.

Table 11. *Estimates of the contribution of livestock to household livelihood*

Items	Livestock kept				
	2 indigenous pigs + 8 indigenous chickens	4 indigenous goats + 3 indigenous chickens	2 indigenous cows + 2 bullocks + 1 heifer	2 crossbred pigs + 5 goats	2 indigenous buffalo
Feed (INR)	500	500	1200	2000	1200
Minerals + vitamins (INR)	–	–	300	300	300
Medicines + vaccines (INR)	100	100	300	200	200
A. Expenses (INR)	600	600	1800	2500	1700
Selling of	2 pigs × INR 2500 + 5 chickens × INR 120	6 young goats × INR 1500 + 2 chickens × INR 120	0.5 litres milk × INR 12/litre × 200 days + 1 heifer × INR 3500	12 piglets × INR 1000 + 4 young goats × INR 1500	4 litres milk × INR 15 × 200 days
B. Income (INR)	5600	9240	4700	18000	12000
Profit (B–A), INR	5000	8640	2900	15500	10300
Contribution to household livelihood	20%	35%	12%	62%	41%
Other benefits of livestock (using the example of cattle)					
Ploughing 1 ha land twice a year			4000		
Fuel 450 kg × INR 2/kg			900		
Fertilizer 450 kg × INR 1/kg			450		
Total, INR			8250		
Cumulative %			33%		

Source: Field study.

Of the livestock options illustrated in Table 11, the rearing of goats and crossbred pigs appears very attractive, as does keeping buffalo, while the apparent poor return from indigenous cattle does not take account of their savings and insurance functions and may underestimate their essential role in crop production. Notable amongst the results are the extra benefits from crossbred compared to indigenous pigs. In the same way goats, which are important and popular small-stock in Jharkhand, offer good

opportunities for contributing to improved livelihoods. For resource-poor households, especially those belonging to the general community, goats are the species of choice for income generation while, for the tribal communities, pigs are the preferred livestock species. Rearing of high yielding (dairy) cattle is not generally a preferred choice for the resource-poor because of paucity of financial capital (limiting their ability to purchase these expensive animals), the high demands of feeding and health management and the risks involved with investing so much capital in a single animal.

In summary, therefore, it can be seen that livestock keeping is integral to the livelihoods of rural Jharkhandi households, the large majority of whom are poor. Livestock provide cash income, high quality food for home consumption, an efficient means of savings and insurance and serve as the primary source of power for crop agriculture. In addition the livestock sector is changing in response to increasing demand for meat, milk and eggs, and, on the supply side, due to the pressure on the state's natural resources and shifts in employment opportunities. These changes provide challenges to, and opportunities for, livestock to contribute more significantly towards alleviating poverty and creating employment in Jharkhand. To exploit effectively that potential requires an holistic understanding of the current production and marketing systems of livestock and of the factors influencing how these systems are changing.

3 Marketing and consumption of livestock products

3.1 Demand and supply scenario of livestock products

To sustain and improve the livelihoods of the rural poor in Jharkhand, improving the production efficiency and scale of livestock production is essential. But for this improvement to be sustainable, it must be driven by demand for the livestock products. Therefore, before deciding on any development initiative in the livestock sector, it is essential that we understand the demand and supply situation of livestock products, consumers' preference and behaviour, changes in food habits and price trends and their relationship to consumption behaviour.

Jharkhand's people are traditionally non-vegetarian and consume the traditional livestock products which include chicken meat, mutton, pork, beef, milk and eggs, along with some wild birds and animals that are hunted by some tribal people. While mutton is the choice of meat amongst general community people, pork is the choice of meat amongst tribals.

Statistics from the Department of Animal Husbandry and Fisheries (DAHF), Government of Jharkhand, showed that the state has an estimated 40% deficit in milk and egg production and about 20% deficit in meat production (Table 12) based on nationally defined targets for per capita consumption. Likewise, government statistics give per capita availability of pork in Jharkhand as 1.05 g/head per day and 25 eggs/head per annum, lower than the national averages (pork: 1.5 g/head per day and eggs: 42 eggs/head per annum). Because our study was limited to only four districts, it is not possible to make categorical statements about the state-level scenario of demand and supply. Nevertheless, the information from these four districts suggest that the deficit in eggs is much higher than the government estimate (38%), mainly because there are only a few small layer farms in the state. The government estimate for the availability of eggs shown in Table 12 could include imported as well as locally produced eggs.

Table 12. Demand and supply of milk, meat and eggs (2007–08)

Product	Production	Per capita availability	Requirement	Deficit	Deficit (%)
Milk	1,400,000 t	152 g/day	2,336,000 t	-936,000 t	40
Meat	698,000 t	7.00 g/day	870,000 t	-1.72000 t	20
Eggs	711 million	25 eggs/annum	1143 million	-432 million	38

Source: Department of Animal Husbandry and Fishery, Government of Jharkhand.

Using the semi-structured questionnaires designed for this study (see section 1.3), wholesalers and retailers were interviewed to assess the current level of consumption of livestock products in the four surveyed districts (Table 13). The responses suggest that the state is deficit in milk, broiler and egg production while it has a surplus of goat and beef cattle production.

Table 13. Daily consumption of livestock products in Jharkhand and in the four surveyed districts

Livestock product	Ranchi	East Singhbhum	Godda	Palamu	Jharkhand
Milk (litre)	275,000	250,000	NA	NA	NA
Mutton (kg)	10,000–12,000	6000–6500	400	1500	NA
Chicken/broiler (kg)	65,000	40,000	2000	10,000	450,000
Pork (kg)	NA	1500	2200	NA	NA
Beef (kg)	5,000	NA	NA	NA	NA
Egg (no.)	30,000	20,000	31,000	NA	NA

Source: Market agents/wholesalers. NA = Data not available.

3.1.1 Milk

Although milk has not traditionally been an important part of diets in Jharkhand, its demand is increasing, especially in the major urban centres, Ranchi and Jamshedpur. The main consumers of milk in urban centres are the people (traditionally consumers of dairy products) from outside the state, especially from northern and western India. Jharkhandi people who have migrated from rural to urban areas have also started to consume milk, generally as a tea whitener and for drinking by children. Milk products like paneer, curd/dahi and sweets are gaining in popularity and demand is increasing. Hotels and sweet makers are some of the major consumers of milk in urban centres. Based on discussions with key informants, it can be estimated that the total milk consumption in Ranchi district is about 275,000 litres per day (Table 13): of this total Sudha Dairy alone supplies about 75,000–80,000 litres. Other dairies, Shyam, Jharkhand and Medha, together supply another 25,000 litres of pasteurized milk. The remaining 150,000–175,000 litres are supplied by local dairy farms (*Khatahs*) and from sales of skim milk powder (SMP) and UHT (tetra-pack) milk imported to the state. Demand for SMP is very high in Jharkhand, but it is difficult to assess the total consumption as traders are very reluctant to disclose the amount. Hotels and other people commonly use it as a tea whitener, while *Khatal* owners and dairy plants use it for reconstitution of milk (in order to produce double and single tone milk).

In East Singhbhum district, the total consumption of milk is an estimated 250,000 litres per day (Table 13), mainly in Jamshedpur town, of which about 100,000 litres is supplied by Sudha Dairy and another 15,000 litres of milk is supplied by Amrit Dairy, Shyam Dairy, Nand Dairy and Dairy Fresh. These dairy plants procure liquid milk from outside the state, mainly from Bihar. For instance, Sudha Dairy alone procures about 50,000 litres of milk per day from Begusarai, Samastipur, Bhojpur, Patna and other districts of Bihar (however, after the devastating flood in Bihar in 2008, milk procurement from Bihar dropped to about 20,000 litres/day). North Bihar has a surplus of milk and Bihar State Co-operative Milk Federation (COMFED) procures milk in Bihar and sells it to different dairy plants in Jharkhand. Similarly, Nand Dairy in Saraikela procures about 10,000 litres from West Bengal every alternate day and about 15,000 litres from Vishakhapatnam, Andhra Pradesh each week.

Thus the dairy plants in Jharkhand mainly depend on outside supply and meet only a small part of their requirements locally. Sudha Dairy procures about 3000–4000 litres of milk per day locally from a network of about 40 Dairy Cooperative Societies (DCS) that it promotes. Formation of dairy cooperative societies in Jharkhand was reported to be problematic because the majority of cattle are desi types with low milk yield; the lack of orientation towards rearing dairy crosses for income generation; the dispersed nature of households; and, the long and cumbersome process of DCS formation. Because of the poor functioning of DCS, government dairy infrastructure (including Milk Unions) is largely unutilized or underutilized. Their supply of tetra-pack milk to Jamshedpur is minimal; only about 500 litres per day. There is no dairy plant in Godda and Palamu districts and the supply of pasteurized milk in both the districts is insignificant.

The major suppliers of milk to urban centres are local *Khatahs* who sell farm-fresh milk. In major towns there is no fixed price of milk and, like the dairy plants, the *Khatal* owners practice quality-based pricing of milk, ranging from INR 14 to 25 per litre depending mainly on the volume of added water. Consumers who pay regularly and those who pay a higher price (INR 22 to 25 per litre) receive better quality milk (i.e. with higher butterfat) while ordinary consumers who pay less (INR 14 to 16) are given poor quality milk (i.e. with lower butterfat). The practice of the *khatahs* adding water to milk is common in Jharkhand, as elsewhere in India, and many of the *Khatal* owners are quite open about the practice. Interestingly, they argue strongly that if the dairy plants can increase the volume of purchased milk by adding SMP and/or separating the fat, why can they not add water to increase the milk volume to get a little more profit? They claim that if they sell only undiluted milk, it gives insufficient profit relative to their investment in feed and labour.



Figure 5. Paneer imported from Bihar is sold at the road side in Jamshedpur.

3.1.2 Mutton

In Ranchi town (the major consumption centre of livestock products in the state) information provided by the Municipality Office suggests there are about 55 registered and about 110 unregistered butchers' shops. About 1000 goats are slaughtered every day. If we assume the average carcass weight of a goat is 10 kg, the total consumption of mutton comes to about 10,000 kg per day. Including the consumption in rural areas, total daily consumption in the district may be about 12,000 kg. About 40% of the required goats are procured from Garhwa and Satbarwa markets, 190 km from Ranchi town while the remaining 60% is met from within the district. In both Garhwa and Satbarwa markets, because of the large number of goats, traders can purchase all required goats from the same market at lower prices than from smaller markets nearby.

Similarly, in Jamshedpur town (the second largest consumption centre of livestock products in the state), about 450 goats are slaughtered every day. Therefore, based on the same assumptions as above, about 4500 kg of mutton is sold per day. Within East Singhbhum district outside of Jamshedpur, consumption of goat meat is much lower and there are no or only a few regular butchers' stalls. Mutton is sold mainly in weekly haats which is the centre for trading for the villagers. Adding the approximate consumption of mutton in rural areas, the total daily consumption of mutton in East Singhbhum district may be 6000–6500 kg. According to market agents in Jamshedpur, there are three goat wholesalers who procure goats mainly from West Bengal and partly from Palamu district in Jharkhand. They supply goats to all the butchers in the town. It is a regular practice for traders from West Bengal to procure goats from goat-surplus districts of Jharkhand and sell the goats at a higher price to the deficit districts of Jharkhand.

In Godda district the consumption of mutton is much lower than in Ranchi or East Singhbhum, possibly because of the residents' poorer purchasing power resulting from less industrialization and lower urbanization (only 4% urban population in contrast to 35% in Ranchi and 55% in East Singhbhum

districts). The Godda Municipal Officer reported that there are only 15 butchers' stalls in the town which sell in total about 200 kg of mutton per day. As in other districts, with the exception of a few regular butchers in some of the small urban centres, there are no regular mutton sellers in rural Godda. Mutton is mainly marketed in weekly haats which take place almost every day somewhere in the district. Therefore, it can be estimated that total consumption of mutton per day in Godda district may be about 500 kg. On the other hand trade sources indicated that about two truckloads of goats (each truck containing 70–75 goats) are exported to West Bengal three times per week. Because of higher prices offered by visiting traders from West Bengal, local butchers find it difficult to procure goats at a price commensurate to that affordable by local consumers. The main weekly markets in Godda district from where goats are exported to West Bengal are Batanda, Dumari and Gangawara.

In Palamu district, the mutton market is about four times bigger than Godda: total consumption per day was estimated at about 2000 kg. As explained earlier, Palamu is one of the surplus districts for goats as a result, probably, of the good availability of grazing and forest resources, leading to good goat production, and the lack of purchasing power of the local residents. Garhwa and Satbarwa are the two major livestock markets in and around Palamu district (Table 2) and from there goats are exported to the major towns of Jharkhand, West Bengal, Uttar Pradesh, Delhi, Haryana, Punjab, Chhattisgarh and Orissa. A survey of the market revealed that about 5000 goats are sold each market day in Garhwa market, which is regarded as the 7th largest market in India (held once every week), and another 1000 goats are sold in Satbarwa market.

3.1.3 Chicken

In Jharkhand, there are limited sales of indigenous chicken. About 90% of sales of chickens for meat are broilers and, in the absence of large-scale broiler farms in Jharkhand, about 80% of the demand is met by broilers imported from other states. In Ranchi town market agents reported that about 500 quintals (50,000 kg) of broilers are imported daily from West Bengal to Ranchi: the major procurement points in West Bengal are Purulia, Bankura and Durgapur. If supplies are not available from West Bengal because of strikes or the recent outbreak of bird flu, broilers are imported from Uttar Pradesh and Madhya Pradesh. A few districts in Jharkhand, like Gumla and Lohardaga, produce a small surplus of broilers. It is estimated that a total about 650 quintals (65,000 kg) of chicken (imported broilers and locally-produced broilers and indigenous chicken) are consumed daily in Ranchi district.

Similarly, trade sources in Jamshedpur reported that about 200 quintals (20,000 kg: 20 trucks of 10 quintals each) of broilers are imported daily from West Bengal (mainly from Medinipur) and Orissa (mainly from Maurbhanj and Balasore). In addition there are about 150 quintals (15,000 kg) of local production including about 30 quintals (3000 kg) from PRADAN's poultry cooperatives (about 8% of market share). PRADAN's project staff estimated that three years ago the demand was about 250 quintals (25,000 kg) of broiler in Jamshedpur which has now increased to about 400 quintals (40,000 kg) indicating 60% growth within three years. A contributory factor may be a gradual increase in consumption in rural areas. Another is the very competitive price of broiler meat, relative to other meats (except beef), as shown later in Table 28.

With a smaller population than the other surveyed districts, the demand for chicken in Godda district is lower than in Ranchi or East Singhbhum. Market sources estimated that only about 20 quintals (2000 kg) of chicken is required daily in Godda district, of which about 60% is met from internal production. The remainder, 40%, is imported from Bihar (Bhagalpur district) or West Bengal. As elsewhere, it was reported that the demand for chicken is increasing: 10 years ago broilers were not popular in Godda, but 5 years later consumption was about 6 quintals (600 kg) per day, and now it has reached 20 quintals (2000 kg).



Figure 6. A broiler wholesaler from Ranchi with his truck used for carrying broilers from West Bengal.

In Palamu district, total chicken consumption is estimated at 100 quintals (10,000 kg) per day. Of the total requirement, one half is met from within the state and the other half is imported from West Bengal or Chhattisgarh.

3.1.4 Pork

Pork is generally sold in the weekly haats and the amount depends on the size of the haat, the number of pig rearers and pork consuming population in the surrounding villages. Rough estimates suggest about 200 pigs are slaughtered in East Singhbhum district per week (about 1500 kg/day) and about 300 pigs per week in Godda (about 2200 kg/day). Market sources suggest that Ranchi and East Singhbhum districts are about 20–30% deficit in pig production while the other two surveyed districts have 10–15% deficits. These deficits are partly met by procuring pigs from neighbouring districts and from nearby states viz. Uttar Pradesh, Bihar, West Bengal and Orissa (e.g. Mednipur and Mayurbhanj districts). A major source of production close to East Singhbhum is Potka block, Sariakelela district. Godda district met the deficit of slaughter pigs by procuring from Dumka, Bhagalpur (75–100 km) and Pakur (50 km).

3.1.5 Eggs

As for marketed chicken meat, Jharkhand depends on imported eggs for most of its supply. During the key informant interviews, trade sources reported that almost 95% of all marketed eggs are imported, sourced from Andhra Pradesh, West Bengal and Uttar Pradesh. A few big merchants (wholesalers) supply nearly all the eggs in Jharkhand and they sell to the small distributors or retailers. Market agents said that Ranchi consumes about 30,000 eggs per day, Jamshedpur about 20,000 and Godda district about 31,000 eggs. From Table 13 it is interesting to note that unlike other livestock products, demand for eggs in less urbanized districts is higher than in urbanized districts. Market sources indicated that, because the price of meat has increased, people consume more eggs, perhaps explaining the higher consumption in more rural (and poorer) districts. While talking to egg merchants, it was felt that they did not want to disclose the total number of eggs that they imported from outside the state (the biggest egg merchant of Jharkhand suggested that the total requirement for eggs in Jharkhand is only about 80,000 per day) perhaps because of fears about government taxation. Therefore any estimates from these merchants are very likely to be significant underestimates.

3.1.6 Beef

It was reported that 150–200 beef cattle are slaughtered per week in Ranchi district, although it was difficult to get exact numbers as the slaughter of cattle and the sale of beef are prohibited by law in Jharkhand. But it was said that demand for beef cattle as well as for beef has been increasing over the years.

3.2 Current livestock marketing channels and their efficiency

If livestock production is to serve as an effective means of increasing income and employment for poor households, the market chains of livestock and livestock products will have to be efficient. To understand current market chains and to assess how they are functioning, the key actors in the chains were interviewed. Section 1.3 described the methods that were applied.

3.2.1 Milk

The information gathered about milk marketing is summarized in Table 14. It shows that, of the four surveyed districts, Ranchi and East Singhbhum had a large deficit in milk production, such that about 40% of the milk that is sold is imported. No milk is sold to traders from outside the district because all the milk that is produced locally is consumed within the district. In the same way Palamu has a deficit of about 10% which is satisfied by imports into the district. By contrast Godda has a small surplus of milk such that it exports about 5% of production to the neighbouring district of Deoghar.

Table 14. Approximate percentage of milk sold in different market chains

Market chain	Ranchi (deficit: 40% imported)	East Singhbhum (deficit: 40% imported)	Godda (small surplus: 5% exported)	Palamu (deficit: 10% imported)
Local producer to consumers directly or at local market	10	20	45	30
Local producer to local retailers or cooperatives (cooperative is not prominent)	50	40	50	60
Local producer to traders or dairy plants for external markets	0	0	5	0
External producers to traders or dairy plants for local markets	40	40	0	10

Milk supply channels—East Singhbhum district

Depending on the district, milk is marketed through three or four channels (Table 14). In the shortest chain, fresh milk produced by *Khatahs* is sold partly to consumers directly and partly to traders. Larger *Khatahs*, sell to consumers and traders from their door step, while smaller *Khatahs* also deliver milk, especially to hotels and sweet makers. Many of the larger traders and wholesalers procure milk from 3–4 *khatahs* and deliver it to small vendors who then generally go from door to door selling milk. Milk producers generally execute a verbal agreement with milk traders/vendors to supply milk regularly to the particular trader against an advance amount as a security. The amount may vary (INR 10,000–25,000/) depending on the producer and the volume of milk sold. The security is used by producers for purchasing new dairy cattle or feed and fodder. The contract is based on mutual trust and the inter-dependency between the buyer means that generally the contract is not broken. Milk quality is inspected visually or by lactometer (mainly by processors) or by the quantity of channa or Khowa produced from a litre of milk or is based on mutual trust. Of all the milk supply channels, producer to retailer to consumer is the major one, supplying about half of all marketed milk (Table 14). In major urban centres, especially Ranchi and

Jamshedpur, imported milk supplied through the dairy plants is substantial but in the small urban centres of Godda or Palamu, supply through this channel is negligible.

It was reported that *Khatal* owners adulterate milk with water and/or SMP and that it is further adulterated by milk traders and small milk vendors: therefore, in general, the longer the supply chain, the lower the quality (level of butterfat) of milk and the greater is the risk of contamination. It was reported that although the number of traders is increasing, this is not really significant given the very large numbers already trading. The major problems associated with milk trading are spoilage, handling loss, transportation, uncertainty of market demand, lack of facility to store unsold milk and poor electricity supply. Also, the demand for milk, which is higher in summer, is inversely proportionate to the production, which is lower in summer.

The supply chain of Nand Dairy is described here as an example of how the formal (regulated) dairy sector operates. It procures milk from Vishakhapatnam (Andhra Pradesh) and West Bengal. In the case of Vishakhapatnam, the milk is collected by local chilling plants from Dairy Cooperative Societies or Milk Producers Institutions. Following chilling it is then transported to a dairy plant in Vishakhapatnam. Nand Dairy buys the milk from the pasteurization plant and transports it in milk tankers covering a distance of about 930 km. The cost at the point of procurement by Nand Dairy is about INR 21.50 while transportation costs about INR 2.20 per litre. Earlier Nand Dairy used to procure milk from Bihar (at INR 21 per litre plus transportation costs of INR 1 per litre), but because of decreased production of milk in Bihar after the devastating floods in 2007 they stopped procurement from Bihar. On arrival in Jharkhand, the milk is sampled, checked, chilled, re-pasteurized and processed into the final product like curd, standard milk or toned milk. Liquid milk is packed in pouches and sold to distributors who, in turn, supply retailers (Table 14).

3.2.2 Slaughter goat/mutton

In section 3.1.2 it was described how Ranchi and East Singhbhum districts are deficit in goat production while Godda and Palamu districts have surplus production (see Table 15). Depending on the district there are three or four chains through which goats are marketed, the most important of which, in terms of numbers of goats (approximately half of all those sold) is local rearer to local butcher or trader (Table 15). The local traders sell the goats in the local (daily and/or weekly) markets either to local butchers or to traders from outside the district or to individual customers. In goat-surplus districts like Godda and Palamu, traders from deficit districts like Ranchi visit the market to purchase stock.

Table 15. Approximate percentages of slaughter goat/mutton sold in different market chains

Chain	Ranchi (deficit)	East Singhbhum (deficit)	Godda (surplus)	Palamu (large surplus)
Local rearers sell in local daily/weekly market	10	5	20	20
Local rearers sell to local butchers/traders	50	65	70	30
Local rearers sell to traders for external markets	0	0	10	50
External rearers sell to traders for local markets	40	30	0	0

In rural areas, the majority of goat rearers sell to visiting traders, who then sell mainly in the markets to large wholesalers or visiting butchers from within or outside the districts. Surveyed households in all the four districts reported that they do not have any major problems in selling goats as visiting traders procure the animals at their door step. They also reported that they are capable of getting satisfactory prices through bargaining with the traders. In the event of an emergency sale (i.e. forced by the circumstances of a sudden need for cash) farmers may take goats to the nearby daily (mainly held in evening) or weekly market where they may get a better price. However this is not always the case and they may be forced to return home without selling their goat. It was said that the price paid in a market mainly depends on the number of traders and goats for sale on a particular market day. Because of this unpredictable variation in

sale prices, the majority of rearers preferred to sell their goats at the farm to traders, which also reduces their transaction costs.

Goat and mutton supply chains—Palamu district

The supply chain for goats is illustrated by the case of Palamu district where about 80% of goats are directly sold at the farm gate to visiting goat traders and butchers and the remaining 20% are sold by the farmers at the weekly market (especially by farmers within a radius of about 5–10 km of a market). Goats are transported to the market or retail outlet by walking (dragging with a short rope) or by bus, jeep, auto van or mini truck. Local traders and butchers visit the villages quite frequently. While local butchers procure goats for slaughtering in their own retail outlet, local traders procure them for sale in the neighbouring daily and weekly markets to visiting traders and butchers from within or outside the district or to individual customers who buy for rearing, for sacrifice or for slaughtering (commensurate with any feast or socio-religious occasions). Unsold goats are taken home and sold at another market on another day. In major markets like Garhwa and Satbarwa, the number of traders from outside the district (i.e. Ranchi, Ramghar, Bokaro, Muri Samar and neighbouring states of Orissa, Chhattishghar, West Bengal, Uttar Pradesh, Delhi, Punjab etc.) is much higher than the number of local traders and butchers. These traders visit the market in groups, buy 2–3 days' requirement of goats and transport by truck or mini truck to the stocking yard where the goats receive feed and water costing about INR 10 to 20 per goat (mainly paid to a labourer who gathers forages or takes goats for grazing) depending on the number of days kept in the stocking yard (generally 1–3 days). Some butchers and traders sell some goats to small butchers at a higher price, while local butchers from the district generally visit the weekly market individually and buy what they need for 3–4 days. Transport costs INR 10 to 30 per goat (depending on the distance) and hidden costs (bribes) are about INR 5–10 (INR 100–200 per police station/check post). Besides hidden costs, shrinkage loss and mortality (some goats may die, especially during summer) are the two other problems associated with goat transport. In Satbarwa market, purchasers pay a fee of 1% of the goat price to the lessee of the market (weekly markets are leased out to a lessee for a year against a fixed amount).

The procurement price on the farm is mainly based on expected slaughter weight of live goat. Generally, the per kg procurement price (of expected slaughter weight) at the farm gate is INR 20 to 30 lower than the retail price of mutton in order to cover the transportation, stocking and selling costs and profit. The price per kg live goat is INR 100–110 at the farm gate, about INR 120 in the market and INR 140 at retail outlet. Although the market price of female goats is about half that of males, there is no variation in meat price due to age or sex. Therefore, a large number of butchers try to make more profit by selling meat from female goats. The per kg live weight farm gate price is lower in Palamu district, possibly because of higher production and poor local demand. As a result, traders come from other parts of Jharkhand and from other states to buy goats, despite the longer supply chain, as the cheaper buying price offers better profits.

As retailers do not have the facility to store unsold meat it is either consumed in the family or sold to hotels and restaurants. In Palamu district and elsewhere, goats' heads, legs, offal and skins are additional products. The skin is bought by traders from West Bengal and Bihar for INR 60–80 each depending on the size and quality. Goat's offal costs INR 20, heads cost INR 50 each and four legs cost INR 20–25 providing additional income for the butchers. On some occasions when the purchase price of goats is high, especially during periods of scarcity, this additional income is the only profit.

3.2.3 Chickens

Since all the surveyed districts have a deficit in broiler production (section 3.1.3) only 2–10% of broilers are marketed through local producers to local consumers or at local markets and 18–45% are marketed by local producers to local retailers (Table 16). The remaining 40–80% are imported from outside the district/state.

Table 16. *Approximate percentages of broilers sold in different market chains*

Chain	Ranchi (deficit)	East Singhbhum (deficit)	Godda (deficit)	Palamu (deficit)
Local producers sell to consumers directly or at local market	2	2	10	5
Local producers sell to local retailers	18	18	50	45
Local producers sell to traders for external markets	0	0	0	0
External producers sell to traders for local markets	80	80	40	50

Broiler supply chain—Ranchi district

Every day Ranchi imports broilers from West Bengal. About 27 wholesalers in Ranchi procure broilers from West Bengal and sell to local retailers. Some of them also have their own retail outlets. According to wholesalers who were interviewed the number of wholesalers has increased from 7 to 27 in the last five years and therefore, although the market volume has increased rapidly over the last few years, individual wholesaler throughput has not changed significantly.

Every day wholesalers visit Purulia, Bankura and Durgapur (250–300 km away from Ranchi) in West Bengal where there are plenty of small to medium broiler farms that are organized under a society for organized procurement and marketing of broiler. The society of broiler producers controls the market price and fixes the price each day. Visiting traders from Ranchi (and other places) procure the broilers which are transported by mini truck, each of which carries about 10 quintals (1000 kg) broilers, at a cost of INR 7000 per truck. A small part of broiler requirement is met internally in Jharkhand, mainly from Lohardaga and Gumla districts.

Traders reported that harassment from police when transporting the broilers is one of their major problems and an additional cost of INR 700–1000 per truck (in about 15 police check posts) needs to be paid, which results in an increase in the retail price of broilers. Other reported problems were fluctuations in market price, unhealthy competition, shrinkage loss (about 2%) and mortality of birds during transport. Retailers can recover certain shrinkage losses or the stocking cost by selling heads, legs and offal of birds at about INR 24 per kg. In the event of scarcity of broilers in West Bengal or during the time of a strike or an outbreak of bird flu, the wholesalers may procure broilers from other neighbouring states, viz. Uttar Pradesh, Andhra Pradesh, Madhya Pradesh and Orissa. Local retailers procure broilers from the wholesalers as and when required and then sell to consumers (Table 16).

3.2.4 Pork

Market information from the various field interviews indicated that all the surveyed districts are deficit in pork production (Table 17). To gather reliable price and cost information to assess adequately the supply chains of pigs proved difficult, because of the very large numbers of pork sellers, their small-scale of production (1–3 pigs) and the general practice of selling pork through weekly markets. The retail sale of pork from permanent stalls, such as those used for mutton and broilers, was not common. Instead, the most common pork market channel is the sale by the pig producer to a retailer: rearers to pork retailers to consumers (Table 17). Pork retailers generally sell their own reared pig or procure a pig from neighbouring villages, e.g. by visiting the tribal villages within a radius of 10–15 km to get their required stock. Procured pigs are transported by tempo, auto van, rickshaw, bicycle or on foot. About a quarter of slaughter pigs (10–25% Table 17) are imported from neighbouring districts or states (Uttar Pradesh, Bihar and Orissa), where market agents are an important link in the chain: rearer to local trader to wholesaler to pork retailers to consumer.

Table 17. *Approximate percentages of pork sold in different market chains*

Chain	Ranchi (deficit)	East Singhbhum (deficit)	Godda (deficit)	Palamu (deficit)
Local rearers sell to consumers or at local market	10	20	25	20
Local rearers sell to local retailers	65	60	60	70
Local rearers sell to traders for external markets	0	0	0	0
External rearers sell to traders for local markets	25	20	15	10

In summary, therefore, the most frequent and popular system of pig marketing in rural areas is selling of pigs to visiting traders (Table 17). The traders visit the villages irregularly and rearers also inform the traders about the availability of marketable pigs when they meet them in the market. None of the interviewed pig rearers reported any difficulty in finding a market for pigs. The market demand is high in the villages and producers are happy with the income generated from the sale of pigs. The traders either slaughter and sell the pork or sell pigs to other pork sellers. There are also small numbers of producers who slaughter and sell the pork in weekly haats.

3.2.5 Eggs

The marketing of eggs reflects the marked dichotomy of egg production: the very limited supplies of eggs from local indigenous hens (and some ducks) and the large quantities of imported chicken eggs from large-scale commercial production. The small quantities of locally-produced eggs are marketed by producers directly to consumers in the village or to the visiting traders (Table 18). About 90–95% of eggs are imported from outside the state and therefore external producers selling to traders (wholesalers) for local markets is the dominant market channel (Table 18).

Table 18. *Approximate percentages of eggs sold in different market*

Chain	Ranchi (deficit)	East Singhbhum (deficit)	Godda (deficit)	Palamu (deficit)
Producers sell to consumers directly or at local market	4	5	10	10
Producers sell to local retailers	1	1	3	3
Producers sell to traders for external markets	0	0	0	0
External farmers sell to traders for local markets	95	95	90	90

Egg supply chain—Godda district

Very small numbers of locally-produced indigenous chicken and duck eggs are sold either directly to neighbours or in the weekly markets. A few are also sold to visiting traders and neighbourhood shops. The vast majority (90–95%) are imported from Andhra Pradesh where they are purchased by big wholesalers (popularly called egg merchants) of which there are 14–15 operating in Jharkhand, based in Ranchi, or Seuri and Rampurhat in West Bengal. The market price in Seuri in West Bengal is INR 462 per patty (tray) (i.e. INR 2.2 per egg). The eggs are transported by truck; where one truck can carry about 1104 patties (trays) of eggs that contain 210 eggs each. These big wholesalers sell to small wholesalers in Godda. The eggs are then transported either by bus or by truck depending on the number purchased. The transportation cost per patty from Seuri to Godda is about INR 12 to 13 and the market price at local wholesalers is INR 480 per patty. Local retailers procure eggs from local wholesalers and sell to consumers at INR 3 per egg. Earlier, local wholesalers in Godda used to procure all their eggs from egg merchants based in Ranchi, but recently have stopped because of the distance and poor road conditions. Price fluctuation, breakage/damage of eggs during transportation and harassment by police are the major problems encountered by egg traders.

3.2.6 Bovines (beef cattle and buffalo)

Ranchi has a small deficit in beef cattle production (and the deficit is met by procuring beef cattle from Gumla district (100 km away), Burmu or Buxar) while the three other surveyed districts are surplus in beef cattle production (Table 19), although similar to goats, there is some inter-district transit (import and export) of beef cattle. Some of the major markets for beef cattle and bullocks are Garhwa, Satbarwa, Haldi Pukur, Batanda, Oruguttu and Dumoni. Beef cattle are mainly exported to West Bengal and Orissa. Since selling of beef is illegal, beef sellers are not registered and they sell beef without the knowledge of the district administration although sometimes they are harassed for money by the police or other local people. Therefore beef sellers are not confident about continuing their business in the years to come. Nevertheless, given the apparent strong demand for beef, presumably mainly from Bangladesh and some of India's NE states, it seems probable that this trade will continue and may well increase if supplies can be sustained.

Table 19. *Approximate percentages of slaughter cattle and buffalo sold*

Chain	Ranchi (deficit)	East Singhbhum (surplus)	Godda (surplus)	Palamu (large surplus)
Local rearers to consumers directly or at local market	5	10	15	10
Local rearers to local retailers	70	70	50	30
Local rearers to traders for external markets	0	20	35	60
External producers to traders for local markets	25	0	0	0

3.3 Consumption of, and preferences for, livestock products

In Jharkhand, livestock products, i.e. milk, meat and eggs, play an important role in the human diet irrespective of age, sex, religion, caste or wealth: most people consume one or more livestock products regularly or occasionally. Livestock foods are also considered esteemed foods and are invariably consumed during festivals and special occasions. However, the preference for, and pattern of consumption of, livestock products varies from group to group and place to place, based on traditional food habits, religious preference, climatic condition and age group.

The traditional food habits of Jharkhandi people are non-vegetarian, with vegetarians in the state mostly migrants from the Northern and Western parts of India. Thus about 90% of the people in Jharkhand are non-vegetarian. Traditionally, tribal people (mainly Santhal) (Singh 2006) used to hunt and consume forest animals and birds. However, with decreased population of wild birds and animals and the increased concerns about their slaughter, the practice is now much less prevalent.

Mutton is reported to be the meat of choice for non-tribal Jharkhandis. The popular term 'Khachi-Bhat' (mutton-rice) is an indication of the same. After mutton, poultry (mainly chicken) is the next choice. Duck is available mainly in the districts adjoining West Bengal. Earlier people did not prefer broilers because of negative perceptions about broiler meat, including its light colour, but over time the acceptability of broiler meat has increased substantially. Pork is regarded as the choice of meat for the tribal communities, but it is not consumed by Hindus and Muslims because of religious reasons. Eggs are consumed by all sections of society, irrespective of religion (except a section of vegetarian people), tribe, cast or community while milk is not a traditional food for the tribal people. A large majority of the population consume milk as tea whitener and as sweets. Demand for processed meat products like ham, sausages, bacon etc. is reported only in major urban centres, i.e. Ranchi and Jamshedpur and only by a small section of people, especially the higher class Christian community. Fresh and warm meat is preferred by almost all consumers.

Responses during the primary survey suggest that over the years food habits have been changing but only slowly. For instance, there has been increased consumption of pork over the last 10 years and some non-traditional pork consumers have gradually started consumption of pork because of its taste. These consumers are mainly young people from the Hindu community who often eat it outside their home without the knowledge of their parents. This trend is making pork one of the most demanded livestock products. Similarly, milk consumption is also increasing because of better availability and accessibility stimulated by production from dairy plants in Jharkhand which sell several dairy products. The consumption of mutton and indigenous chicken meat is static or gradually declining because of high prices, some fraud (selling of less preferred female or diseased goats as healthy male animals and addition of water to increase carcass weight) and substitution by increased consumption of broiler chicken meat, possibly because of lower price and less fraud associated with broiler meat (as no difference between male or female broiler or fat meat or lean meat). Beef consumption is also reported to be decreasing mainly because of the difficulty in slaughtering and selling of beef, but some informants report increased demand and prices of beef animals, although assessment of the actual trend is difficult as people are reluctant to talk about it because of the ban on slaughter of cattle.

Milk is the only livestock product which is consumed regularly (Table 20): about 80% of households reported daily consumption and only about 20% were irregular or occasional consumers. Only about 5% of households choose or could afford to consume mutton once in a week, while about 70% of consumers could not even afford (price was said to be the main factor) to consume it once a month. While frequency of consumption of pork was reported to be slightly higher than mutton this may be because of the lower price or perhaps because pork is sold in weekly haats where people can also earn cash by selling some goods. The frequency of chicken consumption (mainly broilers) was reported to be even higher than mutton or pork probably because of its lower price. Of all livestock products except milk, the frequency of egg consumption was highest because of price, accessibility and its less perishable nature.

Table 20. *Estimates of the frequency of consumption of livestock products by consuming households (% of households)*

Livestock products	Daily	Once per week	Once in two weeks	Once per month	Irregular/ occasional
Milk	80	0	0	0	20
Mutton	0	5	10	15	70
Pork	0	10	15	20	55
Chicken	0	10	20	20	50
Beef	NA	NA	NA	NA	NA
Eggs	5	15	20	30	30

Source: Field survey (figures are indicative only); NA = data not available.

The field study revealed that with increased income and employment over the years, consumption of livestock products is increasing. However, NSSO data shows that expenditure on meat and milk products in Jharkhand is still far below the national average (Table 21). There is also district variation. Consumption of all livestock products is higher in major urban centres and industrial cities like Ranchi and Jamshedpur, while it is much lower in Palamu and Godda, reflecting the large variation for purchasing power and, to some extent, the effect of variation in availability. Respondents in the present survey reported that 50–70% of households, especially rural households, cannot afford to buy even 0.5 kg of meat once in a month. They generally consume meat only when esteemed guests visit their home or when they get some additional cash income by, for example, selling an asset/product. Consumption of meat by them is regarded as a luxury.

Table 21. *Per capita expenditure per month on milk and meat products (2004–05)*

	Ranchi	East Singhbhum	Godda	Palamu	Jharkhand	India
Rural	32.4	22.7	46.5	31.0	29.8	131.9
Urban	69.7	101.1	73.9	55.5	86.6	223.5
Total	41.4	67.4	47.8	31.8	38.9	155.1

Source: NSSO, Consumption expenditure, year 2004–05.

3.4 Sources of procurement of livestock products

The field study responses revealed that consumers generally purchase milk from neighbours in rural areas and from vendors in urban areas. Pasteurized milk is procured from the recognized outlets. Mutton is generally purchased from the nearby butcher whom the customer knows and has some reputation for selling good quality mutton. In the villages fresh mutton as well as pork is purchased from the weekly haats. Chicken is generally purchased from nearby shops as people perceive there is less chance of getting poor quality chicken. Eggs are generally purchased from the daily market or nearby grocery shops. Thus in deciding the source of purchase of any livestock product/s, the reputation of the seller plays the important role.

3.5 Attributes looked for when buying livestock products

The rapid surveys in the four sample districts assessed how consumers perceived and differentiated amongst the various types of livestock products (Table 22). For instance, in purchasing milk, consumers first prefer to have cow milk (but prefer milk products from buffalo milk) and secondly prefer to have normal fat milk with original taste and flavour. However, dairy plants prefer to have high fat buffalo milk. Consumers judge the quality of milk by visual appearance or by putting a drop of milk on the ground.

Table 22. *Attributes looked for by consumers when buying livestock products*

Livestock product	1st attribute	2nd attribute	3rd attribute	4th attribute
Milk	Cow/buffalo milk	Thickness/fat	Colour	Cleanliness
Mutton	Male/female	Bone/lean meat	Freshness	Cleanliness
Pork	Freshness/colour	Lean/fat meat	Smell	Male/female
Chicken	Indigenous/broiler	Size	Diseases	Cleanliness
Beef	Male/female	Age group	Fat/lean	Freshness
Egg	Local/imported	Duck/chicken	Size and colour	Cleanliness

The first attribute looked for in mutton is the sex by observing the presence of testicles (retailers sometimes hang the testicles of a male goat in the carcass of a female goat after selling the male). Meat from young male goats (castrated/uncastrated) is preferred followed by boneless meat (Table 22). Consumers mainly prefer to have lean goat meat with a small quantity of liver. In the case of pork, the first attribute looked for is its freshness by observing the colour and secondly it's lean/fat ratio. There is individual variation in preference for lean or fat meat but no price difference. Some educated consumers look for cottonseed-like follicles in the muscle which is an indication of the presence of internal worms. In chicken the first attribute looked for is whether it is indigenous chicken or broiler and then the desired size (generally the preference is for 1–1.2 kg birds which is sufficient for a family) followed by health status (by observing the activeness) and cleanliness (Table 22). Purchasing of eggs is decided by source (local/imported/ duck/chicken), size, freshness, colour, and cleanliness. Beef from young male cattle/buffalo is preferred to that of old female cattle/buffalo.



Figure 7. Livestock market at Haldi Pokar.



Figure 8. Goats carried in public vehicle from the market.

Traders also look for specific attributes while buying their stock in order to satisfy the need of their customers (Table 23). For example, an important attribute when purchasing milk is high fat milk. Traders and vendors also emphasize getting credit and regular supply from the producers along with the quality of milk. In the case of goats, traders mainly look for young healthy (active) male goats with medium fat content and medium size, preferably black in colour (Table 23). But, some traders look for female, diseased or old goats at cheaper prices (the price of female goats is almost half that of the male goats) to make more profit as there is no price variation of mutton based on breed/age/sex or colour of goat. For pigs, traders look for healthy, young (1–1.5 years) male pigs with high back-fat thickness. For broilers

traders prefer a body weight of 1–1.2 kg, but that does not maximize the return for the producer relative to the investment in chicks and feed and therefore traders mainly purchase broilers of 1.5 to 2 kg weight. Larger eggs are preferred and consumers prefer local chicken and duck eggs, although these are not readily available and their price is higher than commercial layer eggs.

Table 23. *Attributes looked for by traders when purchasing their stock*

Attributes	Milk	Goat	Pig	Chicken	Egg
Breed/type	NA	Indigenous	Indigenous	Broiler	Poultry
Age	NA	1.5 yrs	1–1.5 yrs	35 days	NA
Sex	NA	Male	Male	Male	NA
Size	NA	Medium	Big	Medium	Big
Colour	White	Black	Black	White	White
Fat content	High	Medium	High	Low	NA
Health status	Hygienic	Healthy	Healthy	Healthy	NA
Mode of payment	Credit	Cash	Cash	Cash	Cash
Reputation of seller	High	High	High	High	High

Beef traders look for active, indigenous male animals 2–3 years of age with a glossy coat. Generally white, brown or black colour animals are preferred. Although the prices paid to producers by traders vary by breed, age, sex and colour, these factors do not affect retail prices but most traders try to buy better quality animals to satisfy their customers.

3.6 Seasonality of consumption of livestock products

In Jharkhand, as elsewhere in India, there is significant seasonality in the level of consumption of livestock products. As shown in Table 24 meat and eggs, but not milk, are consumed more during winter than summer months. The survey responses suggested that the consumption of livestock products increased in winter possibly because during the cooler months customers want to consume more meat and egg having higher fat in order to ingest more energy.

In the summer, when temperatures are higher, people eat less fat which tends to lead to an increase in their body temperature. Consumption of milk and milk products is exactly the reverse to that of meat or eggs. Generally milk consumption is higher in summer and lower in winter. Apart from the general trend of seasonality, there is variation of consumption of livestock products within a season, month or week. Since Jharkhand is a Hindu-dominated state, many religious festivals are observed and people follow certain religious beliefs and customs which affect their diet. Consumption of non-vegetarian food items are prohibited during the month of Sawan (July–August) and Kartik (October–November) and during these months, consumption of livestock products except milk, drop down to about 25%. Only the Christian and Muslim communities consume non-vegetarian food items. There are many other occasions like Nav Ratra, Chhatt, Karma, Diwali, Sawan, Shiva Ratri, Ganesh Chaturthi, Jansmatami, Durga Puja, Kali Puja, Gandhi Jayanti etc. when consumption of non-vegetarian food items are prohibited. During these days consumption of milk and milk products increases considerably and demand for meat and eggs drops to almost 20–25% or less.

Table 24. *Seasonality in consumption of livestock products*

Livestock products	Season/festival when consumption is more	Season/festival when consumption is less
Milk	Nav Ratra, Chat, Karma, Diwali, Sawan, Shiva Ratri, Ganesh Chaturthi, Jansmatami, Holi, Tuesday, Thursday, Durga Puja	New Year, Makar Shrankati, Idd
Mutton	Winter months, Holi, New Year, Christmas, Sunday, marriage season, Wednesday and Friday	Summer months, Nav Ratra, Kartik month, Chhatt, Sawan month, Gandhi Jayanti, Purnima, Tuesday, Thursday
Pork	Winter months, Christmas, New Year, Makar Shakranti, Rath Yatra,	Sarhul, Karma, summer months
Beef	Idd-ul-fitr, Idd-ul-zoha	Ramjan month
Egg	Winter months	Summer months, Sawan month, Chat, Navratra
Chicken	Winter months, Holi, Diwali, New Year, Kali Puja, Makor Sharankanti, Idd, marriage season	Summer months, Sawan month, Kartik month, Nav Ratra
Milk products	Holi, Nav Ratra, Chat, Karma, Diwali, Sawan, Shiva Ratri, Ganesh Chaturthi, Jansmatami, Tuesday, Thursday, Durga Puja	New Year, Idd

Consumption of mutton and chicken are higher during the marriage season, Holi, New Year, Christmas, Sunday, Wednesday and lower in Nav Ratra, Kartik, Chhatt, Sawan, Gandhi Jayanti, Purnima. There is also variation in consumption of livestock products within a week because most Hindus in Jharkhand do not consume non-vegetarian food on Tuesdays and Thursdays and, if non-vegetarian, generally prefer to have non-vegetarian food on Sundays (also it is a holiday), Wednesday or Friday. Pork consumption is relatively low during Tribal festivals like Sarhul, Karma and higher at Christmas, New Year, Rath Yatra, Makor Shrankati etc. Beef consumption is understood to be very low or negligible during the month of Ramadan while it is highest at Idd.

Prices were reported to vary seasonally, reflecting the changes in demand. For instance, the records of PRADAN's poultry cooperatives show that the price of broilers increases from November to May and decreases from June to October. For other livestock products, prices tended to increase with increased seasonal demand but it was reported that prices did not then come back down to the same level, but the general trend was for prices to increase a few rupees in each year during the time of a major festival.

Seasonal effects are particularly important for milk: production is highest from June–July to December–January. Producers said that the majority of cattle come into heat during September to October (after a period of plenty for green fodder and other feedstuff) and calve in June or July, producing milk for 5–6 months thereafter (the flush period). With milk scarce in the off or lean season, the price is generally higher.

3.7 Efficiency of livestock product marketing

Table 25 presents the costs incurred from point of production to point of consumption when marketing livestock products. Of all livestock product markets, it was estimated that mutton delivered the highest proportion (88%) of the price of the finish products to producers. Competition amongst traders and the strong demand for goats will have been important factors in reducing marketing margins. For example, traders in Godda reported that because of strong competition between the local traders and the traders from West Bengal, goat rearers are in a strong bargaining position and that the traders' profit margins are low. They reported that sales of head, leg, skin, offal etc. sustain their businesses. Producers' long experience and their skills in bargaining with the traders may also contribute to low trader margins.

Table 25. *Approximate distribution of costs in marketing of livestock products (INR)*

Particulars	Milk (per litre)	Mutton (per kg)	Pork (per kg)	Broiler (per kg)	Egg (per egg)
Farm gate price	18.00	160.00	80.00	48.00	2.00
Commission of wholesaler/middlemen/informants	1.00	2.00	2.00	2.00	0.35
Transportation cost (including owner's)	0.50	3.00	1.00	5.00	0.10
Market cess (in purchasing + selling point)	0	0.50	0.50	0.50	0.02
Hidden expenses		2.00	1.00	0.50	0.05
Stocking cost (feed/labour)	0	2.00	1.00	5.00	0.02
Selling costs (casual labour, wrapping, electricity, rent etc.)	0	5.00	2.00	1.00	0.03
Total expenses	19.50	174.50	87.50	61.50	2.57
Retailer's selling price	22.00	180.00	100.00	75.00	3.00
% of price goes to producers	82	88	80	64	66
Profit per unit of retailer	2.50	5.50	12.50	13.50	0.43
Profit from selling head, leg, skin etc.		15.00	1.00		
Total profit/unit	2.50	20.50	13.50	13.50	
Assumption of volume/day	50 litres	30 kg	50 kg	40 kg	150
Profit per day/trader	125.00*	615.00	675.00	500.00	64.50**

* Actual profit is much higher than this because of adulteration made by milk traders.

** This is a part time job for egg traders.

Source: Market survey with wholesalers and retailers.

The market efficiency of milk, pigs and pork were also high: of the retail price, producers received an estimated 80–82%. Pigs were sold based on expected meat weight. The purchase price is calculated by multiplying the expected weight of the animal by its cost per kg, which is INR 20–30 less than the prevailing market price based on location, market demand and bargaining capacity. Producers assume that if INR 10 is spent by traders as transportation and selling cost, the remaining INR 10 will be the per kg profit of the traders. On the other hand, for broilers and eggs, it can be interpreted that market is not very efficient, as only 64–66% of retailers price goes to producers (Table 25). The balance goes to the wholesalers and retailers or meets the transaction costs including hidden expenses. It was said that generally the rule of thumb is that the longer the supply chain, the less efficient is the marketing system.

From the field surveys, it was understood that livestock producers do not face any major problems in selling of their produce but the traders, who are the key actors in the whole supply chain, face some problems. An aspect that was stressed was the lack of market infrastructure, e.g. facilities for displaying the animals, water for human and livestock consumption (especially in summer), toilets for the traders and slaughter sheds with potable water and a good drainage system.

3.8 Input marketing

Because most livestock are indigenous breeds reared using traditional methods, input markets are, as yet, poorly developed. Exceptions are those serving broiler and dairy production which, in Jharkhand and in other similar states, are generally limited to urban and peri-urban areas and to those areas where cattle induction programs and projects and clusters of broiler units are being promoted. In these more intensive systems and for pig and goat fattening, important inputs are young stock and feed. The prevailing market prices of these inputs in the four study districts are given in Table 26 which shows that there was little variation of price across the study districts but, as expected, indigenous calves were much cheaper than crossbreds. Jharkhand is largely deficit in quality crossbred calves and depends mainly on imports from

Bihar and Uttar Pradesh. Sonpur market in Bihar is regarded as an important market for cattle and Murrah buffalo where prices are reported to be about INR 5000–6000 lower than in Jharkhand.

Table 26. Prices (INR) of farm inputs in the four surveyed districts

Commodity	Ranchi	East Singhbhum	Godda	Palamu
Heifer—indigenous	2000–3000	2000–3000		
Heifer—crossbred	3000–5000	3000–5000		
Milch cow—yielding 10 litres milk/day	20,000–25,000	20,000–25,000		
Buffalo calf	4000–6000	4000–6000		
Milch buffalo—yielding 10 litres milk/day	18,000–22,000	18,000–22,000	18,000–22,000	18,000–22,000
Piglet—crossbred	800–1200	800–1000	800–1200	500–900
Piglet—indigenous	500–800	400–700	400–700	400–600
Goat kid	500–800	500–700	400–600	300–500
Chick	15–18	15–18	16–20	16–20
Broiler feed (kg)	14–16	14–16	15–18	15–18
Chopped paddy straw				2–3.50
Wheat bran (kg)	10–11			7–8
Crushed maize (kg)	10–11			
Oilseed cakes (kg)				12–15
Ground nut cake	20			
Soyabean meal	24			
Fish meal	14			

In Jharkhand most pigs are indigenous types and the price of a piglet is INR 400–600, while crossbred piglets including T&D (Tamworth and Desi cross) and Large Black crosses cost INR 800–1200 (Table 26).

Jharkhand does not have any broiler parent stock farms and chicks and hatching eggs come from outside the state. About 95% of hatching eggs are imported from Andhra Pradesh and the remaining 5% from Orissa and Madhya Pradesh. According to the rough estimates of the key informants, about 4,000,000 broiler chicks are required per month in Jharkhand of which about 60% are hatched in Jharkhand through a network of about 15 hatcheries. The other 40% are procured from West Bengal, Orissa and Uttar Pradesh. All broiler chicks are procured from Andhra Pradesh.

Four or five feed mills produce broiler feed, but feed is also imported from outside Jharkhand. Very little commercial concentrated feed is fed to cattle and buffalo. Producers who feed concentrates generally purchase individual feed ingredients and mix the feed ingredients based on their knowledge and experience. Feed ingredients are mainly available in urban centres and some rural centres but not in remote villages. The prices of locally available feed ingredients like rice polish, paddy straw, wheat bran, are cheaper around harvest time and costlier during off season. In major urban centres like Ranchi or Jamshedpur, there are a few private veterinary clinics which sell veterinary medicines and vaccines and some of them also deal with other farm inputs like feed, chicks or farm implements, while in small urban centres like Godda and Palamu there are no private veterinary clinics. Veterinary medicines are generally kept in human clinics. A private veterinary clinic in Ranchi reported that the demand for veterinary medicine, especially for cattle, is increasing rapidly. Calcium tonic, antibiotic and appetizer are also in demand. It was said that about 40% of clients come with a veterinarian's prescription and that, over the years, the proportion has been increasing. NGO workers interviewed in Godda said that people were increasingly aware of the importance of treating animals and they are ready to pay for veterinary services but the lack of availability of veterinarians was a problem.

3.9 Market trends and marketing behaviour

A key factor affecting the targeting of investments in livestock development is how the market for livestock products is changing. When the key informants were interviewed they confirmed that demand for chicken meat and eggs, pork and milk is higher than mutton and beef (Table 27). On the other hand mutton is widely available and has a strong consumer base, although butchers reported some consumers were now seeking cheaper options like broilers and pork. The preference for meat with less bone was also influencing a shift to broilers and pork. It was also reported that mutton consumption in hotels, restaurants and at other social events had been replaced almost 50% by broiler chicken meat in recent past. Demand for milk is mostly stimulated by dairy plants which are procuring milk from outside the state and sell a variety of products mainly to higher income urban consumers. With the growth of income, the demand for milk sweets is also increasing rapidly and sweet makers have become a major consumer of milk.

Table 27. *Characteristics of the market for livestock and livestock products*

Livestock/ products	Current ranked market demand	Growth trend over recent years	Profitability from producers' point of view
Pig/pork	Second	Increasing rapidly	Second
Goat/mutton	Fourth	Increasing slowly	First
Milk	Third	Increasing slowly	Fourth
Chicken meat and eggs	First	Increasing rapidly	Third
Cattle/buffalo meat	Fifth	Increasing	Fifth

Source: Market information.

Market agents anticipate that demand for broiler, pork and milk will grow further. They are confident in the future profitability of their businesses, whereas mutton retailers were sceptical about the long-term profitability of their businesses. Many of the butchers reported that mutton retailing is a family business, often for two to three generations, and that their siblings were concerned for the future because of the declining goat population, the increasing price of goats, the poor purchasing power of a large section of people, stiff competition from broilers, the increase in hidden expenses and problems from anti-social elements.

As Table 27 shows, livestock producers rank the profitability of goat and pig production higher than other livestock products because of the lower level of investment in feeds and management and the ready market at the farm gate. Mainly because of the strong export market to other states, the demand for live goats is higher than that for fresh mutton. Producers have relatively small profit margins for milk and broilers and there is exposure to a number of risks mainly associated with dependency on external farm inputs. On balance, therefore, it is possible that the pig subsector has the most potential to grow, and not only to meet the current local deficit (Table 17) but also to supply other deficit areas in the region. Northeast India is a major consumer of pork and currently states like Nagaland, Meghalaya and Mizoram have a large deficit in local supply, which is satisfied mainly through imports from northern states like Uttar Pradesh and Haryana (Deka et al. 2008). There may also be scope to export to Bhutan.

As was discussed earlier, it was difficult to assess the demand for beef. Nevertheless, the expanding market for, and the increasing price of, live cattle and buffalo indicate that demand for beef is growing rapidly. An established source suggested that a large number of beef animals is exported to Bangladesh via West Bengal. There is need to further investigate and to formalize this supply chain.

3.10 Prices and prices trend of livestock products

Prices of livestock products were gathered during the survey (Table 28). Whereas the prices of pork, eggs and beef did not vary across the four districts, the price of milk was higher in Ranchi and East Singhbhum than in Godda and Palamu, probably because of the combination of higher demand, less production, more urbanization, higher purchasing power and better access to market. Despite Godda district being one of the surplus producers of goats, the price of mutton was higher in Godda possibly because traders from West Bengal visited the villages to buy goats and competed with the local butchers forcing up the price. In Palamu, the mutton price is lower than in the other three surveyed districts probably because traders do not visit from outside the district.

Table 28. Prices (INR) of livestock products in the four surveyed districts (September–October 2008)

Commodity	Ranchi	East Singhbhum	Godda	Palamu
Milk (litre)	22	22	16	18
Egg (dozen)	34	34	34	34
Beef (kg)	40	40	40	40
Pork (kg)	100	100	90	100
Chicken—broiler (kg)	75	65	65	60
Chicken—indigenous (kg)	140	135	120	125
Mutton (kg)	160	160	180	140

Tables 29 to 34 present the estimates of price changes over the last 10 years calculated from the price information gathered from the key informants in the various livestock product market chains. The price of pork has increased at a faster rate (80–100%) than other livestock products including mutton (75–80%) and milk (60–83%), presumably a reflection of the growing demand for pork relative to its supply. The price of eggs changed little during the first five years, but prices have increased significantly during the last five years, a reflection of increasing demand and, most recently, the impacts of higher grain prices and repeated bird flu scares. Relative to other livestock, beef and broiler prices are increasing more slowly at 50–62% over the past 10 years (Tables 31 and 34). Recent price changes also reflect increased transport costs (including higher fuel prices), higher grain prices if and when purchased grain-based feed is used and the general price inflation that has hit the Indian economy. Therefore it will be important to analyse in more depth these price changes and to correct the price trends for inflation in order to reveal the underlying real changes in livestock product prices.

Table 29. Changes in price of milk during the last 10 years (INR per litre)

District	10 years ago	5 years ago	Current	Change over 10 years (%) *
Ranchi	12	16	22	83
East Singhbhum	12	16	22	83
Godda	10	12	16	60
Palamu	10	12	18	80

* Not adjusted for inflation.

Table 30. *Changes in prices of mutton during the last 10 years (INR per kg)*

District	10 years ago	5 years ago	Current	Change over 10 years (%) *
Ranchi	90	120	160	78
East Singhbhum	90	120	160	78
Godda	100	140	180	80
Palamu	80	100	140	75

* Not adjusted for inflation.

Table 31. *Changes in prices of broiler during the last 10 years (INR per kg)*

District	10 years ago	5 years ago	Current	Change over 10 years (%) *
Ranchi	45	50	70	55
East Singhbhum	40	50	65	62
Godda	40	50	65	62
Palamu	40	45	60	50

* Not adjusted for inflation.

Table 32. *Changes in prices of pork during the last 10 years (INR per kg)*

District	10 years ago	5 years ago	Current	Change over 10 years (%) *
Ranchi	50	70	100	100
East Singhbhum	50	65	100	100
Godda	50	75	90	80
Palamu	50	70	100	100

* Not adjusted for inflation.

Table 33. *Changes in prices of eggs during the last 10 years (INR per dozen)*

District	10 years ago	5 years ago	Current	Change over 10 years (%) *
Ranchi	20	22	34	70
East Singhbhum	20	22	34	70
Godda	20	22	34	70
Palamu	20	22	34	70

* Not adjusted for inflation.

Table 34. *Changes in prices of beef during the last 10 years (per kg)*

District	10 years ago	5 years ago	Current	Change over 10 years (%) *
Ranchi	25	35	40	60
East Singhbhum	25	35	40	60
Godda	25	35	40	60
Palamu	25	35	40	60

* Not adjusted for inflation.

3.11 Food safety and human nutrition issues

The descriptions of the various market chains for livestock and livestock products given above highlight the changing scale and structure of the consumption of milk, eggs and meat in Jharkhand and the changing nature of their supply which extends, for eggs, milk and meat, way beyond the state's borders. In turn the state is a significant exporter of goats and cattle. These changes have important implications for public and livestock health and particularly for food safety.

Notable is the increasing competition between the various types of meat, with broiler meat gaining a significantly larger share of the total market for meat. Yet, despite these changes, there appears to have been little or no change in the traditional practices for livestock slaughter and the handling of carcasses and meat before its sale to consumers. This is not surprising given the state's largely rural population but even in the major urban centres of Ranchi and Jamshedpur there is no slaughterhouse. However, it was learnt that there are either proposals for the construction of a slaughterhouse in some places or that in other places intermittent construction was going on.

More worrying was the apparent lack of a systematic approach to improving hygienic practices and food safety generally in the market chains of edible livestock products. Although each municipality has a health inspector who is in charge of registration of butcher's shops and the inspection and certification of slaughter animals, the inspectors lack adequate manpower, logistic support and infrastructure such that there is no pre- or post-mortem meat inspection. The concerned staff of the municipality offices in Ranchi and Godda reported that it is not practically possible for them to visit all the individual slaughter places with the current quota of staff. For example, goats are slaughtered twice in a day (early morning and afternoon), yet municipal staff work normal office hours. One result of the ineffective inspection process is that the number of unregistered butcher's shops is greater than those registered in Ranchi and Godda. In the former there are only 50–55 registered stalls (butchers register their shop by paying INR 500 per annum) out of the total of 100–110. Moreover even the registered butchers' shops are not following the recommended standard practices of having a glass covering, an effective drainage system, a permanent shed, maintaining clean work surfaces etc. And in any case, the current practice of registration applies only to mutton sellers and does not cover the retail sales of broilers or pork.

Generally the places where livestock are slaughtered lack the bare minimum facilities like a shed with a source of potable water and a drainage facility. Butchers slaughter the animal in the market place or at their home premises and, for cleaning, use water from the nearest available sources without paying attention to its cleanliness. In rural areas, meat is sold on the roadside or weekly marketplace without any measures for hygienic slaughtering or for the cleanliness of the meat. Other risks to human health can arise from the practice of slaughtering diseased animals and selling the meat to consumers, with the potential of serious consequences. It was also reported that unsold meat is retained for sale the next day by retailers, most of whom do not have access to refrigeration.

Some consumers in the surveyed areas reported their concern about the risks of high blood pressure, diarrhoea, allergies, worm infestation and loss of appetite associated with meat consumption especially pork. However, it is probable that these perceived risks are not considered important by the majority of meat consumers and it is not expected that they will have a significant impact on the demand of meat. And the concerned municipal officers said that there had been no reported ill-health caused by consumption of livestock products. Nevertheless, current practices for the handling of meat and milk, the consumption of which is growing significantly, are lacking adequate precautions to reduce the risks associated with unhygienic food. The lengthening and the increasing complexity of the livestock production value chains in Jharkhand suggest that a priority should be a thorough assessment of the public health risks along each of the value chains together with a concerted program of participatory training in hygienic practices for each of the actors in the chains.

4 Livestock production systems

4.1 Distribution of livestock and livestock management systems

Livestock species and management systems in Jharkhand are very much ethnic group and location specific (Table 35). Livestock are integral to the livelihoods of the large majority of rural households: 90–95% of households keep one or more species of livestock of which cattle, goats and poultry are the most common (Table 35). A small section of people also keep buffalo, sheep and pigs. In all the surveyed blocks almost 85–90% of rural households irrespective of tribe or ethnicity rear indigenous cattle, an important function of which is providing draught power for the preparation of cropping land, but less than 5% have crossbred cattle. Certain communities like Yadav, Mahato, Manjhi and higher class Hindu community traditionally rear high-yielding (crossbred) cattle for milk production which they consider as a status symbol. Many of the crossbred cattle owners are originally from Bihar or West Bengal (mainly in districts neighbouring West Bengal) and have settled in their own or government land and keep crossbred dairy cattle as a primary source of livelihood. The crossbred cattle population is mainly concentrated in urban and peri-urban areas where there is ready access to the milk market and farm inputs. In rural areas, away from the urban centres, the crossbred cattle population is very low, possibly because of little or no orientation of the people towards milk production, lack of access to inputs, market and extension services, poor level of confidence and motivation, lower risk bearing capacity and poor financial resources. Only about 10–25% of households keep buffalo, mainly poor yielding indigenous breed (Table 35), the males of which are draught animals. Certain communities like Yadav, Mahato etc. in urban and peri-urban areas keep Murrah buffalo for milk production.

Table 35. Estimated percentage of households and their ethnic groups with livestock in the rural areas of the four surveyed districts

Livestock type	District				Ethnic groups
	Ranchi	East Singhbhum	Godda	Palamu	
One or more	95	90	90	90	
Cattle (indigenous)	90	85	85	90	All ethnic groups
Cattle (crossbred)	3	5	2	2	Yadav, Mahato, Manjhi, Teli, Koiri, Ghatwar, Upper caste Hindu
Buffalo	25	15	10	10	Mahato, Yadav, Kurmi (only R and ES), Ghatwar (only R), Muslim
Chicken—indigenous	80	70	70	70	All ethnic groups, especially Muslim
Goats	70	60	60	65	All ethnic groups
Pigs	50	30	25	15	Adivasi, Horizon, Santhal, Sahish

Source: Focus group discussions and district key informants.

Goat rearing is very popular in rural areas especially in the vicinity of forest land or barren or uncultivable land. People in urban and peri-urban areas find it difficult to rear goats due to lack of grazing land. Pigs are kept by tribal communities, like *Santhal* and *Horizon* (Sweeper), who traditionally rear pigs irrespective of their location (rural or urban) (Table 35). There is also religious taboo associated with pig rearing by some communities and, therefore, Muslim and high caste Hindu communities never rear pigs, although pig rearing is gradually increasing amongst some other non-traditional pork rearing communities (although the actual numbers are probably still very small). Poultry rearing is very common amongst the Muslim and tribal communities and almost 70–80% of the rural households rear indigenous poultry (Table 35).

4.2 Management systems

The management systems in each of the four surveyed districts are given in Table 36. The surveys and focus group discussions confirmed that traditional grazing systems continue to dominate the management of cattle, buffalo and goats. Generally it was only specialized dairy cattle and buffalo that were stall-fed. On the other hand between a third and a half of all pigs are now penned or tethered, while all indigenous chicken continue to scavenge in contrast to the intensive commercial production of hybrid broilers and layers (Table 36).

Table 36. Approximate percentages of livestock rearing households by management system

Species and management system	Ranchi	East Singhbhum	Godda	Palamu
Cattle/buffalo				
Stall-fed/confined	10	10	5	8
Semi-scavenging	90	90	94	90
Free ranging*	0	0	1	2
Goats				
Stall-fed/confined	Negligible	Negligible	0	0
Semi-scavenging	100	100	100	100
Pigs				
Penned/tethering	50	60	30	30
Semi-scavenging	50	40	70	70
Free ranging	0	0	0	0
Chicken (indigenous)				
Semi-scavenging	100	100	100	100
Chicken (broiler/layer)				
Intensive	100	100	100	100

* System under which animals are allowed to graze throughout the day and night.

4.2.1 Cattle and buffalo

About 90–95% of cattle and buffalo in surveyed districts are reared under semi-scavenging conditions. Animals are housed in the homestead during the night and during the day they are let loose to graze. Movement of animals is restricted during the cultivation season especially in the areas having intensive agriculture by tethering in grazing land, road sides, school fields etc. During the time of grazing, family members, mostly young boys and girls, take care of the animals. A popular system in many parts of Jharkhand is for 10–20 households to appoint a cowboy (herder) to look after the livestock, perhaps 40–50 in number (mainly cattle, buffalo, goat and sheep) from morning to evening. In return he is paid in kind, mainly in paddy—the prevailing rate is about 40–60 kg paddy per household per year to the boy. Often the whole family of the cowboy including women is involved in looking after the livestock

A large majority of households have a cattle shed or use a part of the house for keeping cattle and/or buffalo. The structure is made with locally available materials with or without side walls. Households without a cattle shed confine the animals in the home premises (mainly in Palamu district) by tying them to a post by a short rope throughout the night. In the evening, the cattle are offered paddy straw or a feed mixture mainly constituted from kitchen waste and crop by-products (rice polish, wheat bran etc.) and without any purchased feed ingredients.

About 5–10% animals are stall-fed, i.e. they are confined throughout the day and night in the cattle shed or home premises. This type of stall-fed animal is locally called *Khatal* and are invariably high yielding

cattle or buffalo kept for commercial milk production. They depend wholly on household feed resources and some purchased feed ingredients.



Figure 9. Babulal Sarada, a cowboy (aged 12 years) with his herd of livestock.



Figure 10. A Khatal in Jamshedpur.

There are also reports of another system of cattle rearing in some of the districts like Godda or Palamu, where all the cattle and buffalo from a village are taken together for grazing for several months to certain areas having abundant fodder (during January to May) when cattle are not needed for ploughing and brought back to the village again in June at the start of monsoon when they are needed for draught purpose.

4.2.2 Goats

Almost all goats are reared under semi-scavenging conditions, similar to that of semi-scavenging cattle and buffalo. Except for a very small number of goats of exotic (i.e. introduced) breeds such as Beetal and Jamunapari, intensive rearing is not popular. Unlike cattle or buffalo, goats are not put inside a shed throughout the day and night, rather they are tethered in the home premises and offered various tree leaves, starch and other kitchen waste etc. Because this is a simple management system, investment in goat rearing is much less than for stall-fed cattle and buffalo. Interestingly, the field study suggests that goat rearing may be responsible for children not attending school in certain households as households having higher numbers of goats generally assign a young member of the family to look after them (or the children may act as a cow boy to others). This can result in the children losing interest in education and become a wage earner for the family.



Figure 11. *A shed used for keeping goats.*

4.2.3 Pigs

Unlike cattle, buffalo or goats, many pigs are confined in the home premises either by tethering or penning. In urban or peri-urban areas or areas having intensive agriculture, movement of pigs is restricted by tethering with a short rope in the home premises or in an enclosure made out of locally available material. This is mainly to prevent damage to crops and vegetables which can become a cause of conflict between families. In rural areas with no cropping land nearby, pigs are let loose to scavenge in and around the home premises or on the road side. During scavenging hours they consume tuber of grasses and colocasia, forages, kitchen waste and some others.



Figure 12. A tethered crossbred pig.

4.2.4 Chickens

Indigenous chickens are all reared under semi-scavenging conditions. Scavenging, birds gather grains, insects, shoots of grasses, kitchen wastage etc. and in the evening they are offered water and leftover rice or paddy. Broilers and layers are kept under intensive conditions with purchased inputs under standard management practices practised elsewhere in India.

4.3 Herd and flock sizes

A typical herd size in stall-fed systems ranges from 2–6 cattle and 1–3 buffalo, although some big *khatahs* may have more than 20 cows or buffalo (Table 37). These *khatahs* may have either cattle or buffalo or both. The majority of households keep 2–5 indigenous cattle; the number depends on land holdings, objectives of rearing and available manpower to look after the animals. Almost all households have at least 2 bullocks for ploughing with 1 or 2 cows and their progeny. Herd sizes above 10 are generally kept by a small section of households having larger land holding, more use of livestock in agriculture and more household feed resources to feed more animals. Buffalo herd size tends to be smaller than cattle possibly because most buffalo owners also have cattle. On average, every household rears 3–6 goats, of which 1–2 are adults and another 3–4 are kids or growers (Table 37). This is in line with the findings by Rustagi and Agarwal (2000), who mentioned that 79% of goat keepers in Mathura district had 1–5 goats; only 3% had more than 20 goats. Those who keep pigs generally have 1–3 (Table 37). Since pigs largely depend on household feed resources, scarcity of feed restricts the herd size to below three. Indigenous chicken rearers generally keep about 3–8 chickens, although some households may have up to 15–20 chickens, while households rearing broilers keep batches of 200–500.

4.4 Reasons for keeping livestock

The various species of livestock kept by the rural households fulfil one or more objectives based on their traditional beliefs and practices and livelihood strategy (Table 38).

Table 37. Common herd/flock sizes (numbers of animals per household)

Species	Ranchi	East Singhbhum	Godda	Palamu
Cattle (stall-fed/ <i>Khatal</i>)	2–7	2–8	2–5	2–5
Cattle (semi-scavenging)	2–5	2–5	3–6	3–6
Buffalo	1–3	1–3	1–3	1–4
Goats	2–4	2–5	3–6	3–8
Chickens (indigenous)	3–5	3–7	5–7	5–8
Pigs	1–3	1–3	1–3	1–3
Broilers	300–500	300–500	200–300	200–300

Table 38. Reasons for keeping livestock

Species	Objective	% of livestock
Indigenous male cattle	Ploughing and pulling of bullock cart, fertilizer and fuel	90
	Meat, fertilizer and fuel	10
Indigenous cows	Breeding/earning cash	70
	Milk for home consumption and/or sale	30
Crossbred cows	Milk for sale	100
Buffalo	Draught purpose (mainly male buffalo)	80
	Milk production	20
Goats	For sale	95
	Subsistence purpose/sacrificial purpose	5
Pigs	Fattening pig for sale	92
	Producing piglets for sale	8
Indigenous chickens	For sale	50
	Subsistence/sacrificial	50

4.4.1 Cattle and buffalo

Traditionally, the prime reason for keeping male cattle and buffalo is to provide power for ploughing, pulling carts and to produce dung for fuel and fertilizer. Indigenous male buffalo are reported to be very good for ploughing muddy land; however, crossbred male cattle are generally not used for ploughing or pulling bullock carts as they are perceived to be too weak to do such hard labour. Cattle and buffalo serve an important role for livestock keepers as an asset which can be sold when cash is needed. Cows are mainly kept for reproductive purposes, i.e. to produce calves. Almost all indigenous Jharkhandi people are non-vegetarian, yet milk does not play an important role in their diet. Nor has milk been a traditional food of the tribal people, some of whom even consider milking of cows as a sin—they feel that milk produced by cows is not for human consumption but for calves. Other households do milk cows, mainly for household consumption. Selling of milk from indigenous cows is very limited. Rural people tend to give less attention to cows once they stop lactating.

4.4.2 Goats

Goats are important especially for the landless and marginal poor farmers for whom they are an important source of savings, cash and insurance—they can sell a goat when they need money. The strong demand for slaughter goats means that selling a goat is not a problem. A small section of rural households, mainly from the Hindu religion also rear goats for religious purposes to provide animals for sacrifice.

4.4.3 Pigs

Pork is the meat of choice for the tribal population and a large majority rear pigs for meat for both home consumption and sale (Table 35). Pigs are also reared for religious purposes. The large majority of pig keepers in Jharkhand, over 90%, prefer to rear fattening pigs. They purchase 1–3 piglets, rear them for 10–12 months for sale and then invariably purchase another batch of piglets. Generally slaughter pigs are sold in the months of December–January, when demand of pork is high due to the festive season and prices are high. Those who rear fattening pigs feel that keeping breeding pigs is quite difficult and requires higher levels of skill. Fewer than 10% of pig producers keep breeding sows and sell piglets to others.

4.4.4 Chickens

About half of the poultry are reared for home consumption and the other half for producing eggs and meat for sale.

4.5 Estimated levels of performance²

The performance of the various livestock species depends on breed, feeding, management practices, level of health and climatic conditions but given the prevalence of indigenous breeds managed in traditional low-input systems, production surpluses (e.g. young stock and/or milk or eggs available for sale) are low. Nevertheless these saleable surpluses and the capital accumulation from the growth of herds and flocks are very important sources of income and assets for these capital- and income-scarce rural households. Estimates of key production parameters of the various livestock species are given in Table 39.

Table 39. *Estimated performance of different livestock species*

Species	Milk (litre/day)	Live weight (kg)	Offspring (number per time)	Eggs (number per year)
Cow (indigenous)	0.25–1.0		1	
Cow (crossbred/others)	8–10		1	
Buffalo (indigenous)	2–3		1	
Buffalo (Murrah)	8–10			
Pigs (indigenous) at 12 months		30–40	6–8	
Pigs (crossbred) at 12 months		60–80	8–12	
Poultry (indigenous) at 8 months		0.75–1.25		40–60
Poultry (broiler) at 36 days		1.5–2.0		
Layer at 18 months				250–320
Goat at 12 months (uncastrated)		8–10	1–3	
Goat at 12 months (castrated)		12–16		

4.5.1 Cattle and buffalo

Milk production from indigenous cows ranges from 0.25 to 1 litre per day, while milk production of high grade crossbred cows (i.e. after the second or third cross) is about 8–10 litres per day with a lactation length of 250–280 days (Table 39). Milk production of first crosses with indigenous cows is generally about 4–5 litres per day. Indigenous cows calve for the first time at the age of 3.5–4 years while crossbred/high-grade dairy cows calve at 3–3.5 years. The large majority of households keep cows for 6 or 7 lactations and then sell them. However tribal people generally do not like to sell even old unproductive cattle as they feel that the sale of old cattle dishonours the animal after it has served

2. Management aspects are described in subsequent sections.

the family for many years. Therefore tribal households may keep more cattle than those in the general community but overall production from their herd may be lower.

The milk yield of indigenous buffalo cows is generally higher than that of indigenous cows, i.e. 2–3 litres per day, and the fat percentage is also higher (6–6.5%), while murrah buffalo yield almost 8–10 litres of milk per day.

4.5.2 Goats

The Black Bengal breed of goat in Jharkhand produces 1–3 kids (generally 2), mostly kidding twice in about 16 months (Table 39). The first kidding is at about 1.5 years old. Live weight of an un-castrated male goat at the age of 12 months is about 8–10 kg while a castrated one is about 12–16 kg at the same age.

4.5.3 Pigs

Indigenous and crossbred pigs farrow for the first time at the age of about 15–16 months and 12–14 months respectively. Litter size of indigenous pigs is smaller (6–8) than crossbred pigs (8–12) (Table 39). Generally, litter size at the first farrowing is smaller than at subsequent farrowings. There is a significant difference between the growth performance of indigenous pigs (30–40 kg at 12 months) and crossbred pigs (60–80 kg at 12 months).

4.5.4 Chickens

Indigenous poultry (chicken) have much lower growth rates and egg laying capacities than improved broilers and layers (Table 39). One indigenous hen subsisting on semi-scavenging lays 40–60 eggs in comparison to 280–320 eggs laid by improved layer bird fed a balanced grain-based concentrate feed. Similarly a broiler chick fed concentrate feed *ad-libitum* achieves about 1.5 kg live weight in 32–38 days of age while a semi-scavenging indigenous chicken will take 8–10 months to achieve the same weight.

4.6 Breeding and reproductive management

The main breeds (or type) of livestock in Jharkhand with their approximate percentage within a species are listed in Table 40 which shows that only 1–5% of the livestock population are improved breeds or their crosses: the vast majority are indigenous non-descriptive breeds. (An exception is the pig population, with an estimated 30% crossbreds.) Indigenous animals are assumed to be more adaptable to local geo-climatic conditions, more resistant to diseases, capable of surviving with little or no external supplementary feed and can be reared with less management input. However, with such low levels of production, it will not be possible to meet the growing demand of livestock products and it will be imperative to improve the productivity of the existing populations through incremental production changes and targeted crossbreeding.

4.6.1 Cattle and buffalo

The most common breeding practice for indigenous cattle and buffalo in rural areas is natural service by an indigenous bull from within the local herd (Table 41).

Table 40. *Main livestock breeds in Jharkhand*

Species	Breed	% of total
Cattle	Jersey	4
	Holstein Friesian	1
	Indigenous	95
Buffalo	Murrah	5
	Indigenous	95
Pig	T&D (Tamworth × Desi)	2
	Large Black cross/Large White cross/others	28
	Indigenous	70
Goat	Black Bengal	99
	Jamunapari/Beetal/others	1
Chicken	Indigenous	94
	Broiler	6
	Layer	Negligible

Source: Field study (figures are only indicative).

Table 41. *Breeding practices of livestock*

Attributes	Cattle	Buffalo	Goats	Pigs
Community or neighbours' breeding male (% of total)	80	88	98	80
Cost	Free	Free	Free	Free
Repeat breeding problem	Medium	Low	Little/none	Little/none
Convenience	High	High	High	High
Quality of progeny	Low	Low	Low	Low
Own male (% of total)	5	6	1	10
Cost (not considered rearing expenses)	Nil	Nil	Nil	Nil
Repeat breeding problem	Low	Low	Little/none	Little/none
Convenience	Very high	Very high	Very high	Very high
Quality of progeny	Medium/high	Medium	Medium	Medium
Private (paid) natural breeding service (% of total)	10	5	1	10
Cost (INR)	200–300	200–300	10–50	50–150
Repeat breeding problem	Low	Low	Low/none	Low/none
Convenience	High	Medium	Medium	Medium
Quality of progeny	Medium/high	Medium	Medium	Medium
Artificial insemination (% of total)	5	1	Nil	Nil
Breeding cost (INR)	20 (Govt)	20		
	40 (BAIF)	40		
Repeat breeding problem	Medium	Low	–	–
Convenience	Medium	Medium	–	–
Quality of progeny	High	High	–	–

The practice is more prevalent in tribal areas where there is little or no demand for breeding services like artificial insemination or selective breeding. On the other hand some households, who expect some milk production from their indigenous cows, generally prefer to breed the cows with the recognized community bull available in rural areas. This is a popular practice in Jharkhand, as in other parts of India,

where some rural households let loose an uncastrated bull in the name of Hindu God 'Shiva', which is later recognized as a community bull and roams freely around a larger area (3–4 km radius): locally this bull is called 'Shar'. In urban and peri-urban areas, many commercial dairy farmers with bigger herds have their own bull and offer breeding services to others, charging INR 200–300 per service. It was reported that the Animal Husbandry and Fisheries Department used to distribute breeding bulls but that it no longer does.

For buffalo breeding, the fee-paying mating system also prevails in rural areas (mostly prevalent in Palamu district) as the number of uncastrated male buffalo is low and therefore the owners of such buffalo ask INR 200–300 per natural service (Table 41). A major breed improvement program is being carried out by the Department of Animal Husbandry and Fisheries through a network of 651 AI centres over the last several years. Frozen semen from Jersey, Tharparkar, Sahiwal and Holstein–Friesian bulls are used. Of these, Jersey and Holstein–Friesian semen are the most popular. For buffalo only Murrah semen buffalo is used. Although the official price of each insemination is INR 20 or INR 40 per insemination, in rural areas the total cost is up to INR 200 which includes the inseminator's fee and travel expenses. Jersey semen is generally used for breeding of indigenous/non-descript cows because of its smaller size. In 2006 the Directorate of Dairy Development engaged BAIF, to provide animal breeding services in Jharkhand. Currently they have about 160 AI centres in 23 districts of Jharkhand and these performed almost 55,000 AIs in contrast to 38,000 AIs performed by the 651 AI centres run by government department in 2007–08. Conception rate of BAIF's program is reported to be about 62% against 40% in the government run AI centres.

Infertility and repeat breeding is understood to be a major problem in cattle and buffalo although the incidence is reported to be much lesser in buffalo than cattle.

4.6.2 Goats

In rural areas breeding practices for goats are almost the same as those for cattle. There are some uncastrated nondescript goats within the flock in every village that serve the female goats in heat. The 'Shar' system is also used for goats. Some religious people let loose a healthy goat in the name of God 'Shiva' which then roams around the village freely and becomes a community goat called 'Patha' that breeds with the females. No charge is levied. Some households with a large numbers of goats have their own buck for breeding purpose. This is consistent with the findings of Tanwar et al. (2007) who found that the majority of farmers (82%) did not possess their own buck and used a community buck for breeding. They also showed that most goats came into heat during the monsoon (June–September) and kidding occurred between January to March. No AI service is reported for goats in Jharkhand. However, an NGO called Tagore Society for Rural Development (TSRD) adopted a breeding system for goats in Patamda Block, East Singhbhum District through distributing a Jamunapari buck to one individual in each village with 75% subsidy, who then charged INR 10 per service. In one month, each goat serviced about 7–8 goats. On visiting one project village the progeny was found to be very good, but it is understood that after the death of the supplied buck, no one came forward to purchase and rear another buck mainly because of low profitability. This could perhaps have been overcome by increasing the mating fee from INR 10 to INR 50 or so. It was said that there were few problems of repeat breeding and infertility in goats.



Figure 13. A breeding bull (*Shar*) roaming in the city street.



Figure 14. A buck used for breeding by TSRD.

4.6.3 Pigs

Generally only about 8% of households that keep pigs have breeding sows; the others purchase 2–3 month old piglets and rear them for selling for meat. Of the breeding households, one or more households keep one boar, especially the well-off households having more than 2 or 3 sows or having sufficient feed resources to rear a boar. About 70% of the pigs in Jharkhand are the indigenous

nondescript type (Table 8); the other 30% are crossbreds with the characteristics of two or more breeds resulting from apparently haphazard crossbreeding. Natural service is the only breeding method used by producers and there is no report of artificial insemination. Sows are reportedly served by the boar available with a neighbour without reference to its breed. Consequently it is not possible to ascertain the degree of exotic blood in different crosses. There is no system of organized selection of breeding boars or of efforts to maintain specific male:female ratios of breeding stock in a village. Based on the availability of boars in the village and the breed, the mating may be free or fee-paying. Breeding to non-descript boars is generally free, while mating to a crossbred boar usually costs INR 50–150 per service because of its scarcity in the village. Intensity of services is almost the same throughout the year, although producers prefer to have their sows mated during June to September so that litters are born in October to January and piglets are ready for sale in December to March when they fetch higher prices.



Figure 15. A herd of pigs managed by Birsa Agricultural University for producing T&D breed.

College of Veterinary Sciences and Animal Husbandry, Birsa Agricultural University, Kanke has developed and promoted a new breed of pig called T&D by crossing the Tamworth with the indigenous breed (Desi) under the All India Coordinated Research Project on Pigs (AICRP). Relative to the desi pigs, the T&D is reported to have better growth performance, higher resistance to disease, larger litter size and is suited to local climatic conditions. The college is promoting the breed through Krishi Vigyan Kendras (KVK) under the university, offering both male and female piglets (1+4 unit) to the villagers on condition that they deliver the same number of piglets (1+4 unit) to another villager free of cost. It is reported that the breed is becoming popular and the pig breeding farm at Kanke is unable to meet the demand. Problems of infertility and repeat breeding in pigs are generally lower than in cattle and buffalo but may be higher than in goats.

4.6.4 Chickens (indigenous)

In local backyard poultry, almost every household has a mixture of cocks and hens which breed freely (flock mating) with no controlled breeding management.

4.7 Feeding management and its seasonality

Feeding practices in the surveyed districts almost invariably depend on locally available feed resources which, when fed to livestock, result in only moderate levels of production. Roughly 30% of livestock are reared only on grazing; about 65% on a combination of grazing and household feed resources (mainly crop residues) and about 5% (or less) are fed on purchased concentrate feed. Purchased concentrate feeds mainly comprises individual feed ingredients such as milling by-products like rice polish, wheat bran, oil cakes, maize crush etc. and balanced concentrate feed prepared by some feed mills like Sona Dana, Sudha Dana and Kopila Pashu Aahar. Except for a small number of commercial livestock farms, the use of balanced concentrate feed is negligible. Other commercial livestock farmers purchase individual feed ingredients which they mix with other household feed resources based on their knowledge and experience.

Cultivation of fodder is not common in Jharkhand. Despite some sporadic efforts by the government and other agencies there has been little adoption of planted fodders. Lack of awareness (information) is a factor but more important are the availability of grazing (fallow land, forest and other common propriety resources) and crop residues, and the limited number of households having a commercial orientation towards the rearing of livestock. Small land holdings (on average less than 1 ha) and the priority for producing subsistence food crops is another important factor inhibiting planted forage production.

In the four surveyed districts there is little or no variation in respect of feed resources and feeding practices, therefore, they are presented together (see Table 42).

Table 42. Feed resources used for different livestock species

All districts	First major component	Second major component	Third major component	Occasionally
Cattle	Grazing	Paddy straw	Rice polish	Oil cakes, ground pulses, wheat bran, maize crush
Buffalo	Grazing	Paddy straw	Rice polish	Oil cakes, ground pulses, wheat bran, maize crush
Goats	Grazing	Kitchen waste, tree leaves	Vegetables	Rice polish, wheat bran etc.
Pigs	Vegetables and kitchen waste	Residue of country liquor	Green forages, tubers of colocasia	Maize, wheat bran, pulses
Chicken	Paddy, maize, wheat and pulses	Kitchen waste	Shoots of grasses, insects	

4.7.1 Cattle and buffalo

Almost all indigenous cattle and buffalo are dependent on grazing (Tables 36 and 42). Grazing is allowed on fallow, barren and forest land throughout the year while in cropped fields it is allowed only in the off-season. Since paddy is the major crop and mono-cropping prevails, the paddy fields remain barren and cattle are allowed to graze from November to June, whereas during the cropping season livestock are restricted by tethering to the home premises or common property resources like road sides, playing grounds and barren land. In the evening, they are fed with paddy straw (locally called *Powal*) with or without chopping (*Kuti*). Some paddy straw is available in almost all farming households. Some farmers have a chaff cutter to chop paddy straw. During the rainy season, paddy straw becomes the major feed for the cattle herd. Those who can afford to purchase paddy straw (price INR 2–3/kg), buy it after harvesting when it is cheaper and store it for feeding during the scarcity period (June–October). Many producers also feed rice polish and rice bran mixed with water with or without cooking. Only households having crossbred or high-yielding (dairy) cattle or buffalo buy rice polish/rice bran (INR 8/kg). Research on feeding management in smallholder dairy in Uttarranchal (Singh et al. 2001) suggested that 83% of dry

fodder in the form of crop residue came from private property resources (PPR) and only 17% came from common property resources (CPR). It was further reported that browse (shrub and tree leaves) amounted to only about 16% and green grasses as high as 84% of the total greens. Average shortage of green fodder was 26% and that of dry fodder is as high as 77%. In field conditions, a dairy farmer on average provided only 100 kg concentrate feed to the dairy animals in a year, the bulk of which (77 kg) was produced at home. In Jharkhand similar studies are needed to better understand the feeding systems, their constraints and opportunities.



Figure 16. A tribal lady at her fodder plot grown under the initiative of PRADAN.

Bovine producers who cultivate wheat, maize and/or mustard oil, feed the crop by-products, maize crushed (locally called *Dara*), wheat bran (*Bhusa*) and oil cakes (*Khalihoi*) but generally they do not purchase them from the market. Only producers with high yielding cattle and buffalo purchase these feed ingredients and mix them with water and feed with or without boiling twice or thrice in a day. These producers mainly belong to urban or peri-urban areas having easy access to markets for these inputs. They report that for a cow yielding 10 litres of milk, they spend about INR 100 per day on feeding and about half of that during the dry period. Purchasing of balanced concentrate feed like Kapila Pashu Aahar and Sudha Dana is not popular. Producers generally buy the feed ingredients for mixing based on their experience. Poor producers cannot afford to purchase these concentrate feeds and therefore they feel that rearing of high yielding cattle is not possible for them. Producers with high yielding cattle or buffalo, add some mineral and vitamin mixture, especially during pregnancy and lactation, to prevent metabolic diseases like milk fever and to maintain higher milk yields. Others do not feed any mineral mixture except perhaps some salt added to the feed.

Dairy producers complain about the recent increases in the prices of grains and their by-products and how dairying has become less remunerative, such that some dairy producers have sold their cattle herd and shifted to other livelihood options. It is also reported that many younger people from farming families do not like to take up dairying as a business because of its low profitability and high labour requirement. Because of the hard nature of the work, it is even difficult to find labourers to work in the dairy sector for less than INR 3000 per month.



Figure 17. A stack of paddy straw stored for feeding to cattle.

4.7.2 Goats

Nearly all goats graze during day time. In the evening they are provided with kitchen waste like leftover rice, vegetables, starch etc. Concentrates are not fed although some households feed goats with locally available crop by-products like rice polish and damaged maize. However, the priority for feeding these crop residues is usually to other livestock species like cattle, buffalo, pigs and poultry rather than to goats. Households also collect leaves of trees etc. for feeding goats. During the cultivation period and rainy season, movements of goats are restricted to the home premises or common property resources, especially in the areas where there is shortage of grazing land.

4.7.3 Pigs

Pigs are mainly fed with kitchen waste and grazing in the home premises or in neighbours' premises. They scavenge for tubers of colocasia, tapioca and jungle grasses. Feeding of purchased feed to pig is not popular. A large section of tribal households prepare country liquor with rice, locally called *Haria*, and feed the residue to the pigs. Since pigs are mainly reared by the tribal people who are mostly resource-poor, gathering sufficient feed is always challenging and serves to limit herd sizes to 1–3 pigs. Hardly any feed ingredients are bought because of poor financial resources to do so or unavailability in the market. Where pig producers reside near hotels and restaurants, they may collect hotel waste for feeding to pigs. The availability of hotel waste food may explain the significantly higher body weights reported by Kumar et al. (2005) of piglets maintained in peri-urban areas compared to those kept in rural areas. The traditional diets fed to pigs and other livestock are not balanced for energy, protein and minor nutrients, and without purchased supplements or additional home grown feeds, growth rate at different stages of the weaner-to-slaughter cycle will not improve (Yadav and Gupta 1994; Gupta et al. 2006). Research has shown that, if supplemented, crossbred pigs fed on local feed rations respond well in terms of growth rate (Pal et al. 2000).

4.7.4 Chickens

Indigenous chickens mainly scavenge throughout the day in search of grains in and around the homestead (Tables 36 and 42). They are also offered broken rice, broken maize and other crop residues.

Kitchen waste (mainly leftover rice etc.) is one of the important feed ingredients. Practically no purchased feeds are used for indigenous chickens. Broilers are fully reared with purchased balanced concentrate feed which cost INR 13–15/kg.

The interviewed livestock producers having indigenous stock mentioned that they are not facing a major problem feeding their livestock as the external input is nil or negligible, while commercial livestock keepers depending on external supplies of concentrate feed and/or feed ingredients mentioned that the higher price of concentrate feed is the major challenge to the profitability and survival of their business.

In addition to higher feed prices, the seasonality of feed resource availability also constrains livestock production through its effects on feeding practices. Table 43 presents the calendar of livestock feed availability.

Table 43. Calendar of seasonal availability of feeds and fodder

Main feeds	Jan–Feb	Mar–Apr	May–June	July–Aug	Sep–Oct	Nov–Dec	Fresh or cooked	Livestock species
Paddy straw	A*	A	Sc**	Sc	A	A	Fresh/ cooked	Cattle, buffalo
Rice polish	A	A	Sc	Sc	A	A	Cooked	Cattle, buffalo, goat
Green forages	Sc	Sc	A	A	A	A	Fresh	Cattle, buffalo, goat
Pulses	Sc	A	A	A	Sc	Sc	Cooked	Cattle, buffalo, poultry
Maize	A	A	A	Sc	Sc	A	Cooked/ fresh	Cattle, buffalo, poultry
Wheat	Sc	A	A	A	Sc	Sc	Cooked	Cattle, buffalo, poultry
Oil cakes	Sc	A	A	A	Sc	Sc	Cooked	Cattle, buffalo, poultry
Hotel waste	Sc	A	A	A	A	Sc	Fresh/ cooked	Pig
Kitchen waste	Sc	A	A	A	A	Sc	Fresh	Pig, goat, cattle
Mineral mixture	A	A	A	A	A	A		All

*A = Available, **Sc = Scarce.

The main livestock feed is paddy straw which is available from October to April after which there is some shortage. Only those with a large area under paddy cultivation have enough paddy straw for the entire year otherwise they need to purchase high-price straw from others. Rice polish is also scarce during May to August/September (Table 43). During this period the stock of paddy straw from the previous year is becoming exhausted and the new batch is not yet harvested. Green fodder is scarce during winter when the grazing fields are dry and becomes available during the rainy season. Kitchen and hotel waste is generally scarce in winter because of less spoilage due to longer preservation period stimulated by the cooler environmental temperatures. Other feed ingredients like wheat, pulses and oil cakes remain scarce from September to February. Mineral mixtures which can be purchased from the feed sellers remain available throughout the year.

4.8 Health management

Livestock in Jharkhand suffer from a number of contagious and infectious diseases. However, it appears that there is little awareness about these diseases and their treatment. If an animal becomes ill, farmers do not generally rush to hospital or a veterinarian. Instead, they wait for free treatment from any source or use some traditional medicine or herbs or magic. As a result the animal's health may deteriorate or die and often it cannot be replaced for lack of capital. Tackling this lack of knowledge about the most prevalent livestock diseases and their treatment or prevention is therefore a priority. In the surveyed districts the livestock producers and veterinary staff cited the following prevailing diseases (Table 44).

Table 44. Common livestock diseases (most important shown in bold) and associated risks reported in the four surveyed districts

Cattle and buffalo	Goat	Pig	Chicken
Foot-and-Mouth disease (FMD)	Peste des Petits Ruminantes (PPR)	Swine fever (SF)	Ranikhet disease (RD)
Haemorrhagic septicaemia (HS)	FMD	Diarrhoea	Coccidiosis
Black quarter (BQ)	HS	Internal worms	Worms
Anthrax	Enteritis	Enteritis	Infectious bursal disease (IBD)
Mastitis	Tympanitis	Pneumonia	Coryza
Metritis		Skin disease	Bacillary white diarrhoea
Tympanitis		Jaundice	<i>E Coli</i>
Worms		Trampling death	
Babeosis			
Theileriosis			
Ephemeral fever			
Seasonal fever			
Reproductive disorder			
Risk of mortality from diseases			
Low	Medium	Medium	High

4.8.1 Cattle/buffalo

Large animals like cattle and buffalo suffer from various diseases (Table 44), of which the contagious viral FMD is reported by producers as the most important. Although mortality is not high, farmers suffer severe economic loss as affected animals become less productive during infection and in subsequent years. Responses during the surveys revealed that the majority of diseases occur during the monsoon, especially June to September, therefore vaccination (when appropriate for a disease, FMD) should be done prior to the onset of the monsoon. Prevention through timely vaccination can be an effective way to control FMD. The vaccination program of the Animal Husbandry and Fisheries Department (AHFD) does not run continuously and therefore is not effective in controlling FMD.

The field surveys confirmed the low level of awareness among producers about the diseases that affect their livestock and possible preventive measures, like vaccination. Research in India has shown that level of education, size of the farm, socio-political participation and exposure to mass media and extension agencies positively affect attitudes towards vaccination (Sasidhar 2001). This suggests that, in Jharkhand, an holistic approach will be required to assess the prevalence of diseases, the economic loss that results, the current status of diagnosis, awareness creation, disease surveillance, vaccine supply, and cold chain maintenance. The results are likely to suggest the need for a community-based animal health delivery system with strong support from NGOs.

4.8.2 Goats

In almost all the surveyed areas goat rearers and key veterinary informants reported *Peste-des-Petits Ruminantes* (PPR, caused by PPR virus) as the most important contagious diseases of goats (Table 44). Mortality was said to be 30–60%, but because of its contagious nature, morbidity was almost 100%, showing that an effective control method is urgently required. The Animal Husbandry and Fisheries Department has a PPR vaccination program but the quantity of vaccine and its delivery is not adequate to control the disease in Jharkhand's large goat population. More effective delivery is required and a reliable supply of the vaccine. Currently government is procuring PPR vaccine from a Bangalore-based biological laboratory, but the supply is insufficient.

4.8.3 Pigs

Swine fever is the major disease of pigs reported in Jharkhand, as elsewhere in India (Table 44). As it is a viral disease, vaccination is the only way to prevent it. It is contagious and morbidity and mortality can be more than 60%. Despite the reported prevalence of swine fever and mortalities it caused, there are very low instances of vaccination. The failure to vaccinate is apparently because of inadequate knowledge of pig keepers, poor availability of the vaccine and the fact that when the vaccine is available it comes in a vial of five doses, more than required by most pig units. Moreover, there are also reports of vaccination failure in the vaccinated animals. This might be either because of poor quality of vaccine or faulty storage (maintaining a cold chain is essential), transportation or vaccination. Clearly, current systems for the delivery of swine fever vaccine do not work and alternative interventions are required.

Several studies have suggested that local (indigenous) pigs are susceptible to piglet diarrhoea and pneumonia (Pal et al. 2000) and diarrhoea, pneumonia, trampling death and non-specific conditions like debility and naval ill are major cause of piglet mortality (Kalita 1996; Murugkar 1998). Infestation of pigs by internal worms and external parasites are also reported to be common problems. Treatment of pigs with deworming drugs is not a common practice in Jharkhand and large the majority of pig keepers are not well aware of their potential use.

4.8.4 Chickens

For indigenous chickens, Ranikhet Disease was reported to be the most serious (Table 44); it is a viral contagious disease with mortality and morbidity above 80%. It occurs in both broilers and layer birds. Improved birds are invariably vaccinated against the disease and therefore the incidence is very low in commercial farms. However, indigenous chickens are rarely vaccinated and therefore the incidence is high. Apart from Ranikhet Disease both indigenous chicken and broilers suffer from Coryza, CRD, IBD and Coccidia. Except for IBD, the other three diseases can be prevented with timely treatment of birds with appropriate medicine, if these are available and affordable.

4.9 Veterinary services

In the event of sickness of livestock, households first try to take care of the diseased animal based on their experience. It was reported that poorer producers usually sought advice from experienced producers in the village or those whose livestock had previously been treated by a veterinarian. They try to treat their diseased animal using traditional herbs, beliefs (e.g. magic) or practices, e.g. tying a FMD-infected animal in muddy water and using petrol to treat a maggotted wound. Relatively well-off producers visit the local government veterinary hospital or private veterinary/human clinic to get the medicine by explaining the symptom of the diseases. Only richer producers are reported to call a veterinary doctor or veterinary field staff to treat their diseased animal. A visit by a veterinarian costs INR 50 to 200, depending on the type of disease and the distance from the hospital. Since field staff charge less, many producers prefer to call them.

But most important from the standpoint of livestock development and the improvement of livelihoods through livestock is that only about 20–30% of households have access to government veterinary services, while another 5–15% have access to services offered by private clinics, NGOs and para-vets (Table 45). Therefore most livestock keepers in Jharkhand, 55–70% depending on the district, cannot access any kind of veterinary service. Despite all development blocks having a government veterinary hospital, the services are very limited because of: the non-availability of required medicine and vaccines in the hospital; the high prices of any medicine and vaccines in stock; the difficulty and cost of taking sick animals to the hospital, and compounded by the poor awareness of the farmers about diseases and their treatment and the farmers’ reluctance to contact veterinarians because of the fees they charge.

Table 45. *Services used by the producer households (%) to treat their animals*

	Ranchi	East Singhbhum	Godda	Palamu
Government veterinary services	30	25	20	25
Private clinic, NGO's or para-vets	15	15	10	5
Households with no access to veterinary services	55	60	70	70

In addition, lack of diagnostic facilities in the hospitals and the irregular presence of some veterinarians, makes treatment less effective on many occasions. Shortage of veterinary doctors is also a problem and the available doctors are often given additional charges of other hospitals or they are engaged in non-veterinary activities, e.g. the National Rural Employment Guarantee program (NREG), census and election duty. As elsewhere in India, the AHFD extension service is starved of resources including vehicles for mobility, mobility advances, extension materials etc. And despite the changing of development approaches, staff are not adequately trained in participatory and other modern tools and techniques of extension. Moreover, it was reported in East Singhbhum and Godda districts that veterinary staff are not paid regularly, with serious impacts on their motivation, aggravated by the poor state of repair of infrastructure facilities, including hospitals and District Animal Husbandry offices.

Some NGO development agencies like PRADAN, BASIX, BAIF are implementing livestock development projects with their own technical staff and trained para-vets. In addition, there are some non-trained para-vets who have specific skills like castration of goats or pigs and the treatment of abscesses, wounds and fractures. They were said to be more affordable and accessible than the government veterinary service providers.

4.10 Risk management

Despite the significant contribution of livestock to livelihood, farmers are regularly exposed to certain risks that include disease (morbidity and mortality), price volatility, feed and water scarcity, breeding, climate change, accident, theft etc. The risks associated with livestock could be broadly classified as market-related and non-market-related. An attempt was made to understand the risk factors faced by the farmers along with the magnitude of risk, probability and risk bearing capacity, the results of which are depicted in Table 46.

The impact of diseases and loss of production may be disastrous for resource-poor livestock keepers. Once a productive asset is lost, resource-poor farmers find it difficult to replace it by a new one. This is not merely an economic loss to them, but also they become more vulnerable to other form of family risks, e.g. disease of family members, savings to meet emergency need etc. as livestock is an important means of saving and insurance. An animal dying within a resource-poor household can be similar to bankruptcy or the collapse of the saving bank or insurance company for rich people.

Table 46. *Farmers' perceptions about the risks associated with keeping livestock*

Risks associated with livestock	Magnitude of risk	Probability	Risk bearing capacity	Precautionary measure
Epidemics like bird flu, RD, SF, FMD	High	High	Low	Disease surveillance
Death due to diseases	High	Medium	Low	Community-based coping up mechanism, insurance
Less demand/price and fluctuation of market price	Low to medium	High	Medium	Market intelligence
Feed scarcity because of drought	Medium	Medium	Medium	Treatment and storage of feed
Irregular supply of feed and higher increase in price	Medium	High	Medium	Community-based approach
Damage caused by accident, theft and predation	High	Low	Medium	Precaution
Hidden expenses/social disturbances	Low	High	High	
Water scarcity	Low	High	High	
Climate change	Low	Medium	Medium	
Policy risk	No idea	Low	No idea	

Source: Household interviews.

The risks may be categorized in terms of their probability of occurrence, magnitude of risk and risk bearing capacity under several heads, viz. high risk–high probability, high risk–medium probability, high risk–low probability, low risk–high probability, medium risk–medium probability and low risk–low probability. Field study suggests that the risks which have high probability of occurrence with low magnitude of damage are perhaps better handled by producers from their experience. For instance, fluctuation of market price, hidden expenses or water scarcity happen frequently or every year and therefore producers/traders assume certain losses and that is built into their market strategy. This kind of risk/shock they can easily absorb. However, there are some risks which have high to medium probability but have high risk, for instance, diseases or death of an animal. This is the most critical type of risk, which the producers or project implementers, should analyse critically and prepare a risk mitigation strategy by adopting prevailing best practices with taking adequate care to absorb the shock. If required, the community may come together to design the risk mitigation approach collectively or may have a system in place to help the producers to cope even after the loss of the asset. The same approach may also be adopted for the risks which have medium probability of occurrence and medium magnitude of damage, for instance, scarcity of feed or drought. While there are some risk which has a low probability of occurrence but if they do occur the loss may be very high, e.g. death of animal due to accident. This kind of risk may be addressed by taking some precautions. Other types of risk which have low probability of occurrence with lower magnitude of risk may perhaps be overlooked. Because of poor policy environment and lack of awareness about the impact of policy changes on livestock production and marketing, producers and traders lack an appreciation of the changing situation and the associated risks.

5 Policy and institutional issues

5.1 Delivery of livestock services

5.1.1 Department of Animal Husbandry and Fisheries

The department is the major development and service delivery agency responsible for the livestock sector in Jharkhand. It has a network of 424 hospitals, 651 AI centres and 6 livestock breeding farms (Table 47). It has offices and staff in almost all the development blocks and districts, but, as pointed out in the earlier chapters, they do not have adequate financial resources, manpower, infrastructure, supply of medicine and vaccines and vehicles for mobility. Unofficial sources suggest that the condition of the infrastructure and services worsened after the fodder scandal in undivided Bihar in 1993–94. Also departmental morale is low: veterinary officers and staff have not been promoted for a long time and they are not getting their monthly salary on time. Funds for the development programs have been reduced significantly. The department has the responsibility for supplying veterinary hospitals with vaccines for HS, BQ, combined HS and BQ, anthrax, rabies, FMD, RD and PPR, and supplies small quantities of deworming drugs, antibiotic, antipyretic, and antihistaminic drugs, cotton, bandages cloth etc, but the deliveries tend to be erratic.

Table 47. *Government infrastructure and support services*

Infrastructure	Ranchi	East Singhbhum	Godda	Palamu	Jharkhand state
Veterinary hospitals	49	21	16	19	424
Government run AI centres	143	51	24	101	651
BAIF's run AI centres	15	10	10	5	160
Livestock breeding farms	1 (pig)				6
Chilling plants	2			1	8
Dairy plants	1				8
Bulk milk coolers	3		1	1	14

Source: Report for 2007–08, Department of Animal Husbandry and Fisheries.

Currently the department is implementing dairy development projects in association with other organizations. For cattle development there is a two-pronged strategy. The short-term strategy is to introduce crossbred cattle while under the long-term plan they intend to strengthen the AI program. Although there are government run AI centres, the department has also engaged BAIF to deliver AI. By November 2008 BAIF had established 160 centres with plans to extend for a total of 310 within a year or two. Through BAIF the department has conducted 104 fertility camps and 4351 health check up camps during the last three years. Since 2006, in association with PRADAN and with financial support from the Tribal Welfare Commission (TWC), the department has been running a cattle induction program in tribal areas. Under the program tribal people are offered a package with a unit cost of INR 50,000 comprising two cows, a cow shed and working capital for feed and fodder.

Under a state-run program the department is supplying fodder seeds, mainly oats, Napier grass and maize to farmers (1 kg per household). However, because there is little or no monitoring, the utility of these fodder seeds is not known. Training on livestock management is also provided to farmers and unemployed youths, mainly at Pasupalan Vidyalaya, Hazaribagh and Farmers Training Centre, Ranchi.

The Dairy Development wing of the department has 8 chilling plants, 8 dairy plants and 14 bulk coolers, but the large majority are non-functioning or functioning far below their capacity. Now the department is entering into an agreement to run all its chilling and processing plants in association with the National Dairy Development Board (NDDB). An MOU has already been signed between the Dairy Development

Department and NDDDB to implement the Jharkhand Dairy Project with financial support from the Jharkhand Government. The program is being implemented in three phases over five years from June 2008. In the first year, the project will be implemented in Ranchi, Ramgarh, Hazaribagh and Lohardaga districts. In the second year it will be extended to Dumka, Godda, Deogarh and Girdhi districts and in the third year to Latehar, Garwah, Palamu and Chatra districts. The NDDDB team has already started its operation in Ranchi.

Under a centrally-sponsored scheme called Rastriya Krishi Vikash Yojana (RKVY), the department is going to implement goat development, poultry development and pig development schemes with a component of subsidy from the government.

There are three cattle breeding farms in Jharkhand, one each for the Red Sindhi and Haryana breeds and one bull mother farm. There is a goat breeding farm at Chatra, a pig breeding farm at Kanke and a buffalo breeding farm at Hotwav. These farms were reported to have about 123 Red Sindhi cattle, 140 Murrah buffalo, 96 Haryana, 418 goats and 2164 pigs, but the distribution of progeny to producers from these farms in each year is not known. Government sources said that there is a total requirement for about 1236 veterinary hospitals in the state, but currently there are only 424 (and even these are largely dysfunctional), leaving a gap of 812 hospitals. The Animal Husbandry and Fisheries Department proposes to construct 250 additional hospitals in the next 5 years but it was not clear how these would be staffed, resourced with operational funds or supervised.

5.1.2 Ranchi College of Veterinary Science and Animal Husbandry, BAU

The veterinary college has been very active and successful in developing and promoting a new breed of pig called T&D (a cross between Tamworth and Desi (indigenous) breeds under the All India Coordinated Research Project on Pigs (AICRP) sponsored by ICAR. University sources revealed that the new breed of pig has better growth performance (90–100 kg at 12 months) than indigenous breeds (30–40 kg), higher litter size (10–12 piglets), less skin diseases, shorter farrowing interval (about twice in a year). It is black in colour like the indigenous breed and its disease resistance characteristics are said to be almost the same as indigenous pigs. The university is successfully promoting the breed through a network of 16 Krishi Vigyan Kendras (KVKs) in Jharkhand as part of a project sponsored by the National Agricultural Innovation Project (NAIP) funded by World Bank and Government of India. Under this project KVKs are selecting progressive farmers and distributing a pig unit of 4 female and 1 male on the condition that they will return another 4 females and +1 male to the KVK after one year and the KVK then gives this new unit to another progressive farmers. In this way it was said that the KVKs have already covered almost 10,000 progressive farmers.

5.1.3 BAIF

BAIF is a non-profit making, public charitable trust established in 1976 with its headquarters at Urulikanchan, Maharashtra. It has long experience in livestock breeding, management and service delivery. The organization maintains an elite herd of Jersey, Holstein Friesian and some native Indian cattle breeds like Gir, Sahiwal, Tharparkar, Khillar and Murrah, Jafarbadi and Surti buffalo to produce superior bulls for semen collection. The semen collection centre of BAIF at Urulikanchan produces about 4.5 million doses of semen annually which partly meet the requirement of semen in many states of India.

BAIF started its operation in Jharkhand in October 2005. To date (November 2008) they have established 160 AI centres throughout the state. They are expanding the number of AI centres rapidly and in the year 2008–09 they are moving ahead to establish another 150 AI centres. BAIF's centres performed 55,000 AI over the 2.5 years (29,000 AI alone in 2007–08) in comparison to 38,000 AI by government-run 651 AI centres. Each BAIF AI centre performs nearly 60 inseminations per month and up until August 2008 about 12,000 calves had been born. BAIF is using semen from Jersey, Holstein–Friesian (HF), Sahiwal and Jersey × HF (cattle) and Murrah (buffalo) to inseminate cattle and buffalo in Jharkhand. Jersey semen

is mainly used for crossing with indigenous or crossbred cows while HF and Jersey × HF semen is used only for crossbred cows. Conception rate is reported to be 62% in cattle and 55% in buffalo. The cost for performing AI is INR 20 in indigenous cows and INR 40 in crossbred cows and buffalo. Along with the AI, BAIF also provide 2 kg of mineral mixture, free of cost with government support. When visiting BAIF's AI centres in Ranchi, East Singhbhum and Godda, it was apparent that the centres were performing well and that there was the scope for extension, and the willingness, to further improve the service.



Figure 18. A BAIF run AI centre in Godda.

5.1.4 National Dairy Development Board (NDDB)

The National Dairy Development Board was created in 1965 with its headquarters at Anand, Gujarat to promote, finance and support producer-owned and controlled organizations. NDDB's programs and activities seek to strengthen farmer cooperatives and support national policies that are favourable to the growth of such institutions. Fundamental to NDDB's efforts are cooperative principles and cooperative strategies. As mentioned in Section 5.1.1, NDDB is going to assume responsibility for the dairy processing infrastructure in Jharkhand from the government under a five-year project starting in June 2008. NDDB initially intends to establish milk routes through informal producers' institutions. They expect that 14–15 members in a village will come forward to deposit their produced milk in a common milk collection centre. The producers will be paid fortnightly directly to their bank account at the prevailing market price, based on two fat and SNF content. Subsequently, based on the strategic importance of sites, bulk milk coolers (BMC) will be installed throughout the milk route. Initially, the operational cost of BMCs will be borne by government under the project fund but subsequently efforts will be made to make it self-sustainable. The initial informal producers' institution will be transformed to village-level Milk Producers Institutions (MPIs) and a state-level producers company. In addition to NDDB which will provide institution building, training and extension services, the Jharkhand Dairy Project involves PRADAN and BAIF in the consortium. BAIF will provide AI services and veterinary support while PRADAN will facilitate community mobilization and NDDB will provide technical training, institution building support and take responsibility of establishing a system of milk collection, processing and marketing. Since the program has yet to start in the field in full swing, it is too early to comment on the program.

5.1.5 PRADAN

PRADAN (Professional Assistance for Development Action) is a national level NGO working in eight states in India. It promotes and strengthens livelihoods for rural poor through organizing them, enhancing their capabilities, introducing ways to improve their incomes and linking them to banks, markets and other social services. In Jharkhand, PRADAN is working on promotion of livelihood through agriculture and livestock (mainly through broiler and dairy farming). Currently, PRADAN has seven poultry cooperatives (at Khunti, East Singhbhum, Bokaro, Lohardaga and Kodarma) and two dairy cooperatives (Lohardaga and Godda), registered under the Jharkhand Cooperative Act. They also have a Poultry Producers Company at Hazaribagh, a Central Hatchery at Lohardaga and a feed plant. PRADAN's poultry cooperative at Potka Block of East Singhbhum district and dairy cooperative at Salliya were visited during this study. PRADAN is implementing poultry development with financial support from Special Central Assistance under the Tribal Welfare Commission (TWC) and the Sir Ratan Tata Trust (SRTT) under the Central India Initiative with the prototype prepared by PRADAN.

As an example of their poultry model, the Potka Gramin Poultry Sahayak Samity Ltd was established in 2005. Initially, a Chief Executive Officer (CEO) is appointed by PRADAN to look after the functioning of the cooperative and his salary and other expenses are borne by PRADAN until the cooperative become strong enough to support their own CEO trained by PRADAN. The cooperative society has 216 women poultry producer members. All the members are offered a broiler unit of 300–450 birds involving a unit cost of INR 60,000 of which INR 40,000 is extended as government subsidy and the remaining INR 20,000 as Bank Loan. The cooperative has a governing body and some full-time staff to manage the cooperative. The CEO reports to the governing body. The cooperative supplies all inputs to the producer members at their door step without receiving any cash and also takes the responsibility for marketing the finish broilers. The price of the broilers is fixed by the governing body of the cooperative for 15 days and payment is made to producer members based on a price index working out through giving due importance to labour efficiency (the per bird profit/fee paid to the producer member against his/her labour invested in management of the farm). Since the cooperative supplies all the required farm inputs and takes the responsibility of marketing the outputs, including taking the market risk, the costs of all inputs are deducted while they make payment to the producers. A strong monitoring and supervision system is built with IT-based information systems and peer pressure is used as a mechanism to prevent any irregularity amongst the group members. The turnover of PGPS in 2007–08 was reported as around INR 30 million with a profit of about INR 1.50 million which (profit) is utilized for running the CEO's office and his staff and to bear the losses resulted from the market fluctuation or other reasons in the off-season.

PRADAN is also promoting dairying in tribal areas with the financial assistance from Tribal Welfare Commission (TWC). For example, in Godda district they have 101 producer members and the target is to have 150 members. All members are offered one dairy unit comprising two crossbred cows with a unit cost of INR 50,000 including small expenses for construction of cattle shed, feed and transportation cost. Tribal people are being organized into Self Help Groups (SHGs) of 10–15 members and further 2 or 3 SHGs are organized into a Milk Producers Group (MPG) in a village. As per the plan, 2 or 3 MPGs will own a bulk milk cooler (BMC). At the moment, all the producers in the project area are using a single BMC of 1000 litres capacity which handles 600–700 litres of milk per day. Currently PRADAN is covering its operation expenses which come to about INR 27,000 per month. The costs are high partly because of the need to constantly run the BMC on a generator (there is no power supply) and the difficulty in supplying it to the Deogarh Dairy Federation because of nonfunctioning of the dairy plant. Currently PRADAN is paying the producers the same price at which they are selling the milk which raises the question of the scheme's long-term sustainability.



Figure 19. A tribal lady supported by PRADAN for cattle rearing in Godda.

Visiting the poultry cooperatives in East Singhbhum district it was felt that PRADAN has done an excellent job by demonstrating a successful model of broiler farming and this perhaps could be replicated outside Jharkhand. Visiting the Dairy Cooperatives, it was obvious that promoting dairy amongst the tribal communities may be a difficult proposition and, ideally, the site of the bulk cooler should have had an electricity supply. Moreover, the sustainability of the project is questionable unless a mechanism is developed to generate adequate revenue for running the BMC and the other project components, including service delivery.

5.1.6 BASIX

BASIX is a livelihood promotion institution established in 1996 with its headquarters in Hyderabad, working with over a million and a half customers in 15 states of India. BASIX's strategy is to provide under one umbrella a comprehensive set of livelihood promotion services to rural poor households. The Holding Company of the BASIX Group is called Bhartiya Samruddhi Investments and Consulting Services (BASICS Ltd.). The BASIX group of companies includes Indian Gramin Services (IGS), Bharatiya Sambridhi Finance Ltd. (BSFL), Non Banking Finance Company (NBFC), The Livelihood School and several others. BASIX adopts a 'triad' approach to development comprising Institutional Development Services (IDS), Livelihood Financial Services (LFS) and Agri-Business Development Services (AgBDS). It provides a whole range of Agricultural/Business Development Services including productivity enhancement, risk mitigation, local value addition, and market linkages. In Jharkhand it is extending agribusiness services, finance and insurance to producers for commercial dairy farming in Ranchi, East Singhbhum, Godda and a few other districts. The project is partly sponsored by the Sir Ratan Tata Trust (SRTT) under the Central India Initiative. For example, in Kanke block in Ranchi BASIX has been implementing a project in 8 villages covering 350 beneficiaries for the last 3 years. While SRTT gave a broad outline for implementation of the project, BASIX prepare the detail work plan. Towards this end it follows a process to identify the activities, village and beneficiaries, mainly in potential areas where community members are generally capable of rearing crossbred cattle. They offer microcredit of INR 15,000 for purchasing a crossbred cow with an interest rate of 2% per month for a loan repayment period of 2 years. Recipients provide cash security of 10% which is refundable in addition to 3% processing fee. Loan recovery rate is almost 95%. As informed, they find some problem in getting the repayment during the dry period of

cows when income from cows does not flow. However, the producers having an alternative source of livelihood can still continue repayment by diverting money from other sources of income. Producers say they are not facing any problems in management of the high yielding cows as they have the traditional knowledge and skills in cattle husbandry and there is a ready market for milk. Many of them are very keen to take further loans from BASIX in order to increase the herd size.

BASIX also offer insurance services to cover the risk from animals of 2–10 years of age with little variation for buffalo, bull or bullock. The premium is 3.9% of the insured amount to cover death with an additional INR 112 as service tax. False claims are not a problem as their staff visit the animal immediately after getting the report of death of the animal.

In addition to credit and insurance services, BASIX also offer Agricultural Business Development Services that include fortnightly visits to the producers' households by BASIX's Livestock Service Providers (LSP), vaccinating the animal against FMD, HS and BQ and providing deworming drugs. They also advise the producers on cultivation of fodder crops including Napier, Sudan, Azola etc. These services cost the producers INR 450 per year including service tax.

It was clear from visiting the project site in Kanke that the project benefited from being implemented in a peri-urban area (i.e. close to a good market for the milk) and from having identified traditional dairy farmers as the beneficiaries. By offering a two-cow dairy unit instead of a one-cow unit, loan recovery rates could improve through minimizing periods with no cow lactating.

5.1.7 Tagore Society for Rural Development (TSRD)

TSRD was established in 1969 to transform Tagore's philosophy of rural development and Gandhi's development doctrine into something implementable. TSRD has been implementing livelihood improvement programs through the livestock sector since 1994 in Jharkhand. They have several rounds of program in Patanda block of East Singhbhum district.

- a. Preventive and curative treatment of cattle, buffalo and other livestock: these include deworming drugs, vitamins and vaccinations against prevailing diseases. To provide curative treatment services they imparted one month training to 40 local youths called 'Veterinary Custom Service Boys' followed by refresher training. Initially, their salary was borne by TSRD, but gradually within 10 years the cost has been shifted completely to farmers. Custom boys treat animals under the supervision of a government veterinary doctor.
- b. For breed improvement they distributed bucks of the Jamunapari breed of goat with 75% subsidy. Owners then charged INR 10 per service. Interviewed beneficiaries reported that the prescribed fee was not remunerative for them and therefore many of the buck owners are not interested in rearing replacement stock. The progeny born out of crossing with Jamunapari was found to be good. A similar scheme was introduced with Large White and Yorkshire boars, again with 75% subsidy but because of lack of any incentive scheme for the boar rearer, the program was not sustainable. Initially they also introduced an AI service in cattle, but because of high operational costs it has been stopped.
- c. A micro-credit scheme was introduced with its own fund or with funds from CAPART (an autonomous body under Ministry of Rural Development, Government of India assisting more than 12,000 NGOs across the country for implementing development projects) for rearing goats (10 female and 1 male in one unit). The program went well.
- d. Promotion of fodder cultivation through distributing fodder seeds and cuttings of Stylosanthes, Napier grass etc. but the scheme was not successful as the farmers were not very interested in fodder cultivation.

It was apparent that the Tagore Society for Rural Development was doing excellent, innovative work through projects that would benefit from incentive schemes based on profit from the investments in livestock and other services.

5.1.8 Integrated broiler farming by Amrit

Amrit, a Kolkata based poultry company, has been implementing sporadically contract farming of broilers in a few areas of Jharkhand. In East Singhbhum district they are implementing the project in Sarjondih and Sonari. They support farmers to start broiler farms with 1000 to 1700 birds. As per the agreement, Amrit supplies all the required chicks, feed, medicine and vaccines while the producers bear the cost for construction of the house, labour and the bedding material (paddy husk). The company collects the broilers at 2 kg of weight and the farmers are paid INR 2.70/kg against their labour and other investments. The price to farmers is fixed in advance and remains the same throughout the year (irrespective of the season), so the market risks are borne by the integrator. Nevertheless, in the summer months the integrator provides fewer chicks because of poor market demand and higher mortality because of higher environmental temperature. The integrator is not concerned about the Feed Conversion Ratio (FCR), although farmers are more concerned because increasing FCR increases the number of batches that can be reared. Producers are currently achieving a FCR of 1.8 to 1.9 which they expect to decrease. Weight gain is about 1.5 kg in 33 days or 2 kg in 38 days. Producers complain that they made less profit than their fellow farmers who directly sold their produce to retailers especially during the winter (but they did not mention the higher profit they earned than their fellow farmers during off season). The company representative complains that many producers sell the feed or broilers without their notice.

There appears to be a lack of staff to supervise and monitor the producers, but perhaps recruiting more people may not be economical to the company. Since the producers are not organized in any form and the company is building relation with individual producer, there is no peer group pressure, making the program less accountable and irresponsive.

5.2 Policy and regulatory environment

As yet, the livestock sector in Jharkhand lacks an overall development policy. Nor are there specific policy briefs to address, e.g. the issues related to livestock breeding, although unofficial sources suggested that the Jharkhand government has constituted a 'Gow Sewa Ayoag' (Cattle Service Commission) to formulate breeding policy for the state. However the current status of the commission was not known.

Given the growing demand for livestock and livestock products and the sector's potential for the alleviation of poverty and employment generation, there is some urgency to develop a comprehensive policy for livestock development capable of guiding public and private investments. For the policy to be an effective roadmap, it should be developed through a participatory process involving all key stakeholders in the livestock sector—from producers through to consumers—and the agencies that serve them. The process will require strong political commitment and the leadership of an effective champion.

When in place the policy will require material political backing through budgetary allocations sufficient to resource the key programs and to develop the supportive policy and regulatory environment essential for stimulating private investment by individuals, households, SHGs and other collective action groups and small, medium and large companies. In turn the policy will need underpinning by regulations and the public resources for their effective implementation.

One regulation that was referred to earlier in this report is the 'Jharkhand Govanshi Pasu Pratished Act, 2005' under which slaughter of cattle in the state is prohibited. And there are regulations framed by the Central Government which are applicable currently in Jharkhand. These include:

- Livestock Importation Act, 1898 (Amendment Ordinance 2001): Under this Act the Central Government regulates, restricts or prohibits the import of livestock from foreign countries in such a manner or to such an extent, as it may deem fit to the territories to which this Act extends. The amendment of the Act in 2001 was made to regulate the import of livestock products in such a manner that these imports do not adversely affect the human and animal health population. This act may affect the importation of livestock breeding stock from abroad (but India is not doing strongly in promoting the livestock breeding stock). However, the current government of India policy regarding importation from abroad is not clear;
- Transport of livestock by rail or road: A valid health certificate from a veterinarian is required. Besides, there are specific instructions for the provision of food and water, first aid, floor space and covering etc. In practice, on many occasions, transporters do not carry a health certificate and violate the specified norms, resulting in rent-seeking by the police (see section 3.2).
- The Prevention of Cruelty to Animals (Transport of Animals on Foot), Rules 2001: For transportation of animals on foot, a valid certificate of the health of the animals is required and specific conditions covering feeding and watering arrangements, the maximum distance covered per day, transportation time, period of rest etc, should be met. But, again in practice, implementation of this act is limited.
- Breeding and Experiments on Animals (Control and Supervision) Rules, 1998 (as amended up to February 2001) under which no establishment shall carry on the business of breeding of, or trade in, animals for the purpose of experiments unless it is registered. Also, a breeder shall not transfer any animals to an unregistered establishment.

A key element critical to the success of a livestock policy will be the better networking of the public and private sector actors contributing to developing and implementing the overall policy and its components.

5.3 Institutional linkages

A number of stakeholders in the livestock sector in the four surveyed districts indicated that there is some level of cooperation between the NGOs like PRADAN and BASIX and also between the Department of Animal Husbandry and Fisheries, NDDDB and BAIF especially under programs sponsored by the government. However, coordination between government departments and the Birsa Agricultural University appears weak. Although the university is carrying out a range of research projects, the results are not communicated to the Animal Husbandry and Fisheries Department and similarly, the field problems faced by the department are not communicated to the university or other agencies that might be able to provide help and support. The linkages between the department and NGOs are also understood to be poor except some joint initiatives with a few major NGOs like PRADAN and BAIF. Lacking is a common forum to address the problems faced by livestock keepers collectively.

5.4 Entry barriers for livestock sector development

There are a number of barriers which may prevent rural people investing in the livestock sector. The barriers are almost common across the surveyed districts. These can be summarized as follows:

- Inadequate knowledge, motivation, skill and confidence to invest on commercial livestock farming.
- Poor financial resources and lack of interest of the commercial banks to finance livestock activities.
- Fears about the exploitation and/or corruption in government system;
- Prevailing perceptions of young people that more can be earned and more quickly in activities other than livestock.
- Traditional beliefs and practices including food habits determining the choice of livestock.
- Resistance to adopt new practices.
- Poor access to inputs and to markets.
- Social insecurity and conflicts within society.
- Lack of entrepreneurship.
- Lack of cooperation.

5.5 Research and information gaps

This study was designed to provide a broad overview of the livestock sector in Jharkhand. It was undertaken using rapid appraisal techniques, consistent with the available time and resources. It brings together wide-ranging information drawn from primary and secondary sources to inform its readers about the current population of livestock in Jharkhand, its production and marketing, and recent and prospective trends within the sector. By design it provides indicative, not definitive, conclusions and recommendations some of which are related to information gaps and the need for research.

These information and research gaps include:

- The Livestock Census report and primary field data show that there has been a significant reduction in indigenous cattle, buffalo and goat numbers from 1997 to 2003. The reasons for this are not clear and a well-designed sample survey of livestock keepers and ex-livestock keepers is needed to understand the underlying reasons and to highlight current and prospective trends.
- Identification of the livestock breeds, their distribution in the state and an evaluation of their performance, including adaptive traits, would provide baseline information contributing to the development of a livestock breeding policy for Jharkhand.
- Apart from the commercial poultry sector, feeding systems are based on locally available resources. Better information is needed on the nutrient content of these feedstuffs and how they may best be combined and supplemented to achieve efficient utilization at minimum cost (including that of household labour). For example, identification of any mineral and vitamin deficiencies suffered by livestock would allow the formulation of appropriate supplements.
- Identification of common livestock diseases in Jharkhand through confirmatory diagnosis, the magnitude of economic loss caused by them, conventional treatments used by the villagers (using herbs and others) and their medicinal value need to be ascertained as the basis for the design of community-based disease surveillance and preventive programs and mechanisms.
- Current livestock development programs implemented by both government and non-government agencies are not being critically evaluated. Evaluation of these programs is important to understand the factors contributing to success or failure and to help, through learning from these lessons, in designing more effective intervention programs both inside and outside Jharkhand.
- A more detailed study of the demand–supply scenario for livestock products is needed through a quantitative study to confirm the qualitative assessment in this report.
- More in-depth studies of the whole value chain for different livestock products are required to identify key points for technical, institutional and policy interventions (including those related to public health) and for guiding public and private investments.
- The policy environment in other states can be evaluated to assess opportunities for their possible impacts in Jharkhand and to support the development of a livestock policy for the state.

6 Recommendations and conclusion

Chapters 2 to 5 described and analysed the livestock sector in Jharkhand in relation to the state's geography and economy, the consumers of livestock products and how livestock and their products are produced and marketed. In this final chapter the major issues related to the production and marketing of livestock in Jharkhand and how they affect livelihoods, particularly of the poor, are highlighted and recommendations are given for addressing these constraints to, and opportunities for, the alleviation of poverty and the generation of employment. Finally some broad conclusions are given.

The study demonstrates the huge potential for the further development of the livestock sector in Jharkhand and the opportunities for its contribution to rural development, poverty reduction and employment generation. It also highlights the need for an integrated and holistic approach to livestock development tailored to the needs of different communities and products. Having said this in order to bring some structure to the discussion the main recommendations are grouped into general issues, marketing, production, and policy and institutions. Inevitably some of these recommendations are generic in nature—the study deals with a number of livestock products across the state and the specific interventions that are applicable for any given context need to be determined only after detailed consideration of the particular value chain.

6.1 General issues

To date livestock development activities in Jharkhand have concentrated mainly on the dairy and poultry sectors with only very limited attempts to improve other sectors. Future livestock development programs in the state need to be considered from the perspectives of both livelihood promotion and employment generation and each requires a different approach. There is still a lot of scope for commercialization of the dairy sector to meet the demand for milk. There are already larger scale producers supplying milk to urban areas who have the required skills and resources to expand their businesses and create employment in milk production. One study (Staal et al. 2008) has shown that for every 1000 litres of milk produced per day in India 230 to 17 jobs are created in milk production (the larger the operation the fewer people employed). The numbers employed in milk marketing are also high: 1000 litres of milk handled per day through the informal sector employs 10.6 vendors (Staal et al. 2008). When milk is processed the employment is even higher, for example, 1000 litres of milk converted to ice cream created 16 jobs.

Recommendation 1: *Continued development of the dairy sector in Jharkhand has the potential to create significant employment and should be encouraged but needs to be targeted to people with the resources to invest and the skills required for commercial dairy production.*

Some of the most marginalized communities do not have the skills nor resources to undertake dairying but goats and pigs offer a lot of potential for livelihood improvement. The local demand for pork is high and the demand for goats for export out of Jharkhand is high. Both these species have the advantage of requiring less investment than dairying and require fewer inputs. Many communities already have the basic skills needed for rearing these species and incremental improvements in productivity and marketing are possible.

Recommendation 2: *Attention should be given to the opportunities for livelihood improvement through pig and goat development. This is especially relevant to some of the more marginalized communities, e.g. tribal communities who keep pigs and communities in districts with the potential to rear goats for export.*

Any livestock development strategy in Jharkhand will have to be ethnic and location specific. Many general recommendations for the whole state may not be appropriate. This study suggests that in urban and peri-urban areas, high yielding cattle and buffalo are appropriate for some ethnic groups like Yadav,

Mahato, Muslims etc. Introducing high yielding cattle in remote rural areas or to tribal communities who have no history of milk production or lack the required physical resources and management knowledge may not be appropriate. Incremental improvements in existing systems of goat rearing may be suitable in the areas having plenty of forest and grazing land. Pig rearing may be more appropriate for tribal households while poultry may be suitable for many groups.

Recommendation 3: *Livestock development programs should be ethnic- and location-specific. Any livestock development program should aim to build on existing skills and resources and be incremental, giving sufficient scope for motivation, awareness building and skill development and to understand the actual objective of the initiatives. This should be done through adopting extensive participatory approaches.*

Livestock development programs require to be implemented in an integrated and holistic manner.

Recommendation 4: *Livestock development should be implemented on a cluster basis in order to establish a system for input delivery, technical support and output marketing services in a cost-effective manner. The services should essentially be affordable, accessible and demand driven and may be led by any competent organization, e.g. NGO, community level organization, private service providers or government. However, veterinary services need to be linked to government services to provide both technical backstopping and linkages to wider animal health programs.*

6.2 Marketing

The demand in Jharkhand, as in other parts of India, for all the livestock products including milk, mutton, pork, chicken, beef and eggs is increasing rapidly with the growth in income and employment. The growth in demand for milk, chicken and pork in particular are high, possibly because of an initial low consumption base and gradual change in food habits. For mutton and eggs the market is almost static or growing slowly perhaps because of a higher consumption base and in the case of mutton, price increases over the past few years. However, there is a very buoyant and increasing export market outside the state for goats.

Generally, producers felt that they did not face any major problems in selling their products, but this does not mean that there are not opportunities to improve the efficiency of specific market chains. Information from traders highlights areas where markets could be made to operate more effectively to the benefit of producers, traders and consumers and some of these are highlighted later in this section.

This appraisal study has provided some initial information on the preferences of different categories of consumers in Jharkhand for different livestock products and gives a starting point for developing a market-oriented livestock development program. However, there is a need to better define the current and future size of the market for different products and consumer preferences in terms of taste, appearance, composition etc. This information will provide a sound evidence base for public and private investment in the livestock sector.

Recommendation 5: *A study of consumer preferences and current and future market demand for different livestock products should be conducted to provide sound basis for decision-making on investment in the livestock sector.*

Live animal markets lack basic infrastructure such as sheds, reliable potable water supplies, toilets, drainage, weighing balances etc.

Recommendation 6: *The government should as a priority put in place minimum infrastructure in live animal markets.*

There is no functional slaughterhouse in the state making the anti-mortem and post-mortem inspection of meat difficult.

Recommendation 7: *Simple slaughter facilities need to be created with good drainage, a reliable and safe water supply and electricity. It may not be necessary to provide sophisticated slaughterhouses. The new rural slaughterhouse scheme soon to be introduced by the Department of Animal Husbandry, Dairy and Fisheries of the Government of India, might provide resources for slaughter facilities.*

Livestock product marketing is mainly carried out through informal markets with poor hygiene and without following food safety standards posing risks for human health. The lack of organized slaughter facilities in Jharkhand for slaughtering any livestock species, makes the anti-mortem and post-mortem inspection of meat difficult. Existing regulations related to slaughtering and selling of meat, proper drainage system and prohibition of slaughtering practices near the shops are not followed by the large majority of meat sellers. Municipal corporations/councils have grossly inadequate staff and are starved of resources for mobility to monitor slaughtering and selling practices. There is a need to improve the food safety of livestock products. With livestock product consumption rising and the number of market participants between producer and consumers increasing, the risks to public health from unhygienic practices are growing.

Recommendation 8: *There is a need to assess the risks along the production to consumption value chain for livestock products to systematically analyse the practices of producers, wholesalers, transporters, retailers and consumers and identify the intervention points to reduce the risks to public health. The evaluation should assess the requirements for improved infrastructure, identify the critical control points and should assess the training need of the actors involved in the whole supply chain. Accordingly, training on hygienic handling, transportation and selling of livestock products may be organized for the actors. In the long term and with appropriate support, the trained actors can organize themselves, create brands and develop self certification process (certified by the relevant authorities) to ensure the quality of the products.*

Retailers and consumers reported that the market for meat is almost exclusively for fresh meat: the sale of processed meat is negligible.

Recommendation 9: *There is no justification for any public investment to support the processing of meat beyond the recommendations of constructing simple slaughter facilities with proper drainage system, water and electricity.*

Distinct seasonal patterns of demand and price fluctuation and price variations associated with festivals create both problems and opportunities for livestock producers. On the one hand high prices associated with increased demand during some festivals creates opportunities for increased income, but small-scale producers find it very difficult to organize marketing of their animals at these specific times. This requires the ability to keep animals until specific dates, when the reality for many livestock keepers is that they need to sell animals when the household needs cash and they may not have sufficient feed available to keep animals until prices are high.

Recommendation 10: *Options for designing marketing systems that allow producers to take advantage of high prices need to be explored, including cost–benefit analyses of the different options. These systems will have to include micro-credit products suitable to allow producers to keep animals until the optimum time of sale, design of cost effective feeding practices and effective linkages to traders. These schemes will be effective only if producers can be organized for collective action. A system for providing market price information and seasonal demand is a pre-requisite. One model of collective action is for where price fluctuations are absorbed by a producer group or cooperative as in the successful PRADAN poultry cooperatives. Opportunities for out-scaling this model should be explored.*

Traders in livestock complain that police harassment and rent seeking during transportation of livestock is a major problem faced by the traders.

Recommendation 11: *The Government of Jharkhand should devise and implement an awareness creation program to highlight this problem. This needs to involve all participants in the market chain: producers, traders, officials from the Police Department, Transport Department, and Animal Husbandry and Fisheries Department.*

Disturbances from the Naxalites are also reported to disrupt the activities and businesses of traders but solutions to this are beyond the scope of this report

6.3 Production issues

6.3.1 Breed improvement

Breed improvement programs in Jharkhand need to take account of the following:

More than 95% of the livestock in Jharkhand are non-descript indigenous breeds. Cattle and buffalo are kept for draught power, fuel and fertilizer and only in some cases for earning cash through selling milk. For many households with indigenous cattle and buffalo, milk production is not an important production objective. Goats are reared by many households for earning cash and pigs are kept, especially by tribal communities, for both selling and for supplying meat to the household. Chickens are kept by many households mainly for subsistence purposes.

The numbers of indigenous cattle decreased by 30% between 1997 and 2004 and the modest increase in crossbred cattle did not compensate, so total cattle numbers decreased by 25%. Even although buffalo numbers increased total bovine numbers fell from 30.4 to 25.4 million.

Recommendation 12: *A detailed study needs to be undertaken into the reasons for the large decrease in bovines, especially indigenous cattle.*

The low numbers of crossbred cattle coupled with the high demand for milk suggests that there is considerable scope for increasing the provision of AI services. The services provided by BAIF appear to be more effective than those provided by the government.

Recommendation 13: *Following a review of the BAIF services the government should consider extending the provision of AI services through BAIF in areas with a high potential for milk production, linked to market development initiatives. Opportunities for cost recovery need to be explored.*

Improved cattle can also be imported into the state, as is already happening. However, this is likely to be most successful if they are procured from similar agro-climatic zones.

Recommendation 14: *If high producing cattle are imported into the state they should be sourced from a similar agro-climatic zone.*

The Black Bengal goat is understood to be the preferred breed and is already prevalent in many areas. Therefore, in most cases breed improvement is not a high priority. However, there is scope for introducing improved bucks in some areas. Where this is the case this needs to be done in a sustainable way.

Recommendation 15: *Improved bucks can be introduced into selected areas but only where there is likely to be a clear market benefit. In such cases the program must be sustainable by recouping the costs from the producers.*

There is considerable scope for pig breed improvement as evidenced by the success of the T&D breed.

Recommendation 16: *Pig breed improvement programs should be developed in a participatory manner to ensure that the breeds/crossbreeds are of types preferred by the beneficiaries. These programs need to be linked to animal health care, feeding programs and training to upgrade management skills.*

6.3.2 Feeding

The major factors limiting the scale and efficiency of livestock production are the limited quantity and quality of locally available feed resources, which are mainly provided from the household's crop by-products, and the lack of knowledge about how they can be best combined to improve production. Cultivation of fodder is not a popular practice in Jharkhand, probably because the scope for cultivation of fodder is limited due to the small size of land holdings, scarcity of water, undulating topography, and little or no awareness or motivation towards fodder cultivation.

Past experience and recent research (Hall et al. 2007) showed that improvement of feed supply is a complex issue. The inter-dependencies between a household's cropping system and livestock mean that changes in crop production, e.g. growing a short-, rather than a long-straw rice variety, will influence the availability of livestock feed and the production attained from the livestock, and vice versa, e.g. sacrificing rice land for growing a planted forage like Napier Grass will reduce the household's rice supply. Changes like these will also impact on the allocation of household labour.

Recommendation 17: *When designing livestock feeding intervention programs for resource-poor rural households, we need to take into account the inter-dependencies of crops, common property resources, and labour and water availability. This necessitates that any new feeding strategies need to be developed using participatory methods. Feeding regimes need to be developed to make optimal use of locally available feed resources.*

Provision of additional fodder involves much more than the technical aspects of feed production. Mere distribution of fodder seed or planting material will not serve the purpose. Hall et al. (2007) has demonstrated how concerted efforts among a range of actors are needed, including researchers, government agencies, NGOs, private companies and the beneficiaries.

Recommendation 18: *Any feeding interventions need to be planned carefully involving all relevant stakeholders.*

Forests and common property resources provide valuable feed resources for livestock.

Recommendation 19: *Opportunities for enhancing feed supply from forest and common property resources need to be explored. That could include development of agro-forestry systems, including multi-layered systems with grasses, legumes, fodder shrubs and trees.*

Pig feeding systems need to be developed which make optimal use of locally produced feed resources.

Recommendation 20: *To improve feeding practices for pigs, intercropping of maize, sweet potato, tapioca, colocasia in small backyard plots could be tested using participatory approaches. These food-feed crops may be promoted with the twin objectives of using the tubers as human feed and leaves as fodder.*

6.3.3 Health care

Disease is the major cause of production loss and deaths of animals. However, there is poor veterinary infrastructure, inadequate manpower, poor supply of medicines and vaccines to government hospitals. An

effective, accountable and affordable veterinary service delivery system is desperately needed. Diseases such as FMD in cattle and buffalo, PPR in goats, swine fever in pigs and Ranikhet's Disease in poultry are all viral diseases and therefore vaccination is the only solution.

Recommendation 21: *An organized concerted effort is needed to put in place an affordable, accessible and easily available veterinary service delivery system through client-oriented staff trained extensively on treatment and control of diseases and extension services. Many of the services can be provided by para-vets providing a paid service under the guidance of government or private veterinarians. Para-vets can supply deworming drugs, vaccinate animals against prevailing diseases, undertake disease surveillance and provide extension services and advice to producers. In order to make the system self sustainable, quality and accountability of the services have to be incorporated.*

Recommendation 22: *Investment in the government veterinary hospitals is a priority area. Hospitals need to be re-furbished, equipment supplied (with adequate budgets for maintenance) and supplied of drugs ensured. Regular refreshment training of government veterinarians needs to be provided.*

6.4 Policy and institutions

Livestock producers lack access to technical information, reflecting the ineffectiveness of the publicly-funded production and veterinary extension services. Some NGOs programs are providing or facilitating access to input services and supplies, including extension advice and business development services.

Recommendation 23: *Innovative, community-based programs to support livestock development that use participatory methods implemented by staff oriented towards the needs of the beneficiaries are required. This approach will require a mindset change by government officials, an increased role for NGOs and can build upon local social infrastructure.*

Poor coordination amongst the government departments, universities, NGOs, banks, other financial institutions and insurance companies are hindering the development of the livestock sector and efficient utilization of technical knowledge and resources (financial and physical).

Recommendation 24: *A common platform should be constituted, facilitated by the government of key stakeholders in the livestock sector. This should include the Animal Husbandry and Fisheries Department, Ranchi College of Animal Husbandry and Veterinary, Krishi Vigyan Kendra, banks, insurance companies, NDDDB, and NGOs involved in livestock development such as BAIF, PRADAN and BASIX. The purpose would be to periodically exchange information on activities and experiences and to identify areas for better cooperation and coordination. The group could also identify knowledge gaps to be addressed through research.*

Recommendation 25: *In the long-term the member of the platform may consider forming a coordination group to draft a state livestock development policy and the strategy for its implementation. The policy would need to acknowledge the dynamics of the sector, recognize the changing nature and structure of demand for livestock products, and, seek to build upon Jharkhand's comparative and competitive advantages in support of poverty alleviation and the generation of employment through livestock.*

Given the prevalence of poverty in Jharkhand, lack of operating capital and limited credit facilities are a constraint to development of livestock. Both livestock producers and traders suffer from lack of available credit. While producers need long-term credit, traders require only short-term credit.

Recommendation 26: *It is recommended that credit should be available on terms that are suitable for the purpose that the credit will be used for. For livestock producers it is important that individuals can achieve incremental changes in their production systems. Micro credit schemes managed by NGOs may be a viable way forward. Capacity building of smaller NGOs on project appraisal and financial*

management would be a first step towards their playing an intermediate role in money lending. Since resource-poor rural farmers are risk-averse, group insurance schemes could be made available along with the credit. Technical extension and business advice should be integrated with these financial services to achieve increased scale and productivity of livestock.

6.5 Summary and conclusion

In Jharkhand, as in the region, livestock keeping is integral to the livelihoods of rural households and to the broad rural economy. The field surveys found that 90% or more households kept livestock (Table 35); the households said that the contribution of livestock to their livelihood varied from 20–60% depending on the species and the income level of the household (Table 11). The livelihoods of the large majority of these rural households are based in smallholder rainfed crop–livestock farming—mainly rice cropping with livestock—and the majority of the farms have less than 1 ha of land. The household land is associated with extensive common property resources (CPR), mainly forests, and the focus of these resource-poor households was ensuring their short-term food security while sacrificing long-term goals like the conservation of natural resources and avoiding risk-taking. On their small farms, as well as growing their food crops, these households keep small numbers of livestock (Table 37). Few external inputs were purchased for the crops or for the livestock. These are traditional risk-averse low-input, low-output systems in which crop residues and CPR are the major sources of feed and fodder for the livestock. Livestock complement the growing of the subsistence food crops, mainly rice and some maize: cattle and buffalo provide draught power for land preparation and transport and, along with the other livestock kept by the household, serve as household savings and insurance. The food crops, in turn, produce crop residues (mainly straws) and by-products (e.g. rice polishings and maize bran) which serve as livestock feeds. Any production surpluses from the livestock, e.g. milk and occasionally animals that are sold for slaughter, provide cash income. Wage labour and petty trading are other sources of livelihood (Table 7).

Adaptations of traditional management practices to accommodate more productive genotypes for milk and pork production have allowed households to respond to the increasing markets for milk and pork for which Jharkhand has significant deficits (Tables 15, 17 and 27). Meanwhile much of the state's large deficit for chicken meat and eggs (Tables 16 and 18) has been met by the competitively priced imports from commercial broiler and layer units in West Bengal and other states. On the other hand the appraisal's surveys (Table 15) confirmed that Jharkhand has comparative and competitive advantages for producing mutton such that the state exports many thousands of goats for slaughter as far away as Punjab. And a similar scenario applies to the export of cattle for slaughter (Tables 19 and 27) with, it appears, Bangladesh as a principal market (Hussain 2009).

The field surveys showed that livestock keepers had no (or little) difficulty in selling their livestock or livestock products (Chapter 3), that their estimated share of retail prices was good (Table 25) and that the growth in demand for chicken meat and eggs and for pork were particularly good, while goats were said by producers to be the most profitable (Table 27). By contrast the market estimates for milk were less strong (Table 27). Taking into account these market indicators and the relative requirements for capital and risk-taking of these livestock enterprises, it would seem that there are good opportunities for developing interventions to give incremental improvements in production and marketing for current resource-poor keepers of goats and of pigs. Improving the availability and utilization of feed is expected to be a major entry point for increasing the scale and the efficiency of production.

The appraisal field surveys found that the large majority of households, kept at least one, and generally more, species of livestock: cattle, goats and poultry (chicken) were the most common and indigenous types predominated (Tables 35 and 40). However, communities like the Yadav, Mahato, and Manjhi traditionally rear high-yielding (dairy crossbred) cattle for milk production, while others favoured dairy

buffalo. In the same way, tribal communities favoured piggery, so concentrations of pig production are associated with these communities, such that in Ranchi district an estimated 50% of households and in Godda district 25% of households were keeping pigs (Table 35). In contrast to the populations of other livestock species in which 95% or more were indigenous types, an estimated 30% of the pigs were exotic crosses (Table 40). This reflected the market orientation of backyard pig keeping, over 90% of which was dedicated to the fattening of purchased piglets for sale as slaughter pigs to earn cash income. In common with the adoption of stall-feeding by the specialist dairy producers, an increasing proportion of the pigs that were being fattened were being kept in a pen or were tethered (Table 36).

The appraisal field studies confirmed that government veterinary and related services do not meet smallholders' needs (Section 4.9 and Tables 45 and 46). As a result, livestock diseases are a major risk factor endangering the livestock assets of these resource-poor households. These risks also inhibit the adoption of more productive genotypes. Current NGOs' programs in Jharkhand are addressing some of these issues through their delivery of animal health care services, including the training of paravets. The appraisal studies show that a priority for these efforts to reduce risks to livestock health and production losses should be the effective delivery of vaccines to control the major epidemic diseases: FMD (cattle and pigs), PPR (goats), swine fever (pigs), and Raniket's Disease and Newcastle Disease (chickens). Developing a sustainable delivery mechanism that covers the key production areas for each species based on systematic epidemiological studies, should be the aim.

In Chapter 5 the lack of a livestock development policy for the state was highlighted. Its absence is limiting government's ability to provide well-targeted support to the livestock sector and to exploit the sector's considerable potential for contributing to poverty alleviation and employment generation. This appraisal report is a good step forward in bringing together the information about Jharkhand's livestock sector and its key stakeholders. The report also serves to highlight the need for better coordination of the efforts of the various public and NGO agencies and the private sector and for more evidence-based investments. An important next step would therefore be the formation of a coordination group to draft a state livestock development policy and the strategy for its implementation. The policy should acknowledge the dynamics of the sector; recognize the changing nature and structure of demand for livestock products; and seek to build upon Jharkhand's comparative and competitive advantages in support of poverty alleviation and employment generation through livestock.

In conclusion, therefore, this rapid appraisal of Jharkhand's livestock sector has confirmed the importance of livestock in the livelihoods of the state's millions of poor households and it has highlighted the growing demand for livestock products, both within the local market and from the region. This increasing demand represents an excellent opportunity for improving the livelihoods of poor livestock keepers provided that they are given effective support by the development agencies and through the engagement of the private sector. Market-led interventions developed through participatory processes will be the key to success.

Bibliography

- Anil, S.S. and Pushkaran, P.S. 1993. The knowledge level of dairy farmers about practices in dairying. *Indian Journal of Animal Production and Management*. 9: 97-100.
- DAHf (Department of Animal Husbandry and Fishery). 2007-08. Annual Report 2007-08. Department of Animal Husbandry and Fisheries, Government of Jharkhand, India.
- Das, K.S., Srivastava, B.B. and Das, N. 1999. A study of goat marketing system prevalent in two animal markets around Bareilly city. *Indian Journal of Animal Management*. 15:146-149.
- Deka, R., Thorpe, W., Lapar, L. and Kumar, A. 2008. Assam's pig sub-sector: Current status, constraints and opportunities. Project Report. Nairobi, Kenya, ILRI.
- Directorate of Agriculture. 2006. Birsa Kishan Dairy. Directorate of Agriculture, Government of Jharkhand, India.
- Directorate of Extension Education. (no date). District profile of Jharkhand. Birsa Agricultural University, Ranchi, India.
- Directorate of Statistics and Evaluation. 2006. Jharkhand: A statistical profile 2006. Directorate of Statistics and Evaluation, Govt. of Jharkhand, India.
- Gupta, J.J., Bordoloi, R.K., Reddy, P.B., Bujarbaruah, K.M. and Das, A. 2006. Performance of crossbred pigs fed on raw and boiled sweet potato tuber at various levels at different stages of growth. *Indian Journal of Animal Science*.
- Hussain, D. 2009. Border rustling. *Himal South Asian*. http://www.himalmag.com/Border-rustling_nw2828.html
- Jharkhand Road Atlas and Distance Guide. 2008. IMS Publication, Jodhpur, India.
- Jharkhand Online. <http://jharkhandonline.in/Profile/Data/>
- Jharkhand: <http://www.whereincity.com/india/jharkhand/>
- Jharkhand: <http://en.wikipedia.org/wiki/Jharkhand>
- Kalita, G. 1996. Performance of Hampshire pigs in respect of important reproductive and litter traits under farm condition of Assam. M.VSc thesis, Assam Agricultural University, Khanapara, Guwahati.
- Kumar, R., Singh, S.K. and Prasad, C.M. 2005. Performance of pigs maintained under different systems of managements at farmer's door. *Indian Veterinary Medical Journal*. 29: 109-112.
- Moll, H.A.J. 2005. Costs and benefits of livestock systems and the role of market and non-market relationships. *Agricultural Economics*. 32: 181-193.
- Murugkar, H.V. 1998. Diagnosis and control of piglet mortality. Annual Report 1998-99. ICAR-NEH.
- Office of the Registrar General and Census Commission. 2001. Census and you 2001. Office of the Registrar General and Census Commission, India.
- Pal, P.P., Naskar, N. and Kumar, R. 2000. Performance assessment of introduced technology in livestock productivity. Annual Report 2000-01. ICAR-NEH.
- PRADAN (no date). Poultry revolution in Lohardaga: A success story. PRADAN, Ranchi, India.
- PRADAN (no date). PRADAN's draft perspective plan for the state of Jharkhand. Ranchi, India.
- PRADAN (no date). PRADAN's poultry intervention for livelihood augmentation in tribal areas.
- Raju, K.G.S., Naidu, K.V. and Rao, K.S. 2007. Incidence of reproductive disorder in buffaloes under field conditions of Andhra Pradesh. *The Indian Journal of Animal Reproduction*. 28: 46-48.
- Rangnekar, D.V. 2006. Livestock in the livelihoods of the underprivileged communities in India: A review. Nairobi, Kenya, ILRI.
- Rustagi, R.L. and Agarwal, S.C. 2000. Cost of rearing and maintenance of goat in rural area of Mathura district (UP). *Indian Journal of Animal Science*. 34: 18-23.
- Sasidhar, R.V.K. 2001. Correlates of livestock owners' attitude towards vaccination program. *Indian Veterinary Journal* 78: 817-819.
- Seventeenth Quinquennial Livestock Census. 2003. Department of Animal Husbandry and Fisheries, Government of Jharkhand, India.
- Singh, S.K. 2006. Inside Jharkhand. Crown Publication, Ranchi, India.
- Singh, V.R., Tulchan, P.M. and Partap, T. 2001. Livestock feeding management at smallholder dairy farms in Uttaranchal hills. *Indian Journal of Animal Sciences*. 71: 1172-1177.

- Tanwar, P.S., Vaishanava, C.S. and Jain, L.S. 2007. Studies on housing and breeding management practices adopted by goat owners in tribal area of Udaipur district. *Indian Journal of Animal Research*. 41: 59-61.
- Tomar, K.P.S., Singh, P., Singh, R. and Singh, S. 2002. Seasonal variation in reproductive problems in buffaloes under field conditions. *The Indian Journal of Animal Reproduction*. 23: 18-20.
- World Bank. 2007. <http://www.worldbank.org.in/southasiaext/indiaextn>.
- Yadav, B.P.S. and Gupta, J.J. 1994. Studies on cheap ration with resource based feeding. Annual Report 1994-95. ICAR-NEH.

Appendix 1 List of key informants/resource persons interviewed

Name	Address
Ranchi	
Mr AK Singh	Principal Secretary, Animal Husbandry and Fisheries Dept., Jharkhand
Mr SK Sattapathy	Secretary, Rural Development Dept, Jharkhand
Dr BK Tiwari	I/C Dean, Ranchi Veterinary College, Birsa Agricultural University, Ranchi
Dr RP Singh Ratan	Director, Extension Education, Birsa Agricultural University
Dr Bindeshwari Choudhary	Jt. Director, Animal Husbandry and Fisheries Department
Mr MP Singh	Asst. Director, Directorate of Dairy Development
Dr Gurudev Sinha	DAHO, Ranchi district
Ms Hemangini C Kumar	District Agriculture Officer, Ranchi district
Dr Sushil Kumar Pandey	Professor, Dept. of Extension Education, Ranchi Veterinary College
Dr Satpriya Sarma	Manager, Agri Training Information Centre
Dr Swati Sahayak	Assoc. Professor, Dept. of Medicine, Ranchi Veterinary College
Dr Rekha Rani Singha	Health Inspector, Ranchi Nagar Nigam
Mr Kallol Saha	Head, HR and Planning, NDDB
Mr Sattyabrata Acharya	PRADAN, Ranchi
Mr Pawan Ojha	PRADAN, Ranchi
Dr Tabrez Khan	Assoc Vice President, BASIX, Ranchi
Mr Samir Bhattacharjee	BASIX, Ranchi
Mr Bikash Kumar	BASIX, Ranchi
Mr Ashok Prasad Sahu	BASIX, Kanke
Mr SK Sinha	BAIF, Ranchi
Dr Sudhir Kumar Sinha	BAHO, Kanke Block
Mr Pathak	SAHO, Kanke
Mr A Lodh	Manager Sudha Dairy
Mr Vikash Kumar	Team Leader, Basix
Mr Rajendra Prasad	BAO, Arki
Dr Sudipta Bariar	BAHO, Arki
Dr Sarkar	TVO, Arki
Mr KD Singh	Egg Merchant, Ranchi
East Singhbhum	
Dr Stenley Kujoor	DAHO, East Singhbhum
Mr Tirkey	DAO, East Singhbhum
Dr Rajesh Kumar Singh	AWDO, Animal Husbandry and Fisheries Department
Mr Bishnu C Parida	Team Leader, PRADAN, Jamshedpur
Mr Uma Sangkat	BASIX, Jamshedpur
Dr Ravi Shankar Sarma	In-charge, BAIF Centre, Jamshedpur
Mr Dinesh Gupta	BAO, Potka Block
Mr Manish Thakur	Team Leader, Basix
Dr Shilpy Minz	BAHO, Musabani
Mr Nanda Lal Baxi	Tagore Society for Rural Development, Patanda

Mr Subhasish Saha	Plant Manager, Nand Dairy
Mr Akhileshwar Pandey	Animal Husbandry and Fisheries Dept
Mr Madneshwar Jha	Prgati Iyuidih
Dr RM Mishra	KVK
Dr Ashutosh kumar Manjhi	BAHO, Potka Block
Dr Suresh Kumar Jha	TVO, Haldi Pokhar
Dr Jayanta Hazarika	Project Executive, PRADAN
Dr Utpal Talkudar	CEO, Poultry Cooperative, Potka
Mr Rajkumar Sardar	Amrit's beneficiary, Sarjondih
Godda	
Dr Ramakant Bhagat	DAHO
Mr Anil Kerketta	KVK
Mr Binod Kumar Dhal	PRADAN
Dr Sadanand Mandal	BAHO, Godda Block
Dr Anil Kumar Lagoon	TVO/BAHO, Sunderpahadi
Dr Ajay Kumar Gupta	BAHO, Porriyahaat
Mr Ashok Kr Jha	Municipal Officer, Godda
Mrs Mamta Mandal	Manas parivartan
Dr Om Prakash Singh	PRADAN
Mr Binit Kumar Gupta	PRADAN
Rajiv Kumar Roy	AI Worker, BAIF
Palamu	
Dr Nand Kishore Prasad Shah	DAHO, Palamu
Dr RKP Mehta	Veterinary surgeon
Dr Vinod	TVO, Bishrampur
Mr MD Gaysuddin	Asst BAO, Palamu
Mr Dev Kumar	BAHO, Bishrampur
Mr Vijay Kishore Wada	BAHO, Satbarwa
Mr Anil Pathak	KVO
Mr Naveen Kumar	Women and Child Development Cell (WCDC)
Xavior Ekka	IDF

Appendix 2 Definition of agro-climatic zones

In Jharkhand there are three agro-climatic zones, namely I, II and III. Their characteristics are:

Zone I:

1. Low water retention capacity of the soil, particularly on upland
2. Late arrival and early cessation of monsoon and uneven distribution of rainfall
3. Poor water storage and moisture conservation practices for raising rabi-crops
4. Drying of surface water resource by February results in no rabi crop production

Zone II:

1. Late arrival and early cessation of monsoon
2. Uneven distribution of rainfall
3. Low water retention capacity of soil
4. Lack of soil and water conservation practices

Zone III:

1. Uneven distribution of rainfall
2. Low water holding capacity
3. Eroded soils
4. Poor soil fertility

Other characteristics of the three agro-climatic zones:

Zone	Total geographical area (million ha)	Cultivable area (%)	Forest (%)	Irrigated area (%)
I	4.1	55	13	6.58
II	2.5	24	33	9.65
III	1.3	31.6	24	4.58

The districts within each zone are:

Zone I: Central and northeastern plateau zone: Dumka, Deoghar, Godda, Sahebganj, Pakur, Hazaribagh, Koderma, Jamtara, Chatra, Girdih, Dhanbad, Bokara and two-thirds of Ranchi

Zone II: Palamu, Lathar, Lohardagga, Garhwa, Simdega and one-third of Ranchi

Zone III: East Singhbhum, West Singhbhum and Sarikela.

www.ilri.org

headquarters

box 30709 Nairobi 00100, Kenya
phone +254 20 422 3000
fax +254 20 422 3001
email ilri-kenya@cgiar.org

principal site

box 5689, Addis Ababa, Ethiopia
phone +251 11 617 2000
fax +251 11 617 2001
email ilri-ethiopia@cgiar.org

ILRI via USA direct

phone +1 650 833 6660
fax +1 650 833 6661