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Final Project Report:

"Livestock Technology Change, Livelihoods Impacts & Policy Lessons"

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by

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1 EXECUTIVE SUMMARY

The Livestock Technology Change, Livelihoods Impact and Policy Lessons project (LTIP-Nepal), is financed by the Livestock Production Programme, DFID, UK and by the Pro-Poor Livestock Policy Facility, FAO. The project's objective is:

"to take an evidence-based analysis approach to the development of strategies for poverty reduction through livestock interventions".

Project outputs include impact evaluations of livestock technology changes for the poor and assessments of livestock policy for pro-poor objectives.

The project commenced at the beginning of September, 2003 and concluded in February 2005. During this period it has completed the following activities:

1. A project inception and planning workshop was carried out with representatives from the Ministry of Agriculture, donor agencies (ADB, DFID), research institutions and farmer groups (Anderson et al, 2004).
2. Formation of a project reference group at the project inception, which then met regularly during the project.
3. A literature review on livestock and livestock keeping in Nepal and a policy review for the Nepalese livestock sector.
4. The collection of primary data using quantitative and qualitative methods in the 12 villages in the Districts of Lalitpur, Chitwan and Mustang. These Districts cover the three main agro-ecological zones of Nepal.
5. The analysis of the secondary and primary data collected and the presentation of the results to the reference group, the management teams of the Livestock Production Programme, UK and Pro-Poor Livestock Policy Facility, Rome, Italy.

The conclusions of the project are as follows:

1. The methodology employed has important merits such as the formation of a reference group, the secondary data analysis and the comparison of between and within village differences. However, improvements could be made in terms of household selection, the quantitative analysis and lesson learning from other sector studies.
2. The regions with the highest incidence of poverty have the highest dependence on livestock. All regions and communities have strong differences whereby poorer households have few livestock and the livestock they have tend to be small species; whilst relatively better off households have more livestock and these tend to be both large and small species. The poorer households expressed interest in keeping livestock, but are limited in this desire by their access to resources and capital.
3. There are clear examples of technology adoption by different ethnic groups, rich and poor. There are also examples where livestock technologies have been adopted and used to improve livelihoods. However, the government's

role in many of these adoptions has been very limited and technologies offered by government services have often been inappropriate due to a:

   a. Poor understanding of the socio-economic situation of actual and potential livestock keepers;
   b. Lack of appreciation of working in mixed farming systems;
   c. Lack of appreciation of competing sectors – tourism and urban based employment; and/or
   d. Poor enabling environment.

4. The agricultural sector lacks flexibility due to:
   a. Land tenure laws (insecurity with regards land ownership leading to fears of losing land and ceilings on land ownership);
   b. A lack of social mobility – cultural constraints; and
   c. A constrained input sector.
5. The lack of flexibility in the agricultural sector has contributed to its stagnation, and with the agricultural sector in its current state it is unlikely that the livestock sector can have much more than a small impact on poverty alleviation.
6. The livestock policies and programmes have failed to promote technologies that relate to the economic reality of livestock keeping, the farming systems and household economics, and have failed to target resources at micro level in order to help families with difficulties in adopting profitable livestock technologies.

Taking into account the above conclusions the following recommendations have been made:

1. There is a strong need for the **coordination** of livestock policies and actions with other related sectors.
2. Each **law, regulation and action** for the livestock sector needs to be **assessed** in terms of public and private **responsibility** and increasing the **flexibility** of the livestock sector to provide opportunities to poor people.
3. Greater **flexibility** is required in the **provision of livestock technologies** through having less prescriptive lists; field staff who work with families in identifying problems and potential solutions; and adequate knowledge and financial support to help families adopt and adapt potential solutions.
4. The continued existence of **contagious animal diseases** in Nepal calls for a strong focus in livestock projects on the **control**, and where possible **eradication** of such diseases. Such actions would benefit poor livestock farmers through **reducing risks** in livestock keeping.
5. Targeting of the poor and their needs in the implementation of the Community Livestock Development Project requires **training** of field staff and technicians in methods such as wealth ranking; livelihoods assessments; community level economic assessments, in particular the impact of interventions; methods to

identify technology demands of the poor; and methods to supply technology to the poor.

6. The **dissemination** of the findings from the LTIP project and related material through making available the existing documents and presentations to the reference group and the LPP and PPLPF networks.
7. The **write up** and **dissemination** of two policy briefings and a working document from the LTIP-Nepal findings.

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6 ABBREVIATIONS

ADB	Asian Development Bank
APP	Agricultural Perspective Plan
CEVEP	Consultores Epidemiologos Veterinarios y Economistas Pecuarias
CLDP	Community Livestock Development Plan
DFID	Department for International Development, UK
DLS	Department of Livestock Services
Dzopa	A cross between a yak and cattle which is male but generally sterile

EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organisation of the United Nations
HDI	Human Development Index
IAAS	Institute of Agriculture and Animal Sciences
ICIMOD	International Centre for Integrated Mountain Development
LPP	Livestock Production Programme, DFID
LSU	Livestock Unit (1 cattle = 0.5 LSU; 1 buffalo = 0.5 LSU; 1 sheep = 0.1 LSU; 1 goat = 0.1 LSU; 1 pig = 0.25 LSU; 1 poultry = 0.01 LSU)
MAC	Ministry of Agriculture and Cooperatives
m.a.s.l	Metres above sea level
MFSC	Ministry of Forest and Soil Conservation
MOA	Ministry of Agriculture
NARC	Nepal Agricultural Research Council
NARDF	Nepal Agricultural Research and Development Fund
NDDB	National Dairy Development Board
NPC	National Planning Commission
NRI	Natural Resources Institute
PPLPF	Pro-Poor Livestock Policy Facility, FAO
PPP	Purchasing Power Parity (PPP$ = Rs.10.91)
Rs.	Nepali Rupees (US$ = Rs. 70.00)
TLDP	Third Livestock Development Plan
VDC	Village Development Committee
WECS	Water and Energy Commission Secretariat

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- Rommy Viscarra for searching for background information in Nepal and through the internet, and providing support whilst writing the report.
- Trevor Rushton for revising literature on Nepal and providing an insight into what is needed for moving from being a farm labourer to a successful dairy farmer.
- The members of the project's Reference Group for their active participation in meetings and correspondence (for a list of members please see Annex 1).

8 INTRODUCTION

The Livestock Technology Change, Livelihoods Impact and Policy Lessons project (LTIP-Nepal), is financed by the Livestock Production Programme, DFID, UK and by the Pro-Poor Livestock Policy Facility, FAO. The project's objective is:

"to take an evidence-based analysis approach to the development of strategies for poverty reduction through livestock interventions".

Project outputs include impact evaluations of livestock technology changes for the poor and assessments of livestock policy for pro-poor objectives.

8.1 BACKGROUND

Much valuable discussion and specification exists of **what** needs to be achieved in livestock development, but there is much less on **how** this should be achieved (Omamo, 2003). One of the reasons is the lack of knowledge of how policies influence changes in the livestock sector and how these subsequent changes affect the livelihood strategies of the poor and have an impact on poverty reduction. However, such changes in livestock sectors are taking place (planned and unplanned) and there exists evidence, which could be analysed and interpreted to improve the understanding of the impact on poverty of these changes and the policies that encourage or constrain these changes.

The **goal** of the project is to facilitate informed policy making based on how policy affects access to public and private goods by poor livestock keepers and the poor interested in becoming livestock keepers. This will be achieved by the development of better analysis methodologies to identify the political, institutional and technological constraints that prevent the poor from benefiting from livestock development and the identification of factors that encourage the access of the poor to livestock development benefits. With this information a policy framework will be developed that relates to the more specific actions, projects and programmes below. Towards this purpose the project will provide:

- Impact evaluations of livestock technology changes for the poor;
- Assessments of livestock policies with a pro-poor objectives focus; and
- Findings made available and used by local & regional stakeholders.

8.2 GUIDE FOR READERS

The report is divided into the following five sections:

- Methodology – containing information on the data collection and analysis methods used during the research.
- Nepal livestock sector and policies – contains a strong overview of the livestock sector based on an analysis of secondary poverty and livestock data. In addition the chapter contains a review of past livestock policies from the national through to the specific project related actions.

- Results – The analysis of the secondary and primary data collected from the study sites including results on livestock functions within households, livestock investments, gender issues and community economies.
- Discussion – placing the analysis of the study sites into the context of technology adoption, policies and poverty. Raising questions of whether past, present and future policies have and will be able to achieve poverty alleviation.
- Conclusions and recommendations – drawing on the evidence based analysis presented in the report conclusions have been drawn on the effectiveness of past policies, programmes and projects. With these conclusions recommendations are made on how future interventions may be improved.

The purpose of this document is to stimulate thought and discussion on livestock research and development in order to ensure that future investments in these subjects are well spent for the social and economic well being of poor people in Nepal and indeed elsewhere. The report is not the last word on the analysis of livestock policies and technology changes in Nepal, but we feel that it makes a good contribution that future studies can follow. The authors would therefore welcome comments on the conclusions reached and how the methodology used can be improved.

9 METHODOLOGY

9.1 INTRODUCTION

The basis of the research has been the use of case studies of areas where livestock technology has been developed for livestock producers and there has been some level of adoption and adaptation. In the areas where technologies have been introduced the pattern of adoption and adaptation has been examined at farm, regional and policy level. A differentiated impact assessment approach was taken to assess how households at different livelihood levels have been affected by the livestock technology changes.

With regards to the planning of activities and sharing of information a collegiate approach was taken. The investigation involved all stakeholders (livestock keepers, traders, RD&TT service providers, policy makers and implementers) in the process of planning data collection, analysis of the data and diffusion of key findings. This involved a mixture of key informant interviews to identify stakeholders, participatory workshops and in-depth discussions with key stakeholders. In addition a project reference group was formed from a wide range of interested stakeholders including those involved in livestock development policy making. The reference group contributed to decisions on technology areas and research site selection and was invited to interpret the outputs from the analyses. The reference group is seen as an essential component of the uptake pathway for the research outputs and the attributes of such a strategy and the methods used are described later.

9.2 CONCEPTUAL FRAMEWORK

The project explored how policy affects access to public and private goods by poor livestock keepers and the poor interested in becoming livestock keepers. This was achieved by identifying the political, institutional and technological constraints that prevent the poor from benefiting from livestock development and the identification of factors that encourage the access of the poor to livestock development benefits. The conceptual framework considered three main domains.

9.2.1 Technological domain

The technological domain relates to the livestock system itself and also the roles of the livestock keepers and their families in these systems. The key question is what livestock technologies are being used and by whom? The project characterised technologies in terms of:

- **Key inputs** being used by a livestock system:
  - Physical inputs such as labour, feed, forage, medicines etc
  - Genetic diversity, i.e. the species and breeds kept
  - Knowledge input which covers the management of the livestock
- **Changes over time** were considered with the collection of data on past & current situations, and also projections of what may happen in the future.

9.2.2 Institutional Domain

The institutional domain refers to "*how people organise themselves and relate to each other"*. Formal and informal organisations and institutions with influence on livestock keeping systems and livestock keepers are considered. In addition, there are social, cultural and economic factors that can influence people's relations. In particular the research examined how people:

- Promote, adopt & adapt technology and inputs;
- Make market transactions;
- And, if there are differences in the nature of these relationships between poor and non-poor groups within the society.

9.2.3 Policy Domain

The policy domain is part of the production environment created by governments, NGOs and possibly private companies. Policies on their own are just statements. To have an effect or impact these polices need policy instruments such as laws, programmes and projects. The key question here is what are the key policies for the livestock sector? The focus is on specific livestock policies, but there is also a need to consider policies that affect livestock systems and institutional relationships such as credit policy, land tenure, education etc. The research investigated how livestock keeping systems and the relationships between actors are affected by policies in positive, neutral or negative ways. Differentiated impacts were identified across social groups. As part of the process of investigating policy, the research investigated which methods are most appropriate to determine policy impacts. An important end point was whether policies can be modified to achieve poverty reduction.

9.2.4 Levels of Analysis

The previous section has introduced the idea of different research domains. Coherent with this, different levels of data collection and analysis were also identified. This structure is to simplify what are potentially very complicated relationships. The levels identified are:

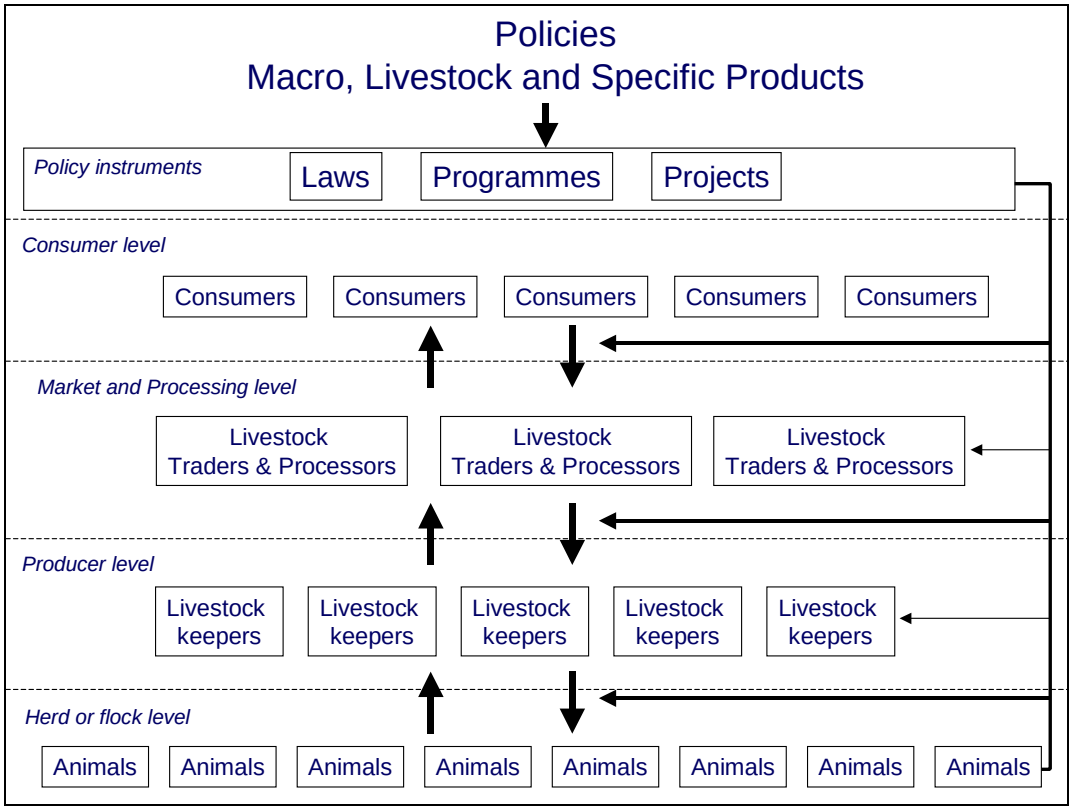
1. Herd or flock;
2. Livestock keepers (members of households);
3. Markets and livestock and livestock product processing; and
4. Consumers.

Above these identified levels is the enabling environment where policies are made and are implemented through laws, programmes and projects (see Figure 1). Examples of these are:

1. A policy to increase livestock production may be implemented through a project that introduces high yielding breeds of animals that directly affects the herd or flock level.

2. A policy to increase the efficiency of feed resource use could be implemented by improving herd or flock fertility management in order to generate more young stock per breeding female. This would influence the relationship between the herd or flock and the livestock keepers.
3. A policy to empower women may be implemented by extension messages that target women with training and information. This would influence the intra-household dynamics of the livestock keepers.
4. A policy to increase government revenues could be implemented through laws that put value added tax on livestock and livestock products. This would affect the relationships between livestock keepers, livestock traders, livestock processors and also consumers.
5. A policy to improve the nutrition of urban consumers could be implemented through the introduction of subsidies on livestock products. This would influence the relationship between livestock product traders and processors and consumers.

Figure 1. The levels of analysis to generate evidence based approach for policy analysis and decision making.



9.3 METHODS

The previous section outlined a conceptual framework for the research methodology. Details are provided here as to how policy influence can be assessed at the different levels and within the domains described. This section presents these aspects of

technology intervention area and research site selection; data collection; data analysis and information dissemination.

9.3.1 The reference group

The project aimed to make a contribution to pro-poor livestock development policy in Nepal and in the region. To facilitate this process, it was decided to invite the participation of a plural set of stakeholders in the project from its inception. The mechanism used is referred to as the "reference group". The reference group was convened following the inception workshop of the project where representatives on livestock groups, animal product processors, extension agencies, NGOs, Government officials and interested donors were invited. The role of the reference group was explained during an inception meeting and the membership was drawn from those present and others suggested by participants (see proceedings in Anderson *et al*, 2004).

Reference group meetings were convened at critical moments during the project cycle to consult members before key decisions were taken and to present the analysis of findings and so the group could provide interpretation of results.

A key function of the reference group was to bring validity to the processes of the project and to contribute to the relevance of the work to the different stakeholders' opinions of what needs to be researched to achieve better livestock development policies in Nepal. The assumption is that involvement of policy makers, shapers and implementers in the project through membership of the reference group will increase the probability of project findings being taken up in policy processes.

9.3.2 Technological Area Selection

The project identified three potential technological or institutional changes to investigate, termed "technology areas":

- Milk production and processing technologies;
- Leasehold forestry and forage to improve communal forest areas; and
- Improving communal pasture in mountain areas in order to improve goat production.

In the selection of the technology areas and also of the research sites for carrying out data collection consideration was given to the following points:

- The findings should be relevant to the 3 agro-ecological zones and the 5 development regions in Nepal;
- The technologies should address Nepali priorities;
- The interests of the research funders, FAO and DFID.

9.3.3 Research Site Selection

The Districts, where the research sites were identified, were agreed with the reference group. The districts were chosen as representative of different development regions in Nepal – high mountain, mid hills and lowlands.

The sampling frame used to identify the research within Districts stipulates that of the four villages identified two should have good market access and two poor access. In each pair of villages chosen due to accessibility one village should be of predominantly medium and higher caste groups, and one of lower castes. Table 1 sets out the site selection made by the project in conjunction with the reference group.

Table 1. Sites selected for primary data collection.

Technology area	Districts	Village types	Projects	Partners
Milk production, processing & distribution	Lalitpur	Accessibility, Ethnic & caste groups, labour to land ratio, livestock density	TLDP, DDC	DLS
Leasehold Forest & Forage Programme	Chitwan	Accessibility, Ethnic & caste groups, labour to land ratio, livestock density	Leasehold forestry and forage, TLDP	DLS, FECOFUN
Goat Production	Mustang	Accessibility, Ethnic & caste groups, labour to land ratio, livestock density	FAO High altitude forage and pasture development	DLS, Min Forest & Soil Cons

9.3.3.1 Sampling Frame for Village Study Sites

Within each study district villages were selected on the basis of their economy and physical accessibility. The economies were determined as being either relatively wealthy or poor and similarly access was either good or poor. In each study site four villages were selected as a combination of these factors:

- Poor Economy, Poor Accessibility – PEPA
- Poor Economy, Good Accessibility – PEGA
- Good Economy, Poor Accessibility – GEPA
- Good Economy, Good Accessibility – GEGA

The chosen villages and their classification are shown in Table 2.

Table 2. Sampling frame for the village study sites.

Regions (District)	Village Types			
	Poor **E**conomy **P**oor **A**ccessibility	**P**oor **E**conomy **G**ood **A**ccessibility	**G**ood **E**conomy **P**oor **A**ccessibility	**G**ood **E**conomy **G**ood **A**ccessibility
Mid hills Lalitpur	Burunchuli	Jhyalungtar	Manegaun & Lekdanda	Seraphat
Lowlands Chitwan	Phujintar	Barowa	Anand chowk	Parashnagar
Mountain Mustang	Ghilling	Syang	Chhusang	Kagbeni

Within each community a wealth ranking was carried out to identify the different socio-economic groups according the perceptions of the local people. In addition information was collected on the cultural diversity of the families in each village.

9.3.4 Data Collection

The data collection attempted to avoid replication of previous studies and duplication of what was on-going. Therefore, searches were made for secondary data such as reports and data on:

- Livestock systems
- Farming systems and livelihoods
- Markets – demand and supply
- Policy, programmes and projects

In addition, the project, where possible, linked up with on-going projects that would benefit from inputs of the project and in turn the project would benefit from data available.

However, it was recognised that there would be gaps in the data available and where necessary primary data was collected. Both qualitative and quantitative data were collected using a mixture of formal and informal data collection methodologies. The data to be collected were determined by the data analysis structures detailed in the following section.

A data collection protocol was established. At each of the four villages within each of the three technology areas the data collection protocol set out in Table 3 below was carried out.

Table 3. Data collection protocol at village level.

Days & Activities	Outputs
Day 1 Walk around the village to familiarize team with geographic aspects of study area. 2 Social and natural resources maps that should include details of:- location of HHs, where caste group are located, numbers of HHs per caste group, land-use, water sources, and services. 3 Key informant interviews (KIIs) with regard to history of village, numbers of HHs in each of the caste groups, history of livestock keeping, and current livestock production systems.	2 Social and NR Maps Summaries of 3 KIIs
Day 2 Key informant interviews – one per caste group details to include:- economic activities of the caste group, combinations of activities, ranking of economic activities combinations by livelihood or wealth strata; list of households per strata HH questionnaires. The sample of HHs surveyed stratified by caste and strata within caste.	Summaries of the KIIs for each caste group Lists of economic activities and combinations of economic activities. Ranking of economic activities combinations.
Day 3 Complete application of modified HH questionnaires. The sample of HHs surveyed should be at least 20 per cent of village and should be stratified by caste and strata within caste.	Completed questionnaires for 20 per cent of village.
Day 4 Input and translate the questionnaires. A day to stop and reflect on the data & information collected so far. Issues to consider include:- HH animal inventories; sales of livestock and animal products; functions livestock keeping plays in the HH livelihood's strategies; cases of livestock technology change; and other economic activities. All analysis done by caste groups and livelihood strata with caste.	Translated questionnaires in the computer. Table of livestock functions for each caste group. Examples of livestock technology change.

Days & Activities	Outputs
Day 5 Focus group meetings:- women's groups; mixed caste groups. Issues to be explored with focus groups include:- gender division of labour for livestock keeping; objectives, organization and functioning of groups; access to natural resources by different caste groups and impact on livestock keeping. Timelines with HHs identified to have changed livestock keeping technology – chose changes in the livestock technology area that is the topic of the appraisal set. Do 4 or 5 timelines that ask about:- technology and innovations; costs and prices of livestock technology and products; livestock services provided; marketing channels.	Summaries of the results from focus group discussions. Tables of timeline results. Comparisons and contrasts between timelines.
Day 6 Return on investment, costs and risk ranking table. Chose 4 or 5 livestock enterprises and do at least 1 table with representatives of each caste group. Discussion should also concentrate on the attitudes of the different caste groups to taking credit or loans for livestock keeping. Team discussion of main conclusions from appraisal concentrating on livestock functions and livestock technology changes. Check that appraisal file is complete. Check that translated questionnaires are inputted into computer and copied onto disk. Prepare draft report.	> 4 or 5 Return on investment, costs and risk ranking tables. Team's main conclusions. Appraisal file. Questionnaires in computer and on disk. Draft report that can be photocopied for distribution.
Days 7, 8 & 9 Take draft report (photocopied and with photos printed) to village and present in a meeting. Income & expenditure data at HH level for different castes. Key informant interviews with service providers asking about:- interventions, technology transfer projects etc Secondary data from VDC to check representative nature of the village. Production systems & marketing channels. Details to include:- costs & prices, margins, enterprise budgets for processors.	Report of meeting – corrections & additions by villagers. Data files. Reports of KIIs. 2nd data & service provider reports. Reports and data sets.
Days 10,11 & 12 Complete appraisal report. Check that data sets are complete for economic analysis.	

A limited gender analysis was carried out in the Mustang study site (see Annex 2 for details of the methodology and the results).

9.3.5 Data Analysis

The data analysis structures address the different levels of the research from herd or flock level through households and socio-economic groups to the policy making.

At herd or flock level productivity estimates using enterprise budgets, herd models and farm activity models to investigate:

- Crop and livestock interactions
- Long-term sustainability (genetic & natural resources use)
- Returns to the most limiting resources

At the livestock keeper level livelihoods analysis will be carried to determine:

- Household dependence on livestock, capital investments in livestock. This will be achieved with household interviews; inventories and modelling of the household system.

- Modelling and historical interviews will be also be used to assess pathways out of poverty and the role of livestock in these pathways.

To capture the impacts of a change in livestock systems that go beyond the livestock systems and livestock keepers it was originally proposed that a number of Social Accounting Matrices (SAMs) would be developed. Whilst we consider that this is still an attractive analysis method, the development of these models has proved to be too data demanding and time consuming given the project resource constraints. However, the conceptual framework for a SAM has been applied in the graphical modelling of the village economy and to look at how changes affect different classes of households. These models, while not being able to quantify change, force an analyst to think carefully about the implications of livestock interventions and technology change (Rushton, 1994).

It was also intended that at the market level, value chains would be determined indicating key flows in terms of number of people involved, volumes and values of product. In addition that marketing margins and transactions costs would also be assessed and where possible returns to marketing by different actors would be determined. Again these analyses have proved to be impossible with the current project due to constraints in the time available to collect data, but are felt to be important in a complete process of livestock policy analysis. These have been successfully applied to non-timber forest products (Rushton et al. 2003) in order to identify the importance of entrepreneurs in the development of marketing systems (de Welde *et al.* forthcoming).

To capture the impacts of policy at a national level, policy analysis matrices (PAMs) were originally proposed in the methodology. However, this proved unnecessary for the milk sector as Tulachan (2004) carried out such an analysis recently. For the other products, the technologies and policies that were focussed on (leasehold forestry and pasture improvement in the high mountains) would generate volumes that are insignificant in relation to the national markets, and the international trade in principally goat meat is not of great importance.

In addition, the general analyses investigated questions on how policy might have influenced:

- Technology generation;
- Technology adoption/adaptation; and
- Transactions.

9.4 REACHING CONCLUSIONS

The project has involved a large amount of analyses, which have been brought together into a summarised format. The research team worked on a matrix that is able to capture key information and present it in a manner that can be understood by policy makers. The matrix is shown in Table 4.

Table 4. Analysis matrix for the research

	Household	Livestock Keeper Groups	Local Economy (Trader, processor, consumer)
Livestock production system	Productivity changes – animal and herd	Productivity changes that are differentiated according to social status	Productivity changes effects on livestock product prices
Contribution to livelihoods	Intra household effects of technology change	Inter household effects (social differentiation)	Changes in labour demand. Consumer budget spending on livestock products
Enabling environment	Intra household effects of political and institutional change	Inter household effects of political and institutional change	Accessibility of livestock products and services for livestock traders, processors and consumers

The hypotheses that the team worked from included:

- Technologies exist that can increase livestock production;
- There continue to be **poor** livestock keepers and people in urban areas who **cannot** afford to buy livestock products;
- Widespread adoption of livestock technologies is not common and is differentiated across socio-economic groups;
- Households access to livestock keeping technologies is affected by livelihood level, asset holding and caste/ethnic group membership.

And these situations can be improved by:

- Increasing the returns to livestock production;
- Improving the availability of livestock products; and
- Modifications in livestock development policy to enable access by the poor to commercial livestock keeping systems.

We believe that a significant contribution can be made by taking an ***"evidence based"*** approach to the analysis of past interventions, and also current and planned interventions. Such an evidence based approach requires the analysis of secondary data and information as well as the collection and analysis of primary data. However, we also recognise that advances in the proposed methodology require the **participation** of all the actors in the livestock sector - from politicians to livestock traders to livestock keepers.

10 THE NEPALI LIVESTOCK SECTOR AND LIVESTOCK POLICIES

Nepal is a country with many reports and much data on different aspects of the society and economy[1]. As a research project looking at livestock policies and technology change, the authors felt it was imperative to present and where appropriate analyse this material in order to provide a strong background for the collection and analysis of the primary data. The following section includes:

- An analysis of the Nepali livestock sector based on secondary data. It is recognised that others have presented analyses of the livestock sector (Tuluchan et al, 2002; Mathema and Joshi, 2000; Tulachan and Neupane, 1999). However, few have made analyses based on tropical livestock unit density and their importance to families and people as have been carried out for Africa (Otte and Chilonda, 2002) and South America (Rushton and Viscarra, 2004).
- An analysis of livestock policies, the policy making environment. Again there have been analyses of the livestock policies (Mathema and Joshi, 2000) but these tend to document and list policies rather than analyse the role of government in the policy making and policy monitoring process.
- A review of the programmes and projects that have been running in the selected districts.

10.1 NEPALI LIVESTOCK SECTOR

10.1.1 Introduction

Nepal is one of the poorest countries in the world, with an annual per capita of US$200 in 1998 and an estimated population of 23 million people (2001 Census). It also has a low human development index (ranked 144 out of 174 countries). Poverty levels are high throughout the country, but are particularly marked in the rural areas. In addition the inequality in society is high with the top 10 percent of the population earning the equivalent of the bottom 50%. In many areas this poverty is deep rooted, often leading to food insecurity for part of the year.

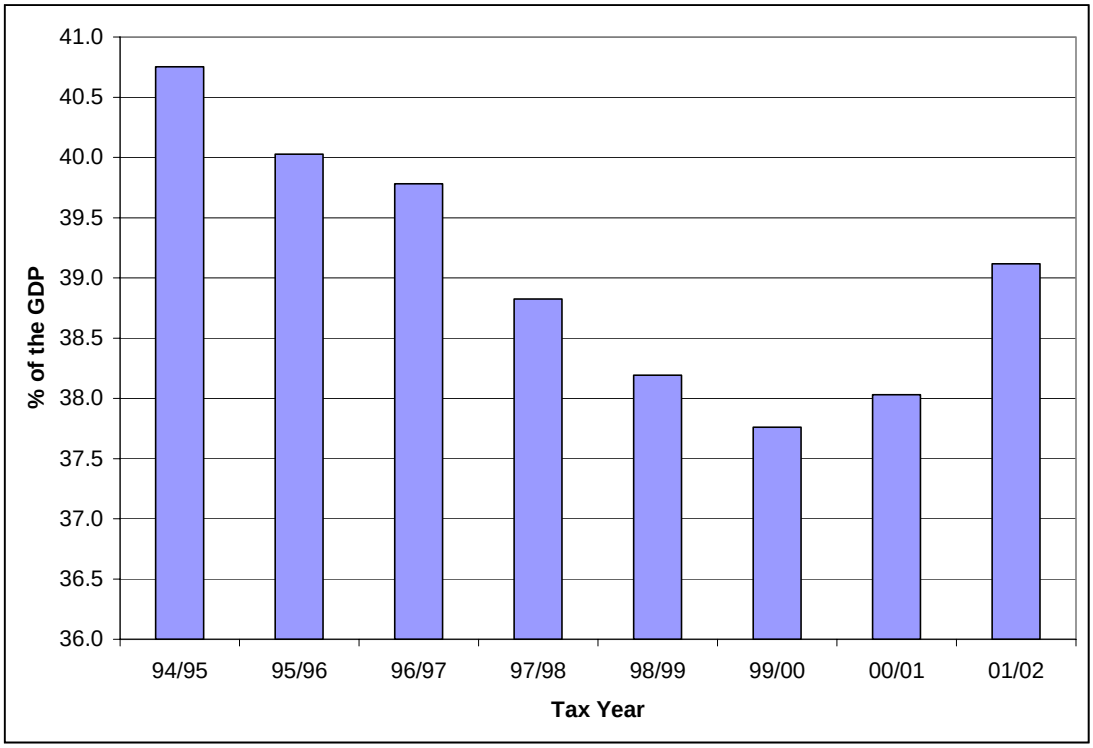
10.1.2 Economy and human population

It is estimated that 86% of the Nepalese population live in the rural areas and that most of this population is supported by agricultural activities that account for around

[1] Winrock International worked with the Ministry of Agriculture from the mid 1980s through to 2001 on a project "Policy Analysis in Agriculture and Related Resource Management" This project generated many documents. There have been a number of very thorough longitudinal anthropological studies mainly in the mountain regions. In addition ICIMOD have generated a number of documents on the livestock sector and various forestry projects have generated documents on the forestry sector with important data on its relationship with livestock production. Finally, Nepal has had regular census that contain data on human populations, poverty and livestock populations

40% of the GDP. The proportion of the GDP contributed by the agricultural sector fell slowly during the late 90s in response to improved economic growth (see Figure 2).

Figure 2. Percentage of the GDP derived from the agricultural sector (Modified from Central Bureau of Statistics, 2002).



Political problems due to the Maoist insurgency at the end of the 90s and in the early part of the current decade, plus a poor monsoon in 2002 have had negative impacts on the economy. The economy shrank in 2002, in part because of difficulties in the tourist sector.

The country can be divided into three main regions: mountains, hills and terai. The majority of the human population is found in the hills and terai (see Table 6). For development purposes the country is divided into five regions: Eastern, Central, Western, Mid-Western and Far-Western. Just over three quarters of the population (77%) are found in the Eastern, Central and Western Development Regions (see Table 5).

Table 5. Human population by agroecological zone and by development region.

Agro-Ecological Zone	Number of		Household Size	Population per Development region				
	People	Households		Eastern	Central	Western	Mid Western	Far Western
Mountains	1,687,859	319,887	5.3	401,587	554,817	24,568	309,084	397,803
Hills	10,251,111	1,982,753	5.2	1,643,246	3,542,732	2,793,180	1,473,022	798,931
Terai	11,212,453	1,950,580	5.7	3,299,643	3,934,080	1,753,265	1,230,869	994,596
Total	**23,151,423**	**4,253,220**	**5.4**	**5,344,476**	**8,031,629**	**4,571,013**	**3,012,975**	**2,191,330**

Very little of the land area in the mountain agroecological zone is suitable for cultivation (4.6%) and although this region has a low population density per total land

area it has a high human population density per cultivated land area. Nearly a quarter of the land area (23.8%) in the hill agroecological zone is cultivated land and the human population density per kilometre square of cultivated land is similar the mountain region. Just over a third of the land area (36.5%) is cultivated in the terai agroecological zone, but this region has a high population density per total land area and per unit of cultivated land (see Table 6). The high population density in this area has to be put into the context that some of this land is irrigated and that the climate would allow double and some cases triple cropping (Koirala, 1998).

Table 6. Land area (square kilometres) and human population density (people per square kilometre) by agroecological zone.

Agro-Ecological Zone	Total Land Area	Cultivated Land	Forest	Unproductive Land	Population density by		
					Total Land	Cultivated Land	Cultivated and Forest
Mountains	51,513	2,355			33	717	
Hills	61,816	14,718			166	696	
Terai	33,852	12,363			331	907	
Nepal	**147,181**	**29,436**	**57,401**	**60,344**	**157**	**786**	**267**

Just over a quarter of the Nepalese economy is in the hill zone of the Central Development Region where Kathmandu is found. A further 21% of the economy is concentrated in the Terai zone of the Central Development Region. These are the only two areas where the percentage of GDP is greater than the percentage of the population and together they account for nearly half the Nepalese economy (see Table 7).

Table 7. The Nepalese economy (PPP US$ 1999) by Development Region and Agroecological Zone (modified from Informal Sector Research & Study Centre, 2002).

Agro-ecological zone	Development Regions					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	GDP per capita (PPP US$ 1999)					
Mountains	1,003	1,023	731	731	629	898
Hills	1,012	2,059	858	741	744	1,262
Terai	1,109	1,520	1,276	1,040	1,144	1,267
Total	**1,073**	**1,713**	**1,022**	**861**	**899**	**1,237**
	GDP ('000 PPP US$ 1999)					
Mountains	402,792	567,578	17,959	225,940	250,218	1,464,487
Hills	1,662,965	7,294,485	2,396,548	1,091,509	594,405	13,039,913
Terai	3,659,304	5,979,802	2,237,166	1,280,104	1,137,818	14,294,193
Total	**5,734,623**	**13,758,180**	**4,671,575**	**2,594,171**	**1,970,006**	**28,728,556**
	% of GDP					
Mountains	1.4	2.0	0.1	0.8	0.9	5.1
Hills	5.8	25.4	8.3	3.8	2.1	45.4
Terai	12.7	20.8	7.8	4.5	4.0	49.8
Total	**20.0**	**47.9**	**16.3**	**9.0**	**6.9**	**100.0**
	% of the population					
Mountains	1.7	2.4	0.1	1.3	1.7	7.3
Hills	7.1	15.3	12.1	6.4	3.5	44.3
Terai	14.3	17.0	7.6	5.3	4.3	48.4
Total	**23.1**	**34.7**	**19.7**	**13.0**	**9.5**	**100.0**

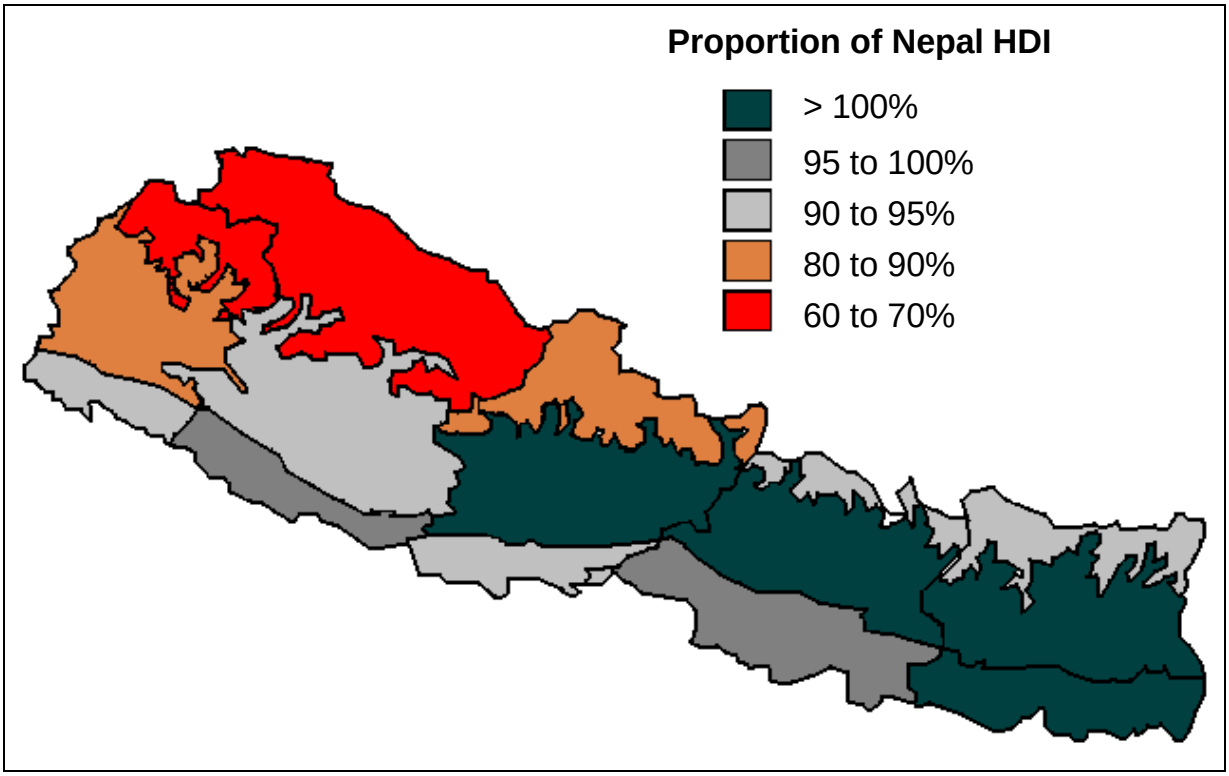
Human Development Index data show that the development is concentrated in the south eastern area of the country (see Table 8).

Table 8. Human Development Index in Nepal by Development Region and Agro-Ecological Zone (modified from Informal Sector Research & Study Centre, 2002).

Agro-ecological Zone	Development Regions					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	Human Development Index (HDI)					
Mountains	0.424	0.437	0.414	0.322	0.286	0.378
Hills	0.513	0.510	0.487	0.433	0.393	0.510
Terai	0.488	0.462	0.435	0.458	0.425	0.474
Total	**0.484**	**0.493**	**0.479**	**0.402**	**0.385**	**0.466**
	Percentage of National HDI					
Mountains	91.0	93.8	88.8	69.1	61.4	81.1
Hills	110.1	109.4	104.5	92.9	84.3	109.4
Terai	104.7	99.1	93.3	98.3	91.2	101.7
Total	**103.9**	**105.8**	**102.8**	**86.3**	**82.6**	**100.0**

Therefore, the most developed part of the country are the hill zones of the Eastern, Central and Western Development Regions and the terai zones of the Eastern and Central Development regions. The poorest and most underdeveloped parts of the country are found in the south and to the west (see Map 1).

Map 1. Human Development Index map for Nepal as a proportion of the national HDI.



10.1.3 Livestock and their importance for the Nepalese people

The livestock sector is estimated to contribute 34% of the agricultural GDP in Nepal and had a growth rate in the late 1990s of 3.6%. Within the livestock sector the most important products are milk (62.6% of Livestock GDP), meat (32.4%) and eggs (5.0%) (Mandip et al, 2004). It is noted here that livestock products such as manure and draught power are not included in the estimates of livestock GDP. These are intermediary products used in crop and other production systems. Due to this omission the proportion of agricultural GDP from livestock is actually higher than the estimated figure stated above.

10.1.3.1 Livestock populations

The hill agroecological zone has just over half the total livestock population, the terai just over a third and the remainder are found in the mountain zone. However, there are more livestock per household, per person and per hectare of cultivated land in the mountain region than in the hills or the terai. The hills have greater densities of livestock per person, household and per hectare of cultivated land than the terai (see Table 9).

Table 9. Livestock population and the number of livestock units by agro-ecological zone (modified from Mandip et al 2004).

Zone	Cattle	Buffaloes	Sheep	Goat	Pig	Chicken	**Total**
Livestock Population ('000)							
Mountain	821	358	352	904	98	1,454	
Hill	3,394	2,052	389	3,544	535	11,177	
Terai	2,764	1,291	99	2,158	301	8,740	
Nepal	**6,979**	**3,701**	**840**	**6,606**	**934**	**21,371**	
Livestock Units ('000)							
Mountain	411	179	35	90	25	15	**754**
Hill	1,697	1,026	39	354	134	112	**3,362**
Terai	1,382	646	10	216	75	87	**2,416**
Nepal	**3,490**	**1,851**	**84**	**661**	**234**	**214**	**6,532**
Percentage LSUs contributed by each species in each ecological zone							
Mountain	54.4	23.7	4.7	12.0	3.2	1.9	**100.0**
Hill	50.5	30.5	1.2	10.5	4.0	3.3	**100.0**
Terai	57.2	26.7	0.4	8.9	3.1	3.6	**100.0**
Nepal	**53.4**	**28.3**	**1.3**	**10.1**	**3.6**	**3.3**	**100.0**
Percentage LSUs contributed for each species by ecological zone							
Mountain	11.8	9.7	41.9	13.7	10.5	6.8	**11.5**
Hill	48.6	55.4	46.3	53.6	57.3	52.3	**51.5**
Terai	39.6	34.9	11.8	32.7	32.2	40.9	**37.0**
Nepal	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
LSUs per household							
Mountain	1.28	0.56	0.11	0.28	0.08	0.05	2.36
Hill	0.86	0.52	0.02	0.18	0.07	0.06	1.70
Terai	0.71	0.33	0.01	0.11	0.04	0.04	1.24
Nepal	**0.82**	**0.44**	**0.02**	**0.16**	**0.05**	**0.05**	**1.54**
LSUs per person							
Mountain	0.24	0.11	0.02	0.05	0.01	0.01	0.45
Hill	0.17	0.10	0.00	0.03	0.01	0.01	0.33
Terai	0.12	0.06	0.00	0.02	0.01	0.01	0.22
Nepal	**0.15**	**0.08**	**0.00**	**0.03**	**0.01**	**0.01**	**0.28**
LSUs per hectare of cultivated land							
Mountain	1.74	0.76	0.15	0.38	0.10	0.06	3.20
'Hill	1.15	0.70	0.03	0.24	0.09	0.08	2.28
Terai	1.12	0.52	0.01	0.17	0.06	0.07	1.95
Nepal	**1.19**	**0.63**	**0.03**	**0.22**	**0.08**	**0.07**	**2.22**

Approximately half of the livestock units are cattle. Cattle and buffalo contribute approximately 80% of the total livestock units. This pattern does not vary very strongly between development regions. Goats are the third most important species in terms of livestock units contributing 10% of the total. In Eastern development region pigs are of the fourth most important species and this region has almost half the pig population of the country. In the Central development region poultry are the fourth most important species and this region has half the national poultry flock (see Table 10). This is a reflection of the development of intensive and semi-intensive poultry systems in this region.

The Central development region has the lowest number of livestock units per household and per person and the Mid Western and Far Western development

regions have the highest number of livestock units per household and person (see Table 10).

Table 10. Livestock population and the number of livestock units by agro-ecological zone (modified from Mandip et al 2004).

Region	Cattle	Buffaloes	Sheep	Goat	Pig	Chicken	**Total**
Livestock Population ('000 head)							
Eastern	1,851	769	121	1,760	427	3,972	
Central	1,461	907	96	1,764	196	10,543	
Western	1,344	1,008	186	1,291	123	3,070	
Mid Western	1,346	538	349	1,199	132	2,881	
Far Western	976	479	87	593	57	904	
Nepal	**6,978**	**3,701**	**839**	**6,607**	**935**	**21,370**	
Livestock Units							
Eastern	926	385	12	176	107	40	**1,645**
Central	731	454	10	176	49	105	**1,524**
Western	672	504	19	129	31	31	**1,385**
Mid Western	673	269	35	120	33	29	**1,159**
Far Western	488	240	9	59	14	9	**819**
Nepal	**3,489**	**1,851**	**84**	**661**	**234**	**214**	**6,532**
Percentage LSUs contributed by each species in each development region							
Eastern	56.3	23.4	0.7	10.7	6.5	2.4	**100.0**
Central	47.9	29.7	0.6	11.6	3.2	6.9	**100.0**
Western	48.5	36.4	1.3	9.3	2.2	2.2	**100.0**
Mid Western	58.1	23.2	3.0	10.3	2.8	2.5	**100.0**
Far Western	59.6	29.3	1.1	7.2	1.7	1.1	**100.0**
Nepal	**53.4**	**28.3**	**1.3**	**10.1**	**3.6**	**3.3**	**100.0**
Percentage LSUs contributed for each species by development region							
Eastern	26.5	20.8	14.4	26.6	45.7	18.6	**25.2**
Central	20.9	24.5	11.4	26.7	21.0	49.3	**23.3**
Western	19.3	27.2	22.2	19.5	13.2	14.4	**21.2**
Mid Western	19.3	14.5	41.6	18.1	14.1	13.5	**17.7**
Far Western	14.0	12.9	10.4	9.0	6.1	4.2	**12.5**
Nepal	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
LSUs per household							
Eastern	0.91	0.38	0.01	0.17	0.11	0.04	1.62
Central	0.50	0.31	0.01	0.12	0.03	0.07	1.03
Western	0.78	0.58	0.02	0.15	0.04	0.04	1.60
Mid Western	1.26	0.50	0.07	0.22	0.06	0.05	2.17
Far Western	1.33	0.65	0.02	0.16	0.04	0.02	2.23
Nepal	**0.82**	**0.44**	**0.02**	**0.16**	**0.05**	**0.05**	**1.54**
LSUs per person							
Eastern	0.17	0.07	0.00	0.03	0.02	0.01	0.31
Central	0.09	0.06	0.00	0.02	0.01	0.01	0.19
Western	0.15	0.11	0.00	0.03	0.01	0.01	0.30
Mid Western	0.22	0.09	0.01	0.04	0.01	0.01	0.38
Far Western	0.22	0.11	0.00	0.03	0.01	0.00	0.37
Nepal	**0.15**	**0.08**	**0.00**	**0.03**	**0.01**	**0.01**	**0.28**

There are more cattle in the east and central parts of the country, with the terai in the Eastern Development Region and the hill zone of the Western Development region having the largest cattle herds. Just over a fifth of the national buffalo herd is found in the hill zone of the Western Development Region and the hill zone of the Central

Development Region has 13% of the national herd. Approximately half of the national sheep population (53%) is found in the hill zones of the Western and Mid Western Development Regions and the mountain zone of the latter Development Region. The national goat herd is concentrated (71%) in the terai zones of the Eastern and Central Development Regions and the hill zones of the Eastern, Central, Western and Mid Western Development Regions. A quarter of the national pig herd is found in the hill zone of the Eastern Development Region. Just over a quarter of the national poultry flock is found in the hill zone of the Central Development Region (see Annex 3 for the population Tables).

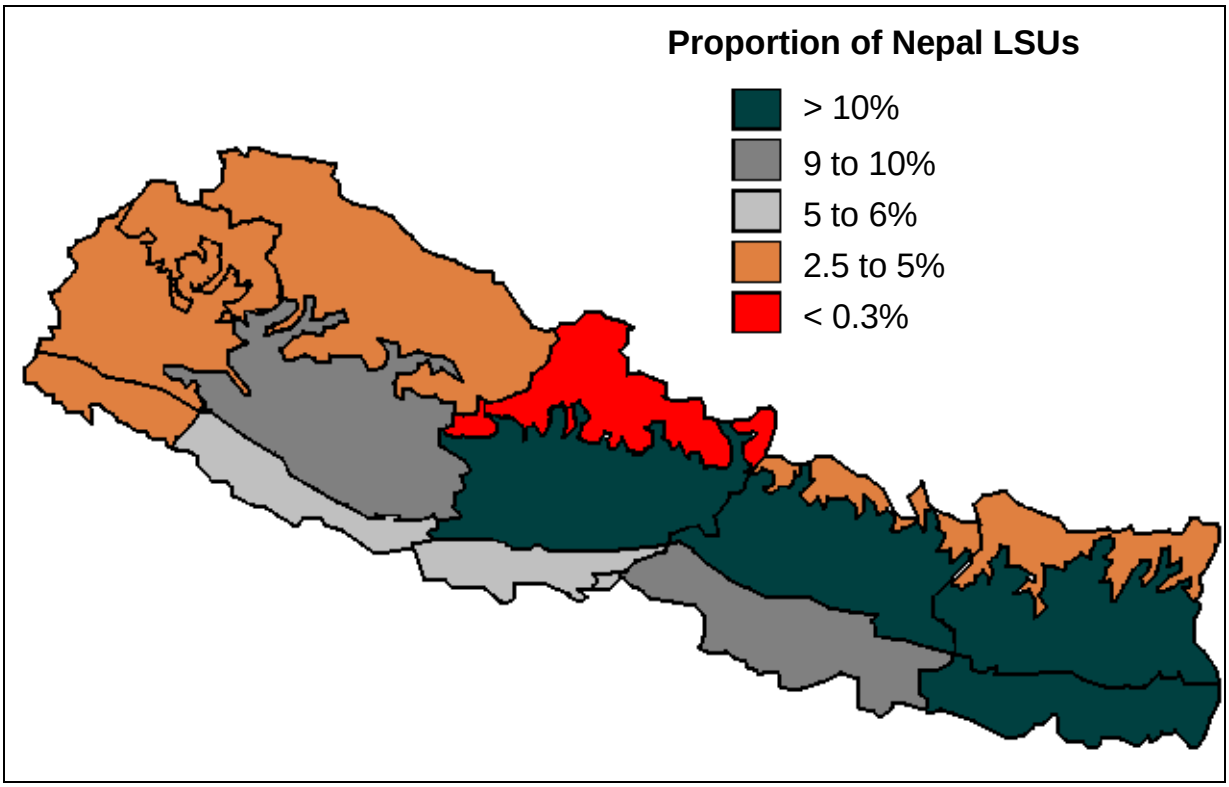
Nepalese livestock are concentrated (67.5% of the LSUs) in the terai zones of the Eastern and Central Development Regions and the hill zones of the Eastern, Central, Western and Mid Western Development Regions. It is the hill zone of the Western Development Region that has the largest amount of livestock, which is in a large part explained by its large cattle and buffalo population (see Table 11). Even though livestock are concentrated in these areas of Nepal, with the exception of the hill zones of the Eastern and Mid Western Development Regions, there are relatively few livestock per household or per person in this area in comparison to other parts of the country (see Table 11).

Table 11. The number of livestock units in Nepal by agro-ecological zone and development region (modified from Informal Sector Research & Study Centre, 2002 and Mandip et al 2004)

Agro-ecological Zone	Development Region					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	LSUs ('000 units)					
Mountain	220	174	11	154	196	754
Hill	672	746	1,016	617	311	3,362
Terai	753	604	359	389	312	2,416
Total	**1,644**	**1,524**	**1,385**	**1,160**	**819**	**6,532**
	Proportion of the national total of LSUs					
Mountain	3.4	2.7	0.2	2.4	3.0	11.5
Hill	10.3	11.4	15.5	9.4	4.8	51.5
Terai	11.5	9.2	5.5	6.0	4.8	37.0
Total	**25.2**	**23.3**	**21.2**	**17.8**	**12.5**	**100.0**
	LSUs per household					
Mountain	2.85	1.55	2.14	2.77	2.80	2.36
Hill	2.17	1.08	1.79	2.29	2.18	1.70
Terai	1.20	0.90	1.24	1.86	2.02	1.24
Total	**1.62**	**1.03**	**1.60**	**2.17**	**2.23**	**1.54**
	LSUs per person					
Mountain	0.55	0.31	0.44	0.50	0.49	0.45
Hill	0.41	0.21	0.36	0.42	0.39	0.33
Terai	0.23	0.15	0.20	0.32	0.31	0.22
Total	**0.31**	**0.19**	**0.30**	**0.38**	**0.37**	**0.28**

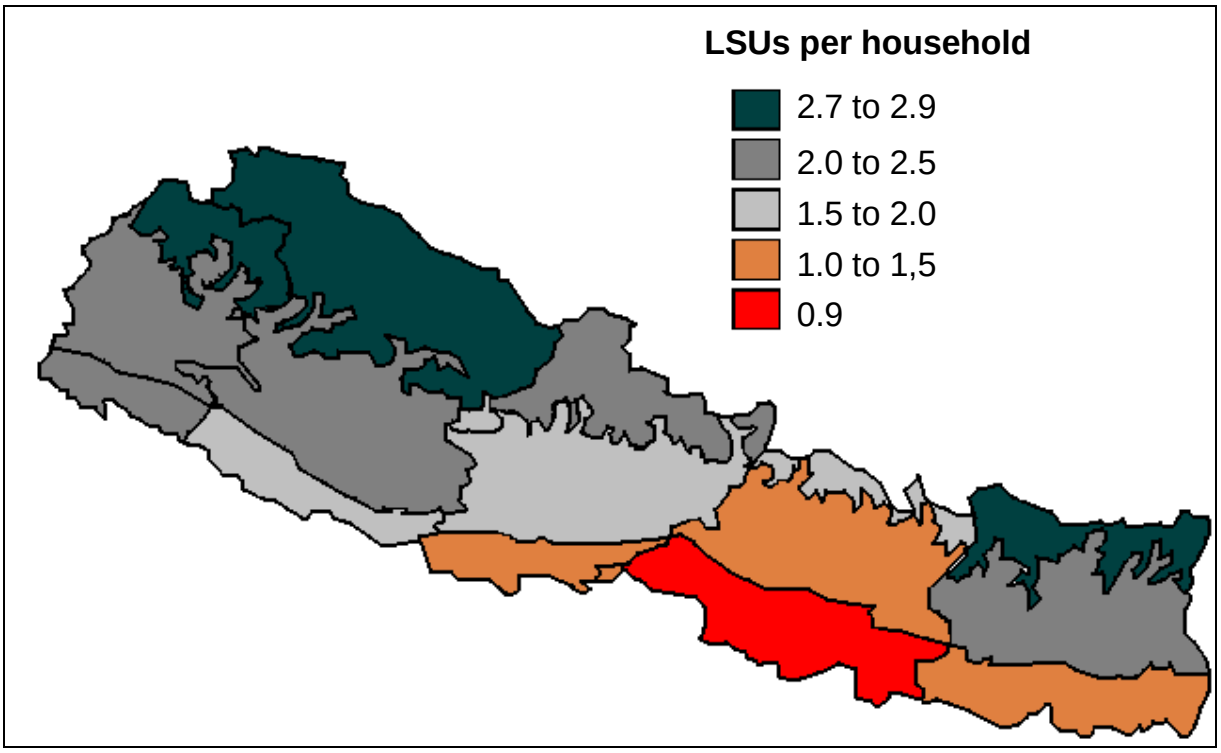
In conclusion, it would appear that the livestock economy is concentrated in the terai zones of the Eastern and Central Development Regions and the hill zones of the Eastern, Central, Western and Mid Western Development Regions (see Map 2).

Map 2. Proportion of LSUs in Nepal per geographical area in terms of Development Regions and Agro-Ecological Zones.



However, animals play a more important role in the livelihoods of the families in the mountain region than in the hills or the terai and in the Far Western and Mid Western development regions where there are more livestock units per household and person (see Map 3).

Map 3. The number of livestock units per household in the Development Regions and Agro-Ecological Zones of Nepal.



Therefore, livestock are probably a more important entry point in the mountains than in the other agro-ecological zones, and in the Far Western and Mid Western development regions because these geographical regions probably have fewer economic alternatives and have greater investments in livestock per person and family than the other regions of the country.

10.1.3.2 Livestock keeping households and meat and milk production

Two thirds of Nepalese households have land and livestock and five percent are landless livestock keepers. Therefore, 71.5% of all households in Nepal have livestock and/or poultry. The percentage of households with livestock or poultry is highest in the Mid and Far Western development regions (see Table 12).

Table 12. Number and percentage of households with land, livestock and poultry by development region (Modified from Informal Sector Research & Study Centre, 2002).

Development Region	Land Only	Livestock keepers								Other
		Landless				With land				
		Poultry	Livestock	Poultry & Livestock	Total	Poultry	Livestock	Poultry & Livestock	Total	
	Number of households									
Eastern	68,418	7,690	50,207	36,087	93,984	10,040	207,300	426,017	643,357	194,599
Central	181,337	6,201	46,091	14,753	67,045	18,059	394,246	395,235	807,540	409,831
Western	74,972	5,430	13,898	8,300	27,628	12,788	279,807	342,934	635,529	124,916
Mid Western	36,193	2,797	7,233	7,006	17,036	6,656	116,339	254,451	377,446	49,142
Far Western	25,321	2,222	5,354	4,406	11,982	4,703	190,902	108,366	303,971	24,127
Nepal	**386,241**	**24,340**	**122,783**	**70,552**	**217,675**	**52,246**	**1,188,594**	**1,527,003**	**2,767,843**	**802,615**
	Percentage of total households in the development region									
Eastern	6.8	0.8	5.0	3.6	9.4	1.0	20.7	42.6	64.3	19.5
Central	12.4	0.4	3.1	1.0	4.6	1.2	26.9	27.0	55.1	28.0
Western	8.7	0.6	1.6	1.0	3.2	1.5	32.4	39.7	73.6	14.5
Mid Western	7.5	0.6	1.5	1.5	3.6	1.4	24.2	53.0	78.7	10.2
Far Western	6.9	0.6	1.5	1.2	3.3	1.3	52.2	29.7	83.2	6.6
Nepal	**9.3**	**0.6**	**2.9**	**1.7**	**5.2**	**1.3**	**28.5**	**36.6**	**66.3**	**19.2**

The most important livestock species in terms of ownership are cattle followed by poultry and goats and then buffalo (see Table 13). It is noted that the yak, although important in some mountain regions, have a relatively small population in Nepal of around 38,000 head.

Table 13. Percentage of households keeping different livestock species by agro-ecological zone (National Sample Census of Agriculture for Nepal cited by Sharma and Banskota, 2000)

Agro-Ecological Zone	Percentage of households keeping:						
	Cattle	Buffalo	Yak	Goat	Sheep	Pigs	Poultry
Mountain	82.8	44.8	2.9	55.5	6.5	10.3	56.4
Hill	77.3	60.0	0.1	54.2	4.2	12.2	67.6
Terai	74.4	35.8	0.0	46.8	1.8	7.1	32.4
Nepal	76.6	48.5	0.3	51.3	3.4	9.9	51.9

The differences between the figures for livestock ownership in Tables 12 and 13 are related to different data sources, Table 12 is the more recent data and will be used in further analyses.

The number of livestock units per household with livestock and/or poultry is estimated to be 2.2, which is equivalent to just over two fully grown Holstein Friesian cows. The families in the Mid Western and Far Western development regions have more livestock than the families in the east of the country (see Table 14). The production of milk per household with livestock is estimated to be 360 litres per year and is highest in the Western and Far Western development regions (see Table 14). The production of meat from households with livestock and/or poultry is estimated to be 61 kilos per year and is highest in the Mid Western and Central development regions (see Table 14).

Table 14. Livestock units per livestock and poultry keeping household, estimation of milk production per livestock keeping household and estimation of meat production per

livestock and poultry keeping household (modified from Informal Sector Research & Study Centre, 2002 and Mathema and Joshi, 2000)

Development Region	Livestock Units ('000)	Households with livestock and/or poultry	LSUs per Household	Household With Livestock	Milk Production		Meat Production	
					Total (Mt)	Per household (litres)	Total (Mt)	Per household (kilos)
Eastern	1,645	737,341	2.2	719,611	230,472	320	41,795	57
Central	1,524	874,585	1.7	850,325	288,028	339	57,509	66
Western	1,385	663,157	2.1	644,939	280,584	435	36,605	55
Mid Western	1,159	394,482	2.9	385,029	121,420	315	26,951	68
Far Western	819	315,953	2.6	309,028	127,536	413	17,815	56
Nepal	**6,532**	**2,985,518**	**2.2**	**2,908,932**	**1,048,040**	**360**	**180,675**	**61**

Over two thirds of the milking cattle and buffalo are found in the Eastern, Central and Western Development Regions and these animals are concentrated in the hill agro-ecological zone of all the Development Regions and the terai agro-ecological zone of the Eastern and Central Development Regions of this area. Just over half of the milking animal population in Nepal are buffalo, with the Central and Western Development regions having the highest proportions of buffalo and the Mid-Western Development Region the lowest. The number of milk animals per person and per household and milk available per person is highest in the Far Western Development Region and lowest in the Central Development Region. However, the milk production per animal is highest in the Central Development Region and lowest in the Far-Western Development Region (see Table 15).

Table 15. Milking animal population and milk production by agro-ecological zone and development region (modified from Mathema and Joshi, 2000 and Mandip et al 2004)

Agro-Ecological Zone	Development Region					Nepal
	Eastern	Central	Western	Mid-Western	Far-Western	
	Milking animal population ('000 cattle and buffalo)					
Mountain	56	46	2	28	55	187
Hill	212	211	345	146	119	1,033
Terai	178	154	89	76	94	591
Total	**446**	**411**	**436**	**250**	**268**	**1,811**
	Percentage of milk animals that are buffalos					
Mountain	50.0	56.5	0.0	32.1	38.2	44.9
Hill	43.4	57.3	68.7	43.2	53.8	55.9
Terai	44.9	55.8	57.3	44.7	50.0	50.4
Total	**44.8**	**56.7**	**66.1**	**42.3**	**49.3**	**53.0**
	Milking animals per household					
Mountain	0.73	0.41	0.40	0.51	0.79	0.58
Hill	0.69	0.30	0.61	0.54	0.83	0.52
Terai	0.28	0.23	0.31	0.36	0.61	0.30
Total	**0.44**	**0.28**	**0.51**	**0.47**	**0.73**	**0.43**
	Milking animals per person					
Mountain	0.14	0.08	0.08	0.09	0.14	0.11
Hill	0.13	0.06	0.12	0.10	0.15	0.10
Terai	0.05	0.04	0.05	0.06	0.09	0.05
Total	**0.08**	**0.05**	**0.10**	**0.08**	**0.12**	**0.08**
	Milk production (Mt)					
Mountain	25,272	28,351	371	8,743	23,808	86,545
Hill	100,143	145,217	220,262	69,055	56,906	591,583
Terai	105,057	114,460	59,951	43,622	46,822	369,912
Total	**230,472**	**288,028**	**280,584**	**121,420**	**127,536**	**1,048,040**
	Milk production per animal (litres)					
Mountain	451	616	186	312	433	463
Hill	472	688	638	473	478	573
Terai	590	743	674	574	498	626
Total	**517**	**701**	**644**	**486**	**476**	**579**
	Milk per person (litres)					
Mountain	63	51	15	28	60	51
Hill	61	41	79	47	71	58
Terai	32	29	34	35	47	33
Total	**43**	**36**	**61**	**40**	**58**	**45**

A study by Tuluchan (1985) indicates that there is a strong seasonal variation in the production of milk in Nepal (see Table 16). These micro-level data agree with the observations of national level milk supply and are related to the "milk holidays", where the DDC do not buy milk during certain days of the flush milk production period (Upadhyay *et al.* 2000).

Table 16. Milk production from 5 villages (in Waling, Chilaunibas, Bhimad, Gandruk, Kobang) in different parts of Nepal (modified from Tuluchan, 1985).

Months Season	Mid Jun to Mid Sept Rainy	Mid Sept to Mid Dec Cooler, drier	Mid Dec to Mid Mar Cold, dry	Mid Mar to Mid Jun Hot, dry
Milch Animals/household	0.9	0.9	1.0	0.8
Production per animal	3.0	1.9	1.4	1.2
Production/household	2.3	1.9	1.5	0.9
Consumption	0.6	0.8	0.6	0.5
Milk for ghee	1.5	1.0	0.7	0.2
Milk sales	1.1	1.1	0.9	0.7
Ghee sales	1.8	1.7	2.5	0.7

Tuluchan (1985) found that the study village close to a market point sold fresh milk and about a third of the milk production was sold. The remainder of the milk was used either for home consumption or the production of ghee. In all the other study villages the milk is used for home consumption or the production of ghee. Two villages used half their milk for ghee production and in two villages ghee was sold as well as consumed. The study shows the importance of physical access to markets for dairy production and the cultural important of ghee as a product when there is a surplus of milk.

The marketing of milk is largely carried out by the informal and private sector, who are reported to have 90% of the market for milk products. Despite the relatively small size of the market occupied by the DDC they have a strong influence in terms of price setting and have also had an impact in the development of the private sector dairy development initiatives (Winrock International, 1994).

Table 17 shows that there is a large variation between the production parameters for local and crossbred cows, but in particular the level of milk produced. The calving interval parameters should be used with caution for reasons explained below the table.

Table 17. Production parameters for local and Jersey cross cows in the hill agro-ecological zone of the Eastern, Central and Western Development Regions (Joshi, 2002)

Geographical Region	Production parameter	Local	Jersey Cross	Reference
Eastern Hills	Body Weight (kg)	206	238	Jansen (1990) cited by Joshi (2002)
	Milk yield/lactation (kg)	455	700	
	Lactation length (days)	292	321	Shrestha et al (1988) cited by Joshi (2002)
	Calving interval (days)*	479	-	
Central Hills	Milk yield/lactation (kg)	549	1921	KLDF (1979) cited by Joshi (2002)
Western Hills	Milk yield/lactation (kg)	321	1100	Joshi et al (in press) cited by Joshi (2002)
	Lactation length (days)	242	287	
	First service after calving (days)	170	149	
	Calving interval (days)*	459	429	
	Butterfat in milk (%)	5.14	4.60	
	Puberty age (days)	1483	1222	

* The calculation of a calving intervals generally uses dates between two calvings for a cow and immediately excludes animals that only calve once during a study period. This measure is biased towards a fertility parameter for the more fertile females in a herd and therefore should be used with caution when calculating calving percentages.

Table 18 shows the data available on production parameters for local and Murrah cross buffalo cows. Whilst these animals produce more milk per lactation than cattle, they calve less frequently, with a calving interval of between 19 and 20 months for those animals recording more than one calving. They also have a higher age at first calving, the data presented shows the age at first calving was between 44 to 46.5 months.

Table 18. Production parameters for local and Murrah cross buffalo cows in the hill agro-ecological zone of the Eastern, Central and Western Development Regions (Joshi, 2002)

Geographical Area	Production Parameter	Local	Murrah x Local	References
Eastern Hills	Milk yield/lactation (kg)	836	1046	Shrestha et al (1988) cited by Joshi (2002)
	Lactation length (days)	396	321	
	Calving interval (days)*	602	596	
Pokhara Valley	Milk yield/lactation (kg)	837	1314	Henk (1988) cited by Joshi (2002)
	Lactation length (days)	396	408	
	Age at first calving (days)	1752	1679	
	Calving interval (days)*	573	576	
Western Hills	Milk yield/lactation (kg)	873	1469	Joshi et al (in press) cited by Joshi (2002)
	Lactation length (days)	352	367	
	Age at first calving (days)	1321	1398	
	Butterfat in milk (%)	7.48	7.53	

* The calculation of calving intervals generally uses dates between two calvings for a cow and immediately excludes animals that only calve once during a study period. This measure is biased towards a fertility parameter for the more fertile females in a herd and therefore should be used with caution when calculating calving percentages.

The study carried out by NDDB (2002) showed that one of the impacts of the differences in the dairy production parameters between cattle and buffalo in Nepal is

that milk production costs per litre are higher for buffalo than for exotic crossbreed cattle. Similar observations have been made by Upadhyay *et al.* (2000). Despite these observations, buffalo continue to be popular as milk animals in most regions of Nepal. It is suggested that these studies have failed to take into account some aspects of costs or cultural issues with regards cattle and buffaloes as milk animals.

10.1.3.3 Non-traded Goods

Livestock are important in Nepal not just for the production of goods that can be sold in the market, but also for products that are part of the general household economy e.g. manure and draught power for cropping etc. It is estimated that there are 2.7 million draught animals in Nepal and the majority of them are cattle bullocks (94%) (Rajbhandari and Pradhan, 1991 cited by Joshi, 2002). This indicates that the majority of the Nepalese cattle population is used primarily for producing draught animals, rather than milk production. Data showing the increasing proportion of milk production from buffaloes supports this assertion (Tuluchan, 2004).

Oli (1985 cited by Joshi, 2002) found that draught animals in the hills were used for an average for 62 days a year and those in the terai for 130. The author estimated that the draught animals generated 1.37 million kilowatts of energy and it was worth an equivalent of NCR 1300 million at 1984 prices.

Manure from cattle and buffalo is a key component of the cropping systems in Nepal. Joshi (2002) estimated that 33 million MT of manure are generated by these species each year, which if it was all collected it would have an equivalent value of US$ 58.75 million. However, the author stated that given the grazing systems for these animals it is unlikely that more than half the total manure produced is collected.

In addition, manure is of vital importance as a source of energy for cooking. Data from the 2001 census indicates that 10% of the households in Nepal rely on this as a source of energy and it is particularly important in the Eastern and Central development regions (see Table 19).

Table 19. The number of households in Nepal using cow dung for cooking by development region (Modified from Informal Sector Research & Study Centre, 2002).

Development Region	Number of households		
	Total	Using cow dung for cooking	
		Total	%
Eastern	1,012,968	175,469	17.3
Central	1,475,477	165,071	11.2
Western	863,045	65,271	7.6
Mid Western	534,310	10,010	1.9
Far Western	367,420	201	0.1
Nepal	**4,253,220**	**416,022**	**9.8**

It is also important to emphasise that livestock are an important source of protein in the rural households of Nepal.

The non-income livelihood functions that livestock keeping fulfils include:

- buffer stocks when other activities do not provide the returns required; as means of saving, accumulating assets, insurance and providing co-lateral for loans;
- as inputs and services for crop production;
- to capture benefits from common property rights (see later for the importance of communal forest areas) e.g. nutrients transfer through foraging on common land and forest areas and manure used on private crop land;
- for transport, fuel, food, fibre for the household; and
- to fulfil the social and cultural functions through which livestock ownership provides status and identity.

All of these functions can be identified as important for the livestock dependent poor in Nepal. The economic value of these functions has not been estimated and, therefore, their contribution to livestock GDP is unknown yet likely to be very significant.

10.1.4 Mountain Region

There are a number of excellent studies of different parts of the mountain regions of Nepal:

- Brower (1991) and von Fürer-Haimendorf (1984) in the Sherpa region
- Fricke (1993) the Tamang in Ankhu Khola
- Rogers (2004) in the Manang
- Vinding (1998) lower or south Mustang

Of striking note is the comment by Brower on the importance of livestock in this area:

"Livestock are central to the Sherpa way of life in Khumbu. Not all Sherpas own cattle, and only a few families are even dominantly dependent on livestock, yet agriculture, trade and nearly every facet of both traditional and transitional Sherpa life are intimately tied up with cattle and cattle keeping."

In a thorough study of this region Brower (1991) identifies a number of key roles for livestock in the mountain systems (see Table 20).

Table 20. Livestock roles in the Sherpa area of Nepal (summarised from Brower, 1991).

Role	Species	Importance	Comments
Manure	Yak is considered to produce the most valuable manure	Seen as being very important	Manure is even collected from fields where animals graze
Stock sales	Cattle and Yak crosses are sold to other areas	Stated by Brower as being the most important output	
Source of food	Yak, goats and cattle	Milk in tea, production of butter oil and churpi	Animals are not killed by the Sherpas, but they have no problem

Stevens (1996) has also carefully documented the livelihoods in the Sherpa region and provided a useful chart of the uses of different livestock in the area (see Table 21).

Table 21. Khumbu pastoral strategies in 1990 (taken from Stevens, 1996)

Livestock	Herd size	Economic Goals	Requirements
Yak (male)	2-6	Income from pack stock	High altitude herding huts. Hayfields
Nak (female)	15-35	Income from the sale of crossbreeds Manure Dairy products	High altitude herding huts. Hayfields
Dzopa	2-8	Income from pack stock	Winter stabling
Cows	1-6	Household dairy supplies Manure	Mid-altitude herding huts Winter stabling in village
Sheep	10-40	Wool, food, manure	None

What is important is that the livestock roles described by Brower (1991) are not static and have changed in the last 30 years due to external influences such as relations with Tibet, the development of the tourist sector, improving education and health of the local populations. In Stevens' study there is a description of change in the region, some of which relate to government regulations and enforcement, and others are about the adoption and adaptation of technologies. What is emphasised is that this is not a static community and that experimentation is an on-going thing for the Sherpa communities. Table 22 presents the changes that have taken place in this area over time.

Table 22. Changes in the use of cropping and livestock technologies by the Sherpas (adapted from Stevens, 1996)

Aspect	When	Introduction	Comments
Potato production	Introduction in the early 19th century	Source unknown	It is generally thought that this has allowed the expansion of the human population
Introduction of red and yellow potato varieties	In the last 30 years	Source from individuals	
Decline in Buckwheat cultivation	In the last 20 years		Change due to changing demands
Fodder crop production	In the last 20 years	Experimentation with wheat and barley as a fodder crop.	Adopted to feed Dzopa
Greater use of the Dzopa	In the last 20 years	Existed previously	Has become important as a pack animal, but requires more fodder than the yak
Animal herding	Constantly changing	Internal	Dependent on labour demands and labour costs

In the lower Mustang area Vinding (1998) states that livestock are of importance to the subsistence economy. Cattle and yak and their crossbreds are important in the production of manure, ploughing and transport. The crossbreed animal, particularly the male (Dzopa) is valued as a pack animal being able to carry up to 120 kilos. The Thakali people are reported not to slaughter cattle or yak, but the demand in the area is high enough for people to bring animals from Tibet for slaughter. There is

also insufficient supply of sheep and goat meat and this has to imported from Lo and Tibet. Butter and churpi are consumed, but the latter is also in short supply and is regularly purchased from outside the area. Despite these shortcomings of the livestock system in terms of satisfying demand, it is still an important source of cash income for many households. Of the most profitable livestock activities, the mule business is stated to be the single most important source of cash income. Mules are used to transport goods along the trade routes in the area.

Rogers (2004) studied the highland communities of Manang, the district to the north-east of Mustang. His study focuses on the success of the people in this region as entrepreneurs, who are well known as traders and business people in Nepal. In his examination of why this is the case, he finds that historically this region was important trading point bringing goods in from Tibet and exchanging them for products from the valleys and tropical areas of Nepal. In addition, the Nepali government gave the people in this region special rights, with easy access to passports and duty did not have to be paid on the goods imported and exported to Nepal. This encouraged further trading activities and increased awareness in business skills that have now been put to good use in the tourist trade. The role of livestock in this context was traditional one of pack animals to transport goods and more recently as pack animals for tourism.

Fricke (1993) describes a Tamang village community in the high mountain areas above the Kathmandu valley. It is an area where there are relatively few livestock per family and oxen are important particularly for draught power. Cattle make up just over 50% of the capital value of livestock holdings followed by sheep (18%) and goats (16%). Out of the total household capital including land, livestock contribute 14.5%.

In summary, the impression from literature is that the well studied mountain regions of Nepal have active and innovative people who adopt and adapt technologies according to their socio-economic reality. These communities are very dynamic and have undergone considerable changes over the last 30 years. Some of these changes have been stimulated by government with regard to access to common property resources and enforcement of restrictions of the slaughter of female animals.

10.1.5 Forestry and Livestock

One of the technologies/policies that has been examined by the project relates to access to forest areas. Nepal has a long history of forest management and in particular community forest management (Winrock, 2002). The reasons for this are obvious, with a growing population there has been a need to increase available land for livestock production and the collection of forest products. SEEPORT (2000) summarised the policies with regards to forest and rangeland in Nepal and their summary is presented in Table 23.

Table 23. Policies and action plans relating to forest and rangeland management in Nepal (SEEPORT, 2000).

Policies	Action plan	Responsible Agencies
Improve forest management by implementing the findings of the Master Plan for the Forestry Sector (MPFS)	Finalise the bye-laws for the implementation of the Forest Act 1993, ensuring they are consistent with HMGN forest policies stated in the MPFS and 8th Five Year Plan (1992-97)	MFSC
Encourage community participation in forest management. Improve rangeland management	Continue to promote community forest schemes in the hills	MFSC
	Undertake strategic assessments of Nepal's rangelands to improve the knowledge base	MFSC, MOA
	Clarify institutional responsibilities for rangeland management	MFSC, MOA
Encourage greater private sector involvement in managing national forests	Develop an appropriate system of incentives and regulations governing private sector management of forests. Review present system of open-ended subsidies which prevents the proper valuation of forests and undermines private sector involvement	MFSC
Reorient forestry research	Develop programmes to provide information (including utilisation of so far lesser known forest species) for users' groups, forest industries and private individuals	MFSC
Raise awareness of the importance of forest conservation	Develop the forest extension agents' role based on promotion and persuasion rather than enforcement and coercion	MFSC
Improve the basis on which land use is decided	Adopt a national land use policy classifying areas by their suitability for alternative uses	NPC, MFSC, MOA
Minimise adverse environmental impacts of forest-related projects	Finalise EIA guidelines for the forestry sector	NPC, MFSC
Promote research and development of alternative energy sources to reduce dependency on biomass sources	Finalise the energy sector strategy study and incorporate alternative energy development and promotion as an integral part of this strategy	NPC, WECS

SEEPORT (2000) detail the amount of money assigned to forest and rangeland management in Nepal during the 1990s and early 2000s. In total around US$ 240 million was assigned to such projects with an estimation of the creation of 6,370 forest user groups, 710,292 users and 450,523 hectares.

Ghimire (1998) examined the issues of the migration of landless and land poor people in the Nawalparasi District by collecting data from people who had settled in this District. Of the 160 households that were studied 72% had less than 0.3 hectares of land. The livestock holdings in these households were limited, with the most common species owned being poultry (three quarters of the households). In total there were 145 cows, 107 oxen, 17 buffalo, 14 pigs, 126 goats and 526 poultry. The most demanded type of animal were oxen as they could be used to plough land and also for share cropping activities. Their importance was related to being able to generate cash.

Acharya (2004) presents a summary of the impacts of different forest management regimes taking into account the environment and the social impact (see Table 24).

Table 24. Impacts of different forest management regimes (adapted from Acharya, 2004)

Forest Management Regime	Impacts
Protection-oriented (Passive Management)	• Limited forest products • Reduced productivity • Not necessarily increased biodiversity
Production oriented to major wood products (Active management)	• Increased productivity • Benefits to wealthier households • Decreased biodiversity
Production oriented for multiple products management (Active management)	• Increased productivity • Products benefits to poorer households • Increased/conserved biodiversity

Acharya's study argued in favour of multi-product forest management and as can be seen in the following tables some of the most important non-timber forest products (NTFPs) in Nepal are livestock related. Arun (2004) found that forest products were important in Nepali livestock systems for all socio-economic categories. However it was the richer households that collected greater quantities of livestock production type products and proportionally these products were most important in the households classified as being medium in the socio-economic class (see Table 25).

Table 25. Average value of NTFPs collected by different farm sizes over a 12 month period in an area with community forest in Nepali Rupees (Adapted from Arun, 2004)

Product	Small	Medium	Large	Total
General NTFPs	1,294	1,430	2,443	5,167
Thatch grass	606	1,235	2,551	4,392
Litter	717	1,652	1,508	3,877
Grass	2,642	5,732	5,356	13,730
Fodder	2,869	5,632	4,166	12,667
Fuel wood	1,554	2,742	2,752	7,048
Total	9,682	18,423	18,776	46,881
%	20.7	39.3	40.1	100.0
Total livestock related products	6,228	13,016	11,030	30,274
As a proportion of total forest products	64.3	70.7	58.7	64.6
As a proportion of the total livestock forestry related products collected	20.6	43.0	36.4	100.0

These results agree with the observations made Dev et al. (2003) and are similar for the work carried out by Malla *et al.* (2003) (see Table 26).

Table 26. Asset holdings of different wealth categories for families involved in community forestry user groups in Parbat and Myagdi, Nepal (Malla* et al. *2003)

Asset	Wealth Category[2]				All categories combined
	1	2	3	4	
Mean land holding per household (ha)	1.22	0.79	0.57	0.28	0.68
Mean number of livestock units per household[3]	4.9	4.5	3.7	3.0	4.0
Number of private trees owned	108	87	111	43	86

Malla *et al.* (2003) state that in their area of study livestock were a major capital asset. Buffalo were important for milk and manure production, cattle for draught power and manure and goats for meat. The richer households tended to own more buffalo and work oxen than poorer households, who had more goats. This study states clearly that in practice many of the livestock kept by the poorer households were actually owned by the richer households, with the profit from animal and product sales being shared (Malla, *et al.* 2003).

The amount of fodder used is similar per livestock unit for each wealth group, but in total is higher in the richer households. The proportion of fodder that comes from private sources falls from the richest to the poorest household group (see Table 27).

Table 27. Fodder source for different wealth categories in four forestry user group areas of Nepal (Adapted from Malla et al. 2003).

Fodder source	Wealth Category				All Categories
	1	2	3	4	
Total Fodder (kg)	17,640	17,040	14,310	11,250	14,970
Private source (kg)	17,070	15,930	13,050	9,810	13,830
Community forest (kg)	330	300	330	330	330
Government forest (kg)	0	90	240	450	210
Purchased (kg)	240	720	690	660	600
As a percentage of total fodder used					
Private source	96.8	93.5	91.2	87.2	92.4
Community forest	1.9	1.8	2.3	2.9	2.2
Government forest	0.0	0.5	1.7	4.0	1.4
Purchased	1.4	4.2	4.8	5.9	4.0
Fodder per LSU	3,600	3,787	3,868	3,750	3,743
Fodder per hectare	13,992	20,165	22,895	35,036	20,338

Richards *et al.* (2003) found more profound differences in livestock units than the study by Malla *et al.* (2003). This study also found that poorer households are more dependent on forest resources to meet their livestock production needs and a large proportion of this comes from the collection of grass and fodder. There is also importance in terms of grazing in forest for livestock production. For the poorest

[2] 1 = sufficient to eat for 12 months (18.4%), 2 = sufficient to eat for 9 months (29%), sufficient to eat for 6 months (25.1%), 4 = work on daily wages for 12 months to survive (27.5%)

[3] These researchers have used 1LSU = 0.8 buffalo, = 1 cattle = 5 goats. Note this is different from the LSUs used in other analyses presented in the document where the standard unit is a fully grown cow in a temperate situation.

families this is associated with cattle and goat production. Only the middle wealth category household graze their buffaloes in the forest (see Table 28).

Table 28. The use of forest products for livestock in the Dhankuta and Terhathum Districts of Nepal (Richards* et al. *2003)

Indicators of Livestock consumption of forest products	Wealth Rank[4]			
	Very poor	Poor	Mid-wealth	Richer
Livestock Units per household	2.4	2.8	6.4	7.3
KG grass	88,800	75,600	135,900	192,900
KG Fodder	56,100	46,800	79,500	131,100
No. cattle/oxen grazing days per household	708	761	1,461	1,386
No. buffalo grazing days per household	0	54	149	0
No. goat grazing days per household	378	324	1,903	1,882
Total kg TDN equivalent forest products per LU	1,319	1,048	891	865

The collection of fodder and grass from the forest area is predominantly a woman based activity, but in the richer households women are less involved. In the very poor households a significant contribution to fodder collection is made by children and Richards et al. (2003) state that this may help explain school absenteeism.

Adhikai (2004) in a study on the transactions of being part of forestry user group in Community Forests in 8 different groups in two districts of the mid-hills of Nepal found that while in general the transaction costs for poorer families were lower than for better off households, as the percentage of total costs there were significant for this group (see Table 29).

Table 29. Transaction costs of belong to a community forestry user group (Adapted from Adhikai, 2004).

	Poor	Middle	Rich
Number in the sample	81	136	92
Average transaction costs	816	1227	1913
Transaction costs as a percentage of total costs	14	12	9

As can be seen by the data presented above, livestock and forestry in Nepal are very closely linked. Therefore, changes in forestry policy, particularly with regards to access to forests have important impacts on livestock production and hence on livelihoods. These impacts can be particularly severe for poorer households where a change in forest access in Humla is reported to have contributed to food insecurity (Winrock, 2002). In the Sherpa mountain area, changes in access to forest have led to the poorest families switching from goat to dzopa production.

10.2 POLICY ENVIRONMENT

The Nepal Government has a high regard for planning of its economy, which can be seen from its reliance on 5 year economic development plans that have been in existence for the last 50 years. In addition to these general plans, the agricultural and livestock sectors have developed their own plans. At one stage in the 1990s there were as many as five overlapping plans running together: Ninth Plan;

[4] Wealth ranking carried out with key informants

Agricultural Perspective Plan; Livestock Master Plan; Dairy Development Plan; and Third Livestock Development Plan (see Table 30).

Table 30. Summary of Livestock and Dairy Development Plans and Programmes (modified from Sharma and Banskota, 2000; NDDB, 2001).

Plan or Programme	Period covered or established	Main Objectives	Strategies or components
Dairy Development Section	1953-54	Organise the dairy sector	
Department of Agriculture, Dairy Development Commission	1955	Guide development in the dairy sector	
Dairy Development Corporation	1969	Consolidate all dairy development activities by: 1. Supplying hygienic milk and other dairy products to the consumers 2. Providing a secure market and incentive prices to the rural milk producers 3. Encouraging producers to produce and sell more milk	Establishing milk collecting and chilling centres, milk supply schemes and providing technical and organisational support.
First Livestock Development Project	5 years (1973/78)	To improve the animal health and production and hence increase rural income and employment particularly of smallholder farmers. (total of US$12 million financed by ADB and UNDP and implemented by HMG/N)	• Diagnostic support facilities for improving animal health • Establishing resources centre • Fodder production • Improving livestock and artificial insemination services
Second Livestock Development Project	5 years (1986-1992)	To reduce livestock mortality, improve health productivity, increase livestock feeding resources, raise level of livestock nutrition through improved livestock management, improve smallholder farmer income and reduce imports of livestock and livestock products (total of US$8.8 million with ADB financing US$6.9 million, UNDP providing US$1.4 million in technical assistance and HMG/N providing US$ 0.5 million)	• Animal health improvement • Animal nutrition and fodder development • Animal breeding improvement • Intensive livestock development • Institutional development
Livestock Master Plan	20 Years (1990 to 2010)	Provide a basis to increasing income and employment for livestock farmers through increased production and productivity	• Improving animal productivity and management of livestock development • Encouraging private sector participation • Improving service delivery • Improving human capital • Enhancing institutional capacity
Ten Year Dairy Development Plan	10 Years (1990 to 2000)	Introduce and apply productivity raising technology and improve the conditions of dairy farmers	• Restructuring DDC into an independent autonomous commercial enterprise • Developing NDDB for planning, coordinating and financing of dairy development • Amalgamation of all dairy extension services of DLS involving MPA and cooperatives in the delivery of support services to their member farmers.
National Dairy Development Board	1992	• Assist HMG in formulating policies and plans of dairy development • Developing dairy industries through livestock	

Plan or Programme	Period covered or established	Main Objectives	Strategies or components
		development and animal health sector • Maintain coordination between the entire private and public dairy sector within the country • Carry out high-level research for dairy development	
Agricultural Perspective Plan	20 Years (1995/96-2014/15)	• Accelerate the growth in agriculture • Transform the subsistence agriculture into commercial systems • Expand opportunities for economic transformation by achieving precondition of agricultural development • Livestock is a key contributor to poverty alleviation and employment generation, specifically for women • Milk production planned to increase at 5 to 6% per year during the plan (see Table 32 for regional targets for livestock GDP growth) • Livestock products including milk and milk products are considered to be demand driven • The demand for these products will be influenced by increases in per capita income and population growth	• Identify immediate short term and long term strategies for implementation • Provide guidelines for preparing periodic plans and programmes for the future
Third Livestock Development Project	6 years (1997/98 to 2002/3)	To improve nutrition income and employment opportunities for farmers and provide resources to the poor rural people through improved products mainly meat, milk and eggs.	• Livestock productivity improvement • Expansion of agro processing • Marketing and institutional strengthening • Organisational development
Ninth Plan	1997/98 to 2002/3	• Has embraced the targets set for the agricultural sector in the Agricultural Perspective Plan. • Privatisation of public corporations including Dairy Development Corporation • Farmers are not charged for services provided by the Government, but they receive no direct subsidies.	•

The Agricultural Perspective Plan has set targets for the different agroecological zones of the country over the number of years of the plan (see Table 31).

Table 31. Regional annual growth rate targets for livestock GDP set by the Agricultural Perspective Plan.

Period	Target Annual Growth Rate (%)			
	Mountain	Hill	Terai	Nepal
1992-95	2.98	2.94	2.79	2.89
1996-00	4.38	4.30	3.94	4.17
2001-05	5.60	5.47	5.00	5.31
2006-10	5.96	5.82	5.39	5.68
2011-15	6.37	6.23	5.83	6.10

It is clear from these plans and programmes for the agricultural and livestock sector that the Government believes it is able to set targets and meet them. There seems to be little awareness that agricultural and livestock production will be stimulated by demand, although this has been mentioned in the Agricultural Perspective Plan. As Tulachan and MakiHokkonen (2002) state past policy measures have largely failed to recognise grassroot realities and most programme interventions have been top down and supply driven. This is particularly relevant for livestock products where general economic development is known to stimulate greater demand for meat and milk products (Delgado et al, 1999). While governments can facilitate growth in the livestock sector by creating an environment for the exchange of goods, technology

and knowledge, they cannot make farmers produce livestock products where there is no demand.

In addition to this planning bias, the level of analysis, monitoring and evaluation of the livestock sector appears to be weak. In the previous section, it is shown that there are very different levels of livestock sector development and livestock dependency in the different agroecological zones and Development Regions. However, there is no mention of targeting resources for livestock development by geographical area, not just by agroecological zone, but also Development Region. The following Chapter will present data that in addition to macro level targeting of resources there is a strong need for micro targeting to ensure that the poor and smallholder farmers benefit from livestock development initiatives.

The Nepal government continues to pursue an agricultural led economic development plan. There are references to the proportion of the GDP from agriculture increasing (see Mandip et al, 2004). In countries that are aiming to improve living standards and reduce poverty, the agricultural sector will have to be strong, but as the economy grows its contribution to GDP and employment will fall. Analysis by Laurent Chazee (personal communication) indicates that a policy to keep people in the agricultural sector will not solve Nepal's poverty problems.

10.2.1 The Future – The Tenth Plan

The first paragraph of the Tenth Plan (HMG National Planning Commission, 2003) states that:

"The overriding objective of development efforts in Nepal is poverty alleviation. In spite of noticeable progress achieved over the past decade, there is still widespread poverty. The Tenth Plan represents a renewed commitment by His Majesty's Government of Nepal to this all-important task. Its sole objective is to achieve a remarkable and sustainable reduction in the poverty level in Nepal from 38% of the population at the beginning of the Plan period to 30% by the end of the Tenth Plan, and to further reduce the poverty ratio to 10% in fifteen years time."

Despite this clearly stated objective and also reiterated in the objective for the agricultural activities within the Tenth Plan, the indicators and outcomes for the agriculture and livestock sectors are primarily based on increasing production and productivity (see Table 32). In addition, the indicators are focussed on measuring inputs by the Plan and not on the impact of actions or changes in terms of production, productivity and poverty alleviation.

Table 32. The agricultural objective, strategies, activities, indicators and outcomes for the Tenth Plan (HMG National Planning Commission, 2003)

Objective	Strategies	Activities	Intermediate Indicators	Outcome
Increase agricultural production, productivity and income for food	Expand the use of available modern technology	Enhanced farmer's group based technology dissemination system and capability enhancement of staff and farmers groups (Continued)	Increased number of effective farmers groups	Need based location specific technology recommendations available and dissemination system in place

security and poverty reduction		Promote research, development and extension for food security in severely food deficit districts (Continued)	Coordinated need based research and extension programs for severely food deficit areas (specially remote) in operation.	More diversified production system and enhanced commercialisation
		Enhance balanced use of agro-chemicals (Continued)	Increased number of integrated pest management and other farmers field schools	Overall agricultural growth by 4.1 %
	Increase farmers access to modern agricultural input and credit	Enhance market based environment for increasing fertilizer supply and uses (Continued)	Increased supply and uses of fertilizer	Crops production increased by 4.1%
		Enhance rural banking activities (ADBN/Rural Banks) for effective credit delivery (Continued)	Increased flow of credits	Livestock production increased by 4.9%
		Strengthen regional research farms, stations and private sectors resources for ensuring quality seeds/breeds/planting materials production and supply to the local multipliers/nurseries (Continued)	Increased supply of quality seeds/breeds/planting materials to local multipliers	Enhanced agricultural productivity
	Promote diversification and commercialisation in crops/livestock production system	Implement intensive agriculture program in year round irrigated areas (Continued)	Increased number and coverage of intensive pockets in year round irrigated areas.	Reduced food insecurity and significant contribution to income increases and reduction in malnutrition and poverty in rural areas
		Provide incentive and appropriate support package for expansion of ground water irrigation and on farm management (Continued)	Increased number of shallow tubewell and improved efficiency of farm water uses.	Increased marketed volumes of agricultural products and diversified agricultural export
		Intensify production of high value crops/livestock commodities in potential pockets (Continued)	Increased areas and coverage of high value crops/commodities	
	Include NGOs/private sector involvement in partnership and contract in agricultural service delivery system	Ensure involvement of private sector/NGOs/CBOs and local bodies in extension service delivery (Continued)	Increased involvement of NGOs/CBOs/private sector in service delivery.	
	Improve effectiveness of planning, monitoring and evaluation (PME)	Enhance PME capabilities at all levels (Continued)	Improved database and regularized reporting and review system in place	
		Ensure effective, transparent and timely reporting and review system (Continued)	Printed monitoring reports in regular basis	
	Decentralise research and extension	Devolve DOA/DLS extension activities to local bodies and ensure operational effectiveness and technical backstopping to them (Continued)	Decentralised extensions are fully functional by 2004	
		Decentralise NARC's adaptive and on farm research activities to Regional Agricultural Research Centres (RARCs) (2005)	Decentralised NARC's research to RARCs in place by 2004	

Develop local and export market opportunities		Coordinate the expansion of agricultural roads and rural electrification (Continued)	Increased investment in agricultural road and electrification	
		Develop commodity policies for congenial environment for private sector investment (Continued)	Commodity policies developed for major commodities by 2004	
	Encourage private and cooperative sectors involvement for market promotion and infrastructure development.	Emphasize on marketing research, flow of market information and development of market infrastructure (Agro industry, collection centre, wholesale and retail outlets) (Continued)	Increased number of market infrastructures and continuity in market research and information flow.	
		Promote conducive tariff rate for agricultural export and import (Continued)	Conducive tariff policies in place	
		Regulate/facilitate agro-processing and standardisation (ongoing)	Regulatory services in place	
	Promote cooperative and contractual farming	Facilitate legal arrangements for cooperative and contractual farming (2004/5)	Legal arrangement for contractual farming in place by 2004	
			Cases of cooperative and contractual farming in place after 2004	

10.2.2 Land Tenure

Land is crucial input to nearly all livestock production systems in Nepal. Land tenure has seen a number of changes over the last 50 years, but one of the important issues is that the current laws place a ceiling on the amount of land that can be owned or tenanted. In addition, land ownership has regularly been used as a means of raising taxes. In areas where it was difficult to measure the amount of land owned this has been done through the amount of seed purchased and sown (Caplan, 2000). The changes in land tenure laws have also created confusion and uncertainty leading to land being left fallow as the owners do not want to rent it out for fear of losing their rights to it (Yadav, 1999).

The current ceilings on land ownership and rental are shown in Table 33.

Table 33. Ownership and tenancy ceilings in different parts of Nepal (from Thapa et al 1995 quoted by Gill, 1996)

Land Category	Maximum area (hectares)		
	Terai	Kathmandu Valley	Other Hill Districts
Agricultural Land	16.4	2.7	4.1
Homestead	2.0	0.4	0.8
Tenant-operated	2.5	0.5	1.0

Obviously one method to increase productivity from land and in a way increase land area is the use of irrigation and fertilisers. There have been initiatives to support irrigation use particularly in the Terai where there is greatest potential, but this has not been smoothly implemented (Koirala, 1998). One of issues raised was the requirement for a minimum landholding before a loan could be give for a shallow tubewell. Incomplete privatisation and liberalisation (Sharma, 1994) in the early

1990s has also hampered fertiliser supply (Gill, 1996) leading to lower than anticipated growth in yields from the major grain crops (Gill, 1996). The implications from these problems are that there are greater pressures to expand land areas through the use of communal land resources such as forest. This in turn has implications on the environment and in areas where forests are important (as shown above) for livestock production, in terms of fodder and forage access.

10.2.3 The Specific Technology Areas and Policies that Relate to Them

As mentioned in the methodology section the project selected the following technological areas:

1. Milk production & processing.
2. Integrated animal feed resource development on marginal and degraded land (Hills Leasehold Forestry).
3. Forage and pasture improvement technology.

The following sections will provide some details of government activities with regards these technology areas.

10.2.3.1 Milk production and processing technologies

Dairy development activities in Nepal began in 1952 with the establishment of a Yak cheese factory in Langtang of Rasuwa district under FAO assistance in 1953. In 1954, a Dairy Development Section was established under the Department of Agriculture (DoA) and also a small-scale milk processing plant was started in Tusal, a village of Kavre district. In 1956, a Central Dairy Plant, with an average milk processing capacity of 500 litres/hr was established in Lainchaur, with the financial assistance from New Zealand and technical assistance from FAO. Around the same time, a second mini milk processing plant was established at Kharipati, in Bhaktapur district. The plant started processing of milk and marketing activities from 1958. Before 1960, two cheese factories were also established by the DoA.

The Dairy Development Corporation (DDC) gradually established more Milk Supply Schemes to meet the growing demand for processed milk and milk products. For example, Biratnagar Milk Supply Scheme (BMSS) was established in 1973, Hetauda Milk Supply Scheme (HMSS) in 1974, Kathmandu Milk Supply Scheme (KMSS) in 1978, Milk Products Production and Supply Scheme (MPPSS) in 1979 and Pokhara Milk Supply Scheme (PMSS) in 1980. Many of the DDC Schemes were rehabilitated with DANIDA assistance to increase plant capacity from 74,000 to 180,000 litres/day. The schemes are involved in collection of milk processing and sales of milk and milk products.

In 1992, the government established a National Dairy Development Board (NDDB) as an autonomous overseeing policy-making body for dairy development in Nepal (National Dairy Development Board Act, 2048 B.S. part of Ten Year Dairy Development Plan). This decision was made in cooperation with the Danish Government.

All the livestock development projects from the 1980s have had components that have been directed at the dairy sector. The First and Second Livestock Development Projects focussed on animal health, feed management, improving income from smallholder livestock farms and livestock product import substitution. The Third project has emphasised more the need for marketing and productivity improvements, but as mentioned above productivity has been restricted to output per animal.

In addition to the specific livestock projects, there have been other more general development projects, which have contributed to milk production and processing technology, with the objective of dairy sector development. For example, the Rasuwa-Nuwakot Rural Development Project financed by a World Bank loan (US$ 23.5 million) included the following livestock components:

- Credit for the purchase of milch animals, small ruminants and dairy equipment;
- Intensive livestock development: through provision of programmes for animal health, nutrition, feed and fodder and better animal breeds;
- Veterinary and extension facilities: through expansion of veterinary hospitals and provision of new livestock centres and related equipment,
- Training programmes for Animal Health Workers to provide private animal health services
- Feed and fodder development such as the promotion of cultivation of legumes, forage and fodder planting; and
- Breed improvement through sire distribution and development of breeding stock for buffalo, cattle, sheep, goats and yaks.

Similarly, the Integrated Hill Development Project funded by the Swiss government (USD 5.3 million), supported pasture development, veterinary services and training of the district agriculture development offices.

Government support for the Nepali dairy sector has covered a range of technologies from fodder, feed and breed improvement, animal health services to processing and marketing of milk and milk products. In addition, the private sector has been involved in the importation of improved buffaloes from India and the establishment of small-scale animal feed plants were established by the private sector.

10.2.4 Hills Leasehold Forestry and Forage Development Project (HLFFDP)

The Hills Leasehold Forestry and Forage Development Project (HLFFDP) was developed out a realisation that within Community Forestry[5] projects (Winrock, 2002) there was inadequate focus on poor families (Yadav and Dhakal, 2000). The project had two objectives:

[5] Note there are five different types of forest in Nepal: national, community, private, religious and leasehold. Leasehold forest was only officially recognised in 1989 (Yadav and Dhakal, 2000).

- To help poor families in having access to land (the families were identified as being poor on the basis of having less than 0.5 hectares of land and a per capita family income of less than Rs. 3,035 (1996/97)
- To stop degradation of land that was or had been forest.

Yadav and Dhakal (2000) state that the project was first devised in 1991, but implementation did not begin until 1993 and was due to close in December 2003. HLFFDP involved four institutions:

- Department of Forest who helped in the identification of leasehold forestland, helping the poor in the preparation of operational plans and facilitated lease approval from the Ministry of Forest & Soil Conservation.
- Department of Livestock Services who provided animal health and breed improvement services, planting materials and training related to livestock and fodder production.
- Nepal Agricultural Research Council who identified the target families, assisted in group formation and helped in organising credit.
- Agricultural Development Bank of Nepal who provided credit through the Small Farmers Development Programme.

The original project was focussed in four districts: Kavre, Sindhupalchowk, Makwanpur and Ramechhap, but was later extended to cover a further six districts which were: Sindhuli, Dolakha, Dhading, Chitwan, Tanahun and Gorkha. In 1999 it was reported that the project covered 5,553 hectares of degraded forest and 8,773 poor families organised into 1,306 leasehold groups (HLFFDP, 1999 cited by Yadav and Dhakal, 2000).

HLFFDP had a total projected cost of US$ 20.4 million, which was to be financed by an IFAD loan, a US$ 3.4 million grant from the Royal Netherlands Government for the Technical Assistance component implemented by FAO, and contributions of US$ 2.7 million and US$ 1.5 million from the HMG/N and participant-farmers, respectively. The amount of the IFAD loan has twice been reduced, most recently to around US$ 6 million. HMG/N cut its contribution by 50 percent due to additional security expenses during the insurgency, and the Dutch-funded grant eventually totalled US$ 4.85 million spread over two phases. In 1999 it was reported that the project had spent US$17 million, which would translate to US$3,061 per hectare of degraded forest, US$1,937 per family or US$13,016 per leasehold group.

The specific objectives of HLFFDP were the increased supply of fodder and forage for livestock and the provision of the income-earning possibilities from livestock and other sources. These objectives were to be achieved by following interventions:

- Development of the degraded lands through a ban on grazing in the leasehold sites and a supervised process of land management and plantation.
- Increase of livestock productivity through the provision of subsidised high-yield exotic grasses and of improved breeds of animal, strengthened

veterinary services and appropriate training programmes, and the provision of subsidised agricultural credit.

- Development of on and off farm income generating activities such as cultivation and sale of seeds, grasses and bamboo, poultry-rearing and beekeeping.
- Strengthening of government technical support through technical assistance, incremental staff and equipment and vehicles;
- Training programmes for government officials and participating farmers and applied research to develop suitable technologies of land development and forage and fodder development;
- Local infrastructure (bridges and trails) and provision of improved cooking stoves.

Livestock were seen as key component (Yadav and Dhakal, 2000). Buffalo was viewed as the most important species as it utilizes low quality forages, and produces more milk than local breed cattle. Goats are also popular for their ability to generate cash income (Shah, *et al* 1998; HLFFDP, 1996), ease of sale and their easy management. Forage and livestock development activities focussed on grassland and shrub land development, intensive cropland based forage production and improvement of livestock genetic quality, health and management (HLFFDP, 1996). In the project sites, these activities were supported by technical assistance, training, extension and research programmes, and also by the free distribution of seeds and planting materials to the participating farm families (Ibid, 1996).

In the three agro-ecological zones of Nepal, participatory trials were conducted on forage species establishment using the Integrated Research, Development and Extension Training (IRDET), developed by the Pasture and Forage Research Division of NARC. Technical packages developed from these trials were reported as being simple, affordable and sustainable at marginal farm level. Costs and minimum inputs were also determined for reclaiming degraded land through pasture legume establishment.

The main problems with the project were identified as being:

- Lengthy process to get approval for the operational plan for leasing forest area to groups of poor families.
- Priority to community forestry over leasehold forestry for poor. Communities had to agree to assign forest areas to the poor before a plan and leases could be issues. This appears to have led to only the worst land being assigned to the poor and potentially very little land in total (it is estimated that only 0.63 hectares on average have been leased to each beneficiary family)
- Right of inheritance of leasehold members. The leaseholds are given to the individual and not the family and there is no clear legal statement on the status of the lease if this individual dies.
- Reasons for rejecting a lease application were not given.

- A general format for an operational plan and its renewal was not given.
- Continued dependence on National Forest to satisfy needs of firewood and fodder. This probably relates to the small quantities of land and the poor quality of land assigned to the leasehold projects.
- Insecurity of forest products from leasehold forests. The areas assigned to the leasehold forest were still open to use by other villagers.
- Inadequate institutional support for sustainable development.

Pande (1997) in a review of livestock policies and actions on fodder and pasture development in Nepal, mentions the HLFFDP but fails to state that this project had a strong poverty focus and a coordination of different government institutions. This author later states that fodder and pasture projects have been hindered by the involvement poor people's participation (Pande, 1997 page 44). While this view may be a constraint it is hardly politically correct in a country where a very high proportion of the farming community would be regarded as being poor. This comment somewhat mars a book that provides a wealth of important information on fodder and pasture research in Nepal.

The interesting issues from this intervention are the coordination of different parts of the government and the provision of inputs in terms of land tenure, credit and technical inputs with a very focussed approach to people viewed as being poor.

10.2.5 Forage and pasture improvement

High Altitude Northern Area Pasture Development Project was initiated as a priority programme under the directive of His Majesty the King in 1988. With UNDP funding (US$ 0.9 million), this project aimed to improved pasture and fodder and access to grazing lands in the northern border districts. The project objectives were as follows.

- The testing of improved pasture systems and new cultivars in the four emergency districts of Mustang, Humla, Sindhupalchok and Dolakha.
- The dissemination through demonstration training and extension work of improved forage techniques that can provide adequate livestock nutrition throughout the year.
- An assessment of current and potential pasture production in the four emergency districts and the six other remote districts covering a total area of 33,505 sq.km.

The project introduced exotic grasses and legumes; promoted forage conservation methods; provided animal drinking water and irrigation facilities to open new grazing areas; established silvipasture combining fodder trees and improved forage species; constructed tracks to previously inaccessible pasture areas and survey pasture lands.

10.3 SUMMARY

The cash livestock economy is dominated by milk and milk products produced from buffalo and cattle. However, the key output from cattle in Nepal appears to be

draught power. This explains why cattle are not highly regarded as milk producing animals. In addition, livestock produce manure critical for cropping activities throughout the country and important as a source of energy for cooking in the Eastern and Central Development Regions. Livestock also provide important sources of protein for rural households.

The livestock sector and economy is concentrated in the hills of the Western, Central and Eastern Development Regions and the terai of the Central and Eastern Development Regions. This geographical area is the most developed part of Nepal. However, the area, with the exception of the Eastern hills, have less dependency on livestock per family and per person, than other areas of Nepal. The pattern would suggest that the more economically developed parts of the country have a larger and more active livestock economy, but the families in these areas are less dependent on livestock to maintain their livelihoods, i.e. the economy is more diverse. In the less economically developed and poorer parts of Nepal, the livestock economy is smaller, but the families are more dependent on animals. From the macro level data it would appear that livestock dependency is associated with poverty and underdevelopment.

The focus of the livestock sector is often on non-commercial production, and there are differences across the country in terms of the level of livestock commercialisation, livestock dependency and investments in livestock. What is clear is that the majority of the livestock systems are part of mixed-farming systems where livestock output is either an input to the agricultural systems, a part of home consumption or a commercial output. In addition, many families rely on communal land and forest areas to keep livestock. The forest areas appear particularly important to the poorer families in the rural areas and are a means of having access to land resources.

There has been no shortage of policies, plans and projects to support the Nepali livestock sector over the last 20 or 30 years. A large proportion of these actions have been directed at the development of the dairy sector, but there have also been heavy invests in the forestry sector where many of the benefits are derived from livestock production. In regions with communal pasture land there have also been programmes to support pasture improvement in these areas.

11 RESULTS AND ANALYSIS FROM THE STUDY SITES

The results chapter is divided into two sections:

- An analysis of the secondary data available from each study district; and
- An analysis of the primary data collected.

11.1 SECONDARY DATA ANALYSIS

11.1.1 Lalitpur District

According to the 2001 census, the Lalitpur District has a total human population of 337,785 people and 45% of this population is found in the urban areas. The literacy rate for the District is 70% and the Human Development Index is 0.523, both figures are well above the national average (Informal Sector Research & Study Centre, 2002). Over the last 30 years the Lalitpur District has experienced more than a doubling of population, a reduced average household size and a dramatically improved literacy rate. The population density in the District has risen rapidly during this period (see Table 34).

Table 34. Human population, number of households, household size, literacy rate and population density from 1971 to 2001 in the Lalitpur District (Informal Sector Research & Study Centre, 2002).

Data	1971	1981	1991	2001
Population	154,998	184,310	257,086	337,785
No. Of Households	26,578	29,943	45,682	68,922
Average Household Size	6	6.2	5.6	4.9
Literacy Rate (%)	25	37.1	63.8	70.77
Population density (persons/sq km.)	375	429	668	877

Of the study VDCs, there has been a population increase in Chapaguam over the last ten years and a reduction in population in Dhusel. The number of households in Chapaguam has increased more rapidly than the population and hence the household size has reduced (see Table 35).

Table 35. Number of households, human population and household size in the Chapaguam, Devichaur and Dhusel VDCs of Lalitpur District in 1991 and 2001(modified from Informal Sector Research & Study Centre, 2002).

VDC	1991 Census			2001 Census		
	Number of households	Population	Household Size	Number of households	Population	Household size
Chapaguam	1,643	9,600	5.8	2,390	12,448	5.2
Devichaur				487	2,734	5.6
Dhusel	294	1,715	5.8	257	1,589	6.2

Just over a quarter of the households in Lalitpur District have livestock, which is lower than for the Central Development Region and for Nepal in general. A fifth of households in the District have land and just over half have neither land nor livestock, both these figures are considerably higher than the regional and national averages (see Table 36).

Table 36. The number of households with land, poultry and livestock in Lalitpur District, Central Development Region and Nepal (modified from Informal Sector Research & Study Centre, 2002).

	Land only	Livestock keepers								Nothing
		Landless				With land				
		Poultry	Livestock	Poultry & Livestock	Total	Poultry	Livestock	Poultry & Livestock	Total	
Number of households										
Lalitpur	14,548	362	505	260	1,127	1,648	9,233	7,283	18,164	35,083
Central	181,337	6,201	46,091	14,753	67,045	18,059	394,246	395,235	807,540	409,831
Nepal	**386,241**	**24,340**	**122,783**	**70,552**	**217,675**	**52,246**	**1,188,594**	**1,547,003**	**2,787,843**	**802,615**
Percentage of total households										
Lalitpur	21.1	0.5	0.7	0.4	1.6	2.4	13.4	10.6	26.4	50.9
Central	12.4	0.4	3.1	1.0	4.6	1.2	26.9	27.0	55.1	28.0
Nepal	**9.2**	**0.6**	**2.9**	**1.7**	**5.2**	**1.2**	**28.3**	**36.9**	**66.5**	**19.1**

The Lalitpur District produces 4% of the national egg production. Estimates of the production of eggs per laying bird indicate that Lalitpur has a larger proportion of its laying flock in semi-intensive and intensive systems than other regions of the country (see Table 37).

Table 37. Poultry laying population and egg production in Lalitpur, Central Hills, Central Development Region and Nepal in 1997-98 (modified from Mathema and Joshi, 2000).

Region	Laying population		Egg Production ('000 eggs)			Production bird		
	Hen	Duck	Hen	Duck	Total	Hen	Duck	Total
Lalitpur	151,516	2,434	17,325	204	17,529	114	84	114
C.Hills	1,362,643	15,790	132,965	1,073	134,038	98	68	97
C. Region	2,325,400	56,240	205,962	4,107	210,069	89	73	88
Nepal	5,181,880	218,669	424,910	16,000	440,910	82	73	82

The Lalitpur District is not particularly important at national level in terms of production of meat or milk (see Tables 38 and 39). Buffalo meat is the most important part of meat production followed by poultry meat and then goat meat. The availability of meat per person is slightly lower than the national average at 7.1 kilos.

Table 38. Meat production (MT) by species in Lalitpur District, Central Hills, Central Development Region and Nepal (modified from Mathema and Joshi, 2000).

Area	Buffalo	Mutton	Goat Meat	Pig Meat	Chicken	Duck	Total Meat
Lalitpur	1,370	22	268	210	539	2	2,411
Central Hills	22,911	165	3,294	1,922	4,034	21	32,347
Central	40,101	354	8,770	2,603	5,606	74	57,509
Nepal	**117,350**	**2,903**	**35,640**	**13,090**	**11,400**	**292**	**180,675**

Milk production per animal is reported to be higher in Lalitpur than in the region or at national level (see Table 39). However milk availability per person is very low at just over 19 litres of milk per person per year.

Table 39. Milking animal population and milk production by species in Lalitpur District, Central Hills, Central Development Region and Nepal (modified from Mathema and Joshi, 2000).

District	Milking animals		Milk Production (Mt)			Production per animal (l/animal)		
	Cattle	Buffalo	Cattle	Buffalo	Total	Cattle	Buffalo	Total
Lalitpur	3,390	4,365	2,222	4,350	6,572	655	997	847
Central Hills	92,799	109,111	42,897	102,320	45,217	462	938	224
Central Development Region	187,810	212,427	87,389	200,639	288,028	465	945	720
Nepal	826,320	882,140	318,680	729,360	1,048,040	386	827	613

The Lalitpur District has two distinct agroecological zones: a valley basin and a mid-hill zone.

11.1.2 Valley basin

The valley basin zone is relatively flat and has irrigation. The zone has intensive cropping, with rice in the wet season and mustard and potato in the dry winter season. This part of the District is well connected with Patan and Kathmandu and has the majority of the human population. The main milk product is fresh milk supplied either to the DDC (who pay Rs. 0.10 more per litre than the private sector) or to a number of private dairies. There is also a strong demand for fresh milk from the teashops in the area. In the less accessible villages in the valley basin, members of poorer families carry the milk to road heads. The zone has had a strong influence from dairy policies in terms of dairy technology and marketing provision. However, buffaloes are regularly supplied by private buffalo traders bringing animals from India. Artificial insemination has been rejected or failed and the use of bulls to improve genetics does not seem to have been very successful.

11.1.3 Mid-hill zone

A hill zone is dominated by forest. It is reported that the area produces millet, which is used mainly for the product of "raksi[6]" and there is also a tradition of goat rearing. DDC do not have a very strong presence in the zone, but a group of private khuwa traders (thought to be 22 in total) have initiated dairy development in some villages. These traders have established village level khuwa[7] processing units with 1 or 2 families and have encouraged the production of milk from buffaloes. It is reported that the buffaloes mainly come from private traders who bring the animals from India. They are milked for one lactation and then sold dry back to the traders who usually slaughter them for meat. Brahmin families carry out the majority of the milk production. The milk processing requires firewood, but with increasing scarcity of this resource there is the strong possibility that kerosene will be used in the future. The poorer families may be involved in firewood collection and are reported to carry the

[6] A strong alcoholic Nepali drink

[7] Concentrated milk used in the production of milk sweets. 20 years ago this product was imported from India, but the local traders have established khuwa production in Nepal.

khuwa to the road heads. Government projects exist in the zone that offer credit to purchase livestock and one of the project team said that a local politician had promoted buffalo keeping as an important economic opportunity.

11.1.4 Is Lalitpur District representative of other Nepalese districts?

Given the general importance of the dairy sector a question investigated by the project team was whether the Lalitpur District is it representative of other Districts? Table 40 details Districts that the project team felt were similar in terms of dairy development.

Table 40. Districts that are similar to Lalitpur in their dairy development activities (information generated by the project team).

District	Development region and ecological zone	How are they similar?			
		Fresh milk production and sales	Who markets the milk?	Milk product	Who does the processing?
Kavre	Central, mid hills	Yes	DDC, Private, informal to teashops and local consumers	Khuwa, Ghee	Household
Rasuwa	Central, high hills	Yes	DDC, Private, informal to teashops and local consumers	Cheese	Household
Dolakha	Central, mid-high hills	Yes	DDC, Private, informal to teashops and local consumers	Cheese	Household
Illam	Eastern, mid hills	Yes	DDC, Private, informal to teashops and local consumers	Cheese, Churpi	Household
Pancthar	Eastern, mid hills	Yes	DDC, Private, informal to teashops and local consumers	Cheese, Churpi	Household
Dhankuta	Eastern, mid hills	Yes	DDC, Private, informal to teashops and local consumers	Cheese, Churpi	Household
Kaski	Western	Yes	DDC, Private, informal to teashops and local consumers	Ghee	Household
Syanja	Western	Yes	DDC, Private, informal to teashops and local consumers	Ghee	Household
Palpa	Western	Yes	DDC, Private, informal to teashops and local consumers	Ghee, Churpi	Household
Surkhet*	Mid Western	Yes	DDC, informal to teashops and local consumers	Ghee	Household

*This district does not have private milk companies

However, the secondary data on cows and female buffalo population plus milk production would indicate that this region is not important for milk production.

11.1.5 Chitwan District

According to the 1998 project census, the Chitwan District has a total human population of 472,048 people and most of this population is found in the rural areas. The literacy rate for the District is 71%, which is well above the national average. Over the last 17 years the District's population has doubled, the average household size has reduced and the literacy rate has improved. The population density has also increased rapidly during this period (see Table 41).

Table 41. Human population, number of households, household size, literacy rate and population density from 1971 to 2001 in the Chitwan District (Informal Sector Research & Study Centre, 2002).

Data	1971	1981	1991	2001
Population	183,644	259,571	354,488	472,048
Male	94,404	133,349	175,656	235,084
Female	89,240	126,222	178,832	236,964
Number of Households	28,712	41,414	65,147	92,863
Average Household Size	6.3	6.3	5.4	5.08
Literacy Rate (%)	21.2	33.7	55.7	70.76
Population density (persons/sq km.)	37	117	160	213

There has been a considerable population increase in both the VDCs of the study area, Bharatpur and Shaktikhor, between 1991 and 2001. The number of households has grown very rapidly in Bharatpur, much faster than in Shaktikhor. In both VDCs the population has also grown rapidly (Table 42). The stronger growth in Bharatpur reflects the fact that it is has one of the most important towns in the Chitwan District and is a major service centre for the tourist industry. Shaktikhor is found in a much more rural region.

Table 42. Number of households, human population and household size in the Bharatpur Municipality Shaktikhor VDC of Chitwan District in 1991 and 1998 (modified from Informal Sector Research & Study Centre, 2002).

Municipality/ VDC	1991 Census					2001 Census				
	HH Size	T. No. Of HHs	Population			HH Size	T. No. Of HHs	Population		
			Male	Female	Total			Male	Female	Total
Bharatpur	5.00	10,918	28,381	26,289	54,670	4.48	19,922	45,858	43,465	89,323
Shaktikhor	5.22	944	2,456	2,469	4,925	5.38	1,378	3,732	3,687	7,419

Two thirds of the households in Chitwan District have livestock, which is higher than for the Central Development Region, but lower than for Nepal in general. A fifth of households in the District have no land or livestock, which is lower for regional and similar to the national average (see Table 43).

Table 43. The number of households with land, poultry and livestock in Chitwan District, Central Development Region and Nepal (modified from Informal Sector Research & Study Centre, 2002).

	Land only	Livestock keepers								Nothing
		Landless				With land				
		Poultry	Livestock	Poultry & Livestock	Total	Poultry	Livestock	Poultry & Livestock	Total	
Number of households										
Chitwan	12,033	461	2,547	995	4,003	1,608	32,824	24,291	58,723	18,104
Central	181,337	6,201	46,091	14,753	67,045	18,059	394,246	395,235	807,540	409,831
Nepal	**386,241**	**24,340**	**122,783**	**70,552**	**217,675**	**52,246**	**1,188,594**	**1,547,003**	**2,787,843**	**802,615**
Percentage of total households										
Chitwan	13.0	0.5	2.7	1.1	4.3	1.7	35.3	26.2	63.2	19.5
Central	12.4	0.4	3.1	1.0	4.6	1.2	26.9	27.0	55.1	28.0
Nepal	**9.2**	**0.6**	**2.9**	**1.7**	**5.2**	**1.2**	**28.3**	**36.9**	**66.5**	**19.1**

During the mid 90s it was reported that there was a significant increase in the populations of buffaloes, goats, pigs and poultry in Chitwan (see Table 44).

Table 44. Livestock population from 1994 to 1997 in the Chitwan District (Nepal District Profile, National Research Associates Nepal, 1999).

Year	Cattle	Buffaloes	Sheep	Goat	Pigs	Poultry	Duck
1994/95	110,193	59,566	4,088	63,000	4,577	309,789	22,465
1995/96	116,000	87,810	4,088	71,514	5,297	690,300	21,256
1996/97	105,742	83,724	4,100	80,860	6,630	915,928	21,200

Production of milk also increased during the mid 90s, meat and fish production almost doubled and egg production tripled (see Table 46).

Table 45. Livestock and fish production between 1994 and 1997 in the Chitwan District (Nepal District Profile, National Research Associates Nepal, 1999).

Year	Milk (Mt.)	Meat (Mt.)	Egg (000)	Wool (Kg.)	Fish (Kg.)
1994/95	21,950	2,786	13,655	2,779	126,000
1995/96	27,101	3,593	25,244	2,779	173,460
1996/97	27,827	4,015	31,800	2,787	212,000

Chitwan is reported to have just over a tenth of the laying chicken population, but the production per bird in the region is lower than the national average at only 73 eggs per bird per year (see Table 46). These data indicate that many of the laying birds are in extensive or backyard systems.

Table 46. Poultry laying population and egg production in Chitwan, Central Terai, Central Development Region and Nepal in 1997-98 (modified from Mathema and Joshi, 2000).

Region	Laying population		Egg Production ('000 eggs)			Production per bird		
	Hen	Duck	Hen	Duck	Total	Hen	Duck	Total
Chitwan	515,697	10,047	37,435	695	38,130	73	69	73
Central Terai	763,717	39,451	58,675	3,015	61,690	77	76	77
Central Development Region	2,325,400	56,240	205,962	4,107	210,069	89	73	88
Nepal	5,181,880	218,669	424,910	16,000	440,910	82	73	82

In Chitwan District buffalo meat contributes two thirds of the meat production (see Table 47). The availability of meat per person per year is above the regional and national at 10.7 kilos versus 7.2 and 7.8, respectively.

Table 47. Meat production (MT) by species in Chitwan District, Central Terai, Central Development Region and Nepal (modified from Mathema and Joshi, 2000).

District	Buffalo	Mutton	Goat Meat	Pig Meat	Chicken	Duck	Total Meat
Chitwan	3,291	10	803	141	787	14	5,046
Central Terai	13,687	17	4,736	517	1,272	52	20,281
Central Region	40,101	354	8,770	2,603	5,606	74	57,509
Nepal	117,350	2,903	35,640	13,090	11,400	292	180,675

Chitwan District is of importance as a milk producer in Nepal and reports to having above average production levels per milch cow and buffalo. It is estimated that it produces 2.7% of the Nepal milk production (see Table 48).

Table 48. Cattle and buffalo milch population and production in Chitwan, Central Terai and Nepal in 1997-98 (modified from Mathema and Joshi, 2000).

District	Milk animal population		Milk Production (MT)			Production per animal (l/head)		
	Cattle	Buffalo	Cattle	Buffalo	Total	Cattle	Buffalo	Total
Chitwan	8,552	19,419	9,494	18,777	28,271	1,110	967	1,011
Central Terai	72,600	79,675	35,260	79,200	114,460	486	994	752
Central Development Region	187,810	212,427	87,389	200,639	288,028	465	945	720
Nepal	826,320	882,140	318,680	729,360	1,048,040	386	827	613

The availability of milk per person is 60 litres per year in Chitwan District, which is much higher that for the Central Development Region (36 l/person/year) and Nepal in general (45 l/person/year). The milk sector, therefore, appears to have importance, not only as a source of milk for home consumption, but also in terms of milk sales to milk deficit areas of the country.

The Chitwan District has two different agro-ecological zones a lowland plain and lowland hills.

11.1.5.1 Lowland plain

The lowland plain has two major rivers, the Narayani, which marks the western border of the district and the Rapti which flows through plain and marks the northern boundary of the Royal Chitwan National Park. In this valley basin zone the land is relatively flat. Where there is irrigation intensive cropping is practised, with maize

and rice grown in the wet summer season, and mustard and potato or wheat in the dry winter season. In rainfed areas maize is the key summer crop and mustard and potatoes are grown during the winter.

The lowland plain of the Chitwan District is well connected by roads to the Kathmandu valley. The main milk product is fresh milk supplied either to the DDC or to a number of private dairies. There is also a strong demand for fresh milk from the teashops in the area. The zone has been strongly influenced by dairy policies in terms of dairy technology and marketing provision. There are smallholders commercial dairy farmers with 5 to 15 improved dairy cows. However, number of improved buffaloes raised is 1 to 4 at the most and are regularly supplied by private buffalo traders bringing animals from India.

The Bharatpur municipality is found in the lowland plains.

11.1.5.2 Lowland hills

The lowland hills of Chitwan are dominated by forest. In this zone the HLFFDP has been involved in converting barren upland areas into community forage/grass forestry in order to provide animal feeds to goats raising by the poor in the community. The Shaktikhor VDC is found in this zone and it has a number of forestry user groups under the HLFFDP. Over a 100 hectares of community land have been improved by planting local grasses and improved grasses such as stylo, molasses and Napier and 23 different species of local fodder tress. Goat raising is the key livestock activity. Most of the cash income from livestock activity is derived from the sales of live goats.

11.1.6 Mustang District

According to the 2001 census, the Mustang District has a total human population of 14,981 people and most of this population is found in the rural areas. The literacy rate for the District is 51.75%. The population growth rate is low and over the past 18 years, the district population has increased by only 15%. Therefore, population density in the District has not risen rapidly during this period (see Table 49).

Table 49. Human population, number of households, household size, literacy rate and population density from 1971 to 2001 in the Mustang District (Informal Sector Research & Study Centre, 2002).

Data	1971	1981	1991	2001
Population	26,944	12,930	14,292	14,981
Male	13,510	6,835	7,468	8,180
Female	13,434	6,095	6,824	6,801
Number of Households	5,134	2,664	3,209	3,243
Average Household Size	5.2	4.9	4.5	4.62
Literacy Rate (%)	19.5	23.3	45.4	51.75
Population density (persons/sq km.)	7	4	4	4

The data from the 1991 and 2001 census indicates that both the number of households and the population in all the VDCs for the study have reduced in the last ten years. In general the household size has also reduced with the exception of Marpha (see Table 50).

Table 50. Number of households, human population and household size in the Chhusang, Ghami, Kagbeni and Marpha VDCs of Mustang District in 1991 and 2001 (Informal Sector Research & Study Centre, 2002).

VDC	1991 Census					2001 Census				
	HH Size	T. No. of HHs	Population			HH Size	T. No. of HHs	Population		
			Male	Female	Total			Male	Female	Total
Chhusang	4.41	195	455	405	860	3.59	186	332	336	668
Ghami	5.38	158	431	419	850	4.78	178	424	426	850
Kagbeni	4.62	260	589	611	1,200	3.96	251	475	519	994
Marpha	3.76	434	966	664	1,630	4.59	338	881	669	1,550

Just over two thirds of the households in Mustang District have livestock, which is lower than for the Western Development Region, but similar to Nepal in general. Nearly a quarter of the households in the District have no land or livestock, which is higher than both the regional and national average (see Table 51).

Table 51. The number of households with land, poultry and livestock in Mustang District, Western Development Region and Nepal (modified from Informal Sector Research & Study Centre, 2002).

	Land only	Livestock keepers								Nothing
		Landless				With land				
		Poultry	Livestock	Poultry & Livestock	Total	Poultry	Livestock	Poultry & Livestock	Total	
Number of households										
Mustang	284	42	40	27	109	98	943	1,064	2,105	745
Western	74,972	5,430	13,898	8,300	27,628	12,788	279,807	342,934	635,529	124,916
Nepal	**386,241**	**24,340**	**122,783**	**70,552**	**217,675**	**52,246**	**1,188,594**	**1,547,003**	**2,787,843**	**802,615**
Percentage of total households										
Mustang	8.8	1.3	1.2	0.8	3.4	3.0	29.1	32.8	64.9	23.0
Western	8.7	0.6	1.6	1.0	3.2	1.5	32.4	39.7	73.6	14.5
Nepal	**9.2**	**0.6**	**2.9**	**1.7**	**5.2**	**1.2**	**28.3**	**36.9**	**66.5**	**19.1**

Between 1994 and 1997 there were reductions in the cattle, buffalo and chicken populations (see Table 52).

Table 52. Livestock population from 1994 to 1997 in the Mustang District (Nepal District Profile, National Research Associates Nepal, 1999).

Year	Cattle	Buffaloes	Sheep	Goat	Pigs	Chicken	Duck
1994/95	4,331	222	13,283	36,974	120	21,089	20
1995/96	3,826	162	13,674	36,657	104	14,589	16
1996/97	3,900	160	14,960	36,100	110	15,500	20

There were large variations in the production of all the major commercial livestock products in the Mustang District between 1994 and 1997. There was a large reduction in egg production and a rise in wool production. The latter is perhaps in response to the growing demand for wool for the manufacture of carpets (Winrock, 1995) (see Table 53). However, these data should be treated with some caution in terms of trends as Mathema and Joshi (2000) report a wool production of 9,020 kilos in the year for 1997/98 for District. It is also important to mention that Mustang is of very minor importance nationally with only 1.4% of national wool production.

Table 53. Livestock products from 1994 to 1997 in the Mustang District (Nepal District Profile, National Research Associates Nepal, 1999).

Year	Milk (Mt.)	Meat (Mt.)	Egg (000)	Wool (Kg.)
1994/95	235	171	823	9,032
1995/96	194	164	569	10,255
1996/97	212	163	450	11,220

The Mustang District contributes very little to the regional and national production of meat. Perhaps of greatest interest is that in the District goat meat provides around two thirds of the meat which is different from other areas of the country (see Table 54). Despite having a small meat production the availability of meat per person per year in the Mustang District is 10.5 kilos, which is much higher than the regional (8.0) and national (7.8) availability.

Table 54. Meat production (MT) by species in Mustang District, Western Mountains, Western Development Region and Nepal (modified from Mathema and Joshi, 2000).

District	Buffalo	Mutton	Goat Meat	Pig Meat	Chicken	Duck	Total Meat
Mustang	4	35	109	1	8	0	157
Western Mountain	6	50	123	1	13	0	193
Western Development Region	26,097	560	6,214	1,887	1,788	59	36,605
Nepal	117,350	2,903	35,640	13,090	11,400	292	180,675

Mustang District has a very small population of milch animals and very few buffalo cows. The production per animal is also much lower than the regional and national averages (see Table 55).

Table 55. Cattle and buffalo milch population and production in Mustang, Western Mountains, Western Development Region and Nepal in 1997-98 (modified from Mathema and Joshi, 2000).

District	Milk animal population		Milk Production (MT)			Production per animal (l/head)		
	Cattle	Buffalo	Cattle	Buffalo	Total	Cattle	Buffalo	Total
Mustang	903	53	207	40	247	229	755	258
Western Mountains	1,360	73	317	54	371	233	740	259
Western Development Region	141,523	274,692	56,518	224,066	280,584	399	816	674
Nepal	826,320	882,140	318,680	729,360	1,048,040	386	827	613

The availability of milk per person is only 16 litres per person per year versus 61 litres for the Western Development Region and 45 for Nepal in general. The milk sector, therefore, appears to have little importance.

Mustang can be divided into two agro-ecological zones: upper and lower.

11.1.6.1 Upper Mustang

The Upper Mustang is located in one of the most remote and inaccessible regions of Nepal. It is in the Trans-Himalayan region and inhabited by indigenous people called Gurungs, who are a Nepali ethnic minority. Pastoral systems are important in the District, and livestock also play an important role in the mixed farming systems. Many able-bodied people migrate to northern India for three or four months during the winter. This is a period of food deficit and generates an important source of income.

Cultivated lands are found close to settlements that have perennial water sources. Cultivated land can be found up to 3,900 m.a.s.l., but only one crop is harvested annually above 3,300 m.a.s.l. The major crops are buckwheat, naked barley (*uwa*), potato and radish and mustard is also grown. The crop residues are important fodder for livestock especially during winter months.

Livestock rearing in the Upper Mustang region include cattle, yaks, dzopas, sheep, goats, horses, mules, donkey and some poultry. Mountain or *Chyangra* goats are also important in the region with the majority occurring between 3000-4500 m.a.s.l. Horses and mules are kept for transportation purposes. Livestock rearing provides the communities with a number of daily essentials such as fresh milk, meat, butter, eggs, and manure and draft power.

11.1.6.2 Lower Mustang

In the lower Mustang zone cultivated lands are also found close to settlements with perennial water sources. In land with irrigation cultivation is intensive and double cropping is common. During the summer, maize, beans, potatoes and buckwheat are grown. There is also the production of vegetable crops such as cabbage, cauliflower, radish and tomatoes are grown during this season. The incentive is that these crops cannot be grown in lowland areas of Nepal during the summer. In the winter, naked barley, barley and wheat are grown. About a quarter of agricultural land is under fruits crops mainly apple, which is famous throughout Nepal.

Livestock rearing in the Lower Mustang region include cattle, yaks, dzopas, sheep, goats, horses, mules, and some poultry. Yaks are raised in high alpine pastures. Local cows provide fresh milk. Horses and mules are kept for transportation purposes. Livestock rearing provides the communities with a number of daily essentials such as fresh milk, meat, butter, eggs, and manure and draft power.

Lower Mustang generates considerable income from tourism. There are a number of hotels and restaurants in several villages along the trekking roads towards Muktinath and Upper Mustang. Places like Lete, Tukuche, Marpha, Jomsom, Kagbeni and Muktinath are famous trekking tourists.

11.2 HOUSEHOLD, COMMUNITY & REGIONAL DATA ANALYSIS

Primary data were collected from the 12 villages. There were inter-village differences, which seem to relate to cultural mix of populations within the villages. The numbers of households in each study village and the number of households interviewed are shown in Table 56.

Table 56. Total number of households in the study villages and the number of households interviewed.

Village types	PE PA	PE GA	GE PA	GE GA
Lalitpur (Mid Hills)	***Burunchuli***	***Jhyalungtar***	***Manegaun & Lekdanda***	***Seraphat***
Total Households	63	68	44	71
Number of household interviewed	14	25	14	13
Chitwan (Terai)	***Phujintar***	***Barowa***	***Anandchowk***	***Parashnagar***
Total Households	35	43	37	82
Number of household interviewed	30	30	30	30
Mustang (Mountain)	***Ghilling***	***Syang***	***Chhusang***	***Kagbeni***
Total Households	60	152	31	75
Number of household interviewed	21	30	20	23

11.2.1 Social cultural and economic diversity of the study sites

In Lalitpur District, Jyalungtar village had no dairy activities, production or sales, whereas the other villages had varying degrees of dairy production and sales. The differences between these activities appear to be related to the socio-cultural mix of the families, where there are more Brahmins there is generally higher levels of milk production. Access to technology and to markets appeared to be very much a secondary factor. In Chitwan District, two villages, Anandchowk and Phujintar did not have dairy activities. These are newly settled areas and goats production has been promoted by HLFFDP through formation of users' groups in growing animal forage grasses and fodder trees on community lands. The other villages, which had better access to markets, had developed dairy activities. In the Mustang District the inter-village differences seem to relate to accessibility and tourism business and service trade.

Caste and ethnic diversity across study villages and districts is shown in Table 56. In the better off villages in the Lalitpur and Chitwan Districts there tends to be a high proportion of high caste families. The poorer villages tend to be dominated by either lower castes and/or ethnic groups (see Table 57).

Table 57. The ethnic and caste composition of the study villages.

Village types	PE PA	PE GA	GE PA	GE GA
Mid Hills	***Burunchuli***	***Jhyalungtar***	***Manegaun & Lekdanda***	***Seraphat***
Lalitpur	Tamang (33)	Dalit (14) Tamang (44) Chhetri (8) Newar (1) Brahmin (2)	Dalit (1) Tamang (24) Chhetri (2) Brahmin (17)	Dalit (2) Tamang (8) Newar (34) Chhetri (1) Brahmin (24)
Lowlands	***Phujintar***	***Barowa***	***Anandchowk***	***Parashnagar***
Chitwan	Chepang (20) Dalit (7) Newar (4) Chhetri (3) Brahmin (1)	Dalit (2) Tharu (29) Magar (2) Brahmin (10)	Magar (9) Chepang (3) Tamang (4) Gurung (1) Newar (19) Chhetri (2)	Gurung (2) Tamang (6) Chhetri (10) Newar (4) Brahmin (58)
Mountain	***Ghilling***	***Syang***	***Chhusang***	***Kagbeni***
Mustang	Gurung (59) Dalit (1)	Thakali (132) Gurung (5) Chhetri (5) Dalit (10)	Gurung (34) Magar (2) Dalit (4)	Bista (7) Gurung (66) Dalit (2)

As can be seen by the above data the village study sites reflect the diversity of the Nepali people.

11.2.2 Socio-Economic Differences between Households

There are important socio-economic differences between the households within the study villages. These were investigated using wealth-ranking exercises. The summarised results are shown in Annex 4 and Table 58.

Table 58. The socio-economic differences between households in the different districts.

District	Poor	Medium	Rich
Lalitpur	• Landless or small plots of poor land • Dependent on household labour sales • No or few livestock (generally poultry and perhaps goats)	• Access to poor land • Own goats, bullocks • Sometimes owned dairy cattle • Some had skilled or government service jobs • Some had businesses	• Access to land • Own dairy animals • Skilled and government jobs • Own and run businesses and shops
Chitwan	• Landless or small plots of poor land • Dependent on human and animal labour sales • No or few livestock (generally local goats and cows)	• Access to medium farm size • Own small number of improved dairy cows or buffaloes, goats and poultry • Some services and business/shops	• Own large farm size (irrigated and rainfed) • Own smallholder commercial dairy farms with improved dairy cows • Some have improved buffaloes and commercial poultry farms • Own goats (common), a few HHs own sheep and pig • Some do service and own businesses/shops
Mustang	• Landless or small plots of poor land • Dependent on household labour sales • No or few livestock (generally local cows)	• Access to medium irrigated land • Own medium size of goats • Own other animals such as dzopas, mules, horses and local cows • Some own businesses/hotels and shops • Overseas employment	• Access to large irrigated land • Own large holding of goats • Own other animals such as dzopas, mules, horses and local cows • Own and run businesses/hotels/restaurants and shops • Overseas employment

Chazee (personal communication) in his analysis of macro-level data has identified four socio-economic groups, splitting the poor groups into two categories. His analysis broadly agrees with the findings of the project. Maltsoglou and Taniguchi (2004) have identified a larger number of groups of livestock keepers using data from a World Bank survey in 1996.

11.2.3 Sources of Income (Data tables are in Annex 5)

An analysis of the qualitative assessment of the importance of livestock in the different village types shows in general that crops are the most important activity followed by livestock, even in the Lalitpur district which is close to Kathmandu (see Table 59).

Table 59. Qualitative analysis showing the economic activities by village type.

Region and District	Village Types			
	PE PA	PE GA	GE PA	GE GA
Mid Hills	Burunchuli	Jhyalungtar	Manegaun & Lekdanda	Seraphat
Lalitpur	Crops Livestock Waged OnF & OfF Business Salaried	Crops, Livestock Salaried Waged OnF & *OfF* Business Caste BP Remittances	*Crops,* *Livestock* Waged OnF Salaried Caste BP	*Crops* Livestock Business Salaried Waged OfF Caste BP
Lowlands	Phujintar	Barowa	Anandchowk	Parashnagar
Chitwan	*Crop, Livestock* *Waged OnF* Waged OfF Salaried	*Crops, Livestock* *Waged OnF* Pensions Salaried Business Waged OfF Caste BP	*Livestock* *Crops* *Waged OnF* Salaried Business Waged OfF Pensions	*Crops* Livestock Salaried *Waged OnF* Business Caste BP
Mountain	Ghilling	Syang	Chhusang	Kagbeni
Mustang	Livestock Crops *Waged OnF & OfF* Business Pension & Rs	*Crops* Livestock Business *Caste BP*	*Crops* *Livestock* Business *Waged OnF & OfF* Pension & Rs	*Crops,* Livestock Business *Waged OfF* *Waged OnF* Pension & Rs

Those activities underlined are main activities and those that are in italics are the main activities of the poor households.

In Lalitpur the village with the least dairy development (Jyalungtar) also has a very low dependence on agriculture and livestock in terms of income generation. Only 8 out of the 25 families interviewed derived income from agriculture or livestock based activities and for these families just over half the total household income came from these activities. The non-agricultural activities were far more important both in terms of the number of families involved and the percentage of income derived from these activities. Despite only 7 families reporting that their income was generated by livestock, 13 families in the sample said that they kept cattle. Nearly all these animals were local breeds. Six families had buffalo and half of the animals were improved breeds.

Phujintar, the poorest village in the Chitwan study area, only 3 out of 30 families said earned income from livestock although a large majority of the families (25) were engaged in livestock activities –mainly goat raising. Wage labour, both on-farm and off farm, was very important for day-to-day living. In Barowa village a small number of richer Tharu households (3 to 4) sold fresh milk to private dairies. The other households did not have dairy animals and majority depended on agriculture for their livelihoods. Similar to Phujintar village the poorest, landless households depended on wage labour for their livelihoods. In Anandchowk, households received half their income from agriculture and livestock activities. Again labour wage and low level service jobs were crucial for the poorest households. Goat raising played an

important role in household economy of those engaged in livestock enterprises. Finally in the richest village Parasnagar, over 80 percent farm families depend on agriculture and livestock for the majority of their income. Some richer households have commercial dairy farms and poultry farms and most of the cash income is derived from these two enterprises. A third of the households had a member of family working in a government office or a school. As in the other villages the poorest depend on agriculture, livestock and wage labour.

In the Mustang village Ghilling, both crops and livestock farming are important sources of household income. Ninety percent of the households in this village reported that livestock were the main cash income. Seasonal migration and goat trading was reported to be an important activity in half the households interviewed. The poorest households depended on farm labour. In Syang, tourism was very important both as a source of employment in hotels and restaurants and also in the demand for fresh vegetables and fruits. In Chhusang, crops and livestock are the most important activities with 80-90% of families deriving their income from these activities. Non-agricultural activities were of little importance, however two households had hotels and 3 families received remittances from sons working overseas. Finally in Kagbeni, although most of households were engaged in agriculture and livestock farming, non-agricultural activities such as running hotels/restaurants and off-farm jobs were an important source of income particularly for the richer households.

11.2.4 Livestock Ownership (see Annex 6 for data tables)

The data from the study villages in Lalitpur show different levels of livestock ownership and adoption of dairy technology. To a large extent the differences appear to be related to the number of households that are of the Brahmin caste and whether this group have shown interest in adopting improved buffaloes. Similarly in Chitwan the differences in technology adoption also appear to be related to socio-economic groups. The high caste the Brahmin adopting both dairy and forage technology.

In Mustang, there were no buffalo and all except for two cattle were local breed animals. The exotic breed cows (Jersey cross) were purchased by the DDC and a farmer-livestock technician working for the DSL district office was raising them. It is of surprise that this District has a high proportion of its cattle milk, with Ghilling and Syang reporting between 40 and 45% of their cattle as being in milk.

In general the buffalo appear to be better managed in terms of milk production as nearly half the buffalo animals were reported to be milking versus just over a quarter for cattle. However, it should be noted that 17% of cattle were adult males, which are probably important for draught power production.

It would appear that low caste group, the disadvantaged groups and the households in the mountain areas did not appear to benefit directly from dairy technology offered by the government. Although all villages under study raise similar different livestock

species, there are inter-villages differences in number of different livestock they own (see Table 60).

Table 60. Ownership of livestock and adoption of dairy technology in the study villages (prepared by project team).

	PEPA	PEGA	GEPA	GEGA
Lalitpur	**Burunchuli**	**Jyalungtar**	**Manegaun & Lekdanda**	**Sera Phat**
Improved Buffalo	Low	Nil	High	Medium
Local Buffalo	Medium	Nil	Low	Nil
Improved Cows	Nil	Nil	Low	Nil
Local Cows	Low	Low	Nil	Low
Bullocks	Low	Low	Nil	Nil
Goats	Low	Medium	Medium	Medium
Poultry	Medium	Medium	Nil	Medium
Chitwan	**Phujintar**	**Barowa**	**Anandchowk**	**Parasnagar**
Improved cows	Nil	Low	Nil	High
Local cows	High	Low	Low	Low
Improved buffalo	Nil	Low	Nil	Low
Local buffalo	Nil	Medium	Low	Low
Bullocks	High	Nil	Low	Low
Goats	High	Low	High	Medium
Sheep	Medium	Low	Medium	High
Duck	Nil	Medium	Nil	Nil
Poultry	High	Low	High	Medium
Mustang	**Ghilling**	**Syang**	**Chhusang**	**Kagbeni**
Goats (Changra)	High	Medium	Low	Medium
Local cows (Lulu)	Low	High	Low	Low
Dzopas	Low	Nil	Low	Nil
Horses	Low	Nil	Medium	Low
Mules	Low	High	Nil	Low
Poultry	Medium	High	Low	High

The most important species in terms of the proportion of households that have that species are surprisingly cattle and buffalo followed by goats. Cattle are particularly important in Chitwan and Mustang, buffalo are absent in Mustang and tend to be more important in the villages classified as have good economies (see Table 61).

Table 61. Percentage of households interviewed that own different types of livestock in the study villages.

District and species	Village type			
	PEPA	PEGA	GEPA	GEGA
Lalitpur	***Burunchuli***	***Jyalungtar***	***Manechaur & Lekdanda***	***Serphat***
Cattle	35.7	52.0	28.6	15.4
Buffalo	71.4	24.0	100.0	53.8
Goats	71.4	72.0	35.7	38.5
Poultry	0.0	56.0	42.9	7.7
Chitwan	***Phujintar***	***Barowa***	***Anandchowk***	***Parashnagar***
Cattle	83.3	46.7	56.7	63.3
Buffalo	20.0	30.0	40.0	63.3
Goats	83.3	53.3	76.7	76.7
Poultry	20.0	56.7	46.7	20.0
Sheep	0.0	23.3	0.0	0.0
Pigs	3.3	13.3	3.3	0.0
Ducks	0.0	13.3	0.0	0.0
Mustang	***Ghilling***	***Syang***	***Chhusang***	***Kagbeni***
Cattle	95.24	40.00	80.00	91.30
Horses	66.67	13.33	70.00	56.52
Mules	0.00	16.67	40.00	39.13
Dzopa	85.71	53.33	80.00	39.13
Donkey	0.00	0.00	0.00	8.70
Goats	85.71	56.67	30.00	30.43
Poultry	42.86	33.33	40.00	26.09
Sheep	0.00	3.33	0.00	0.00

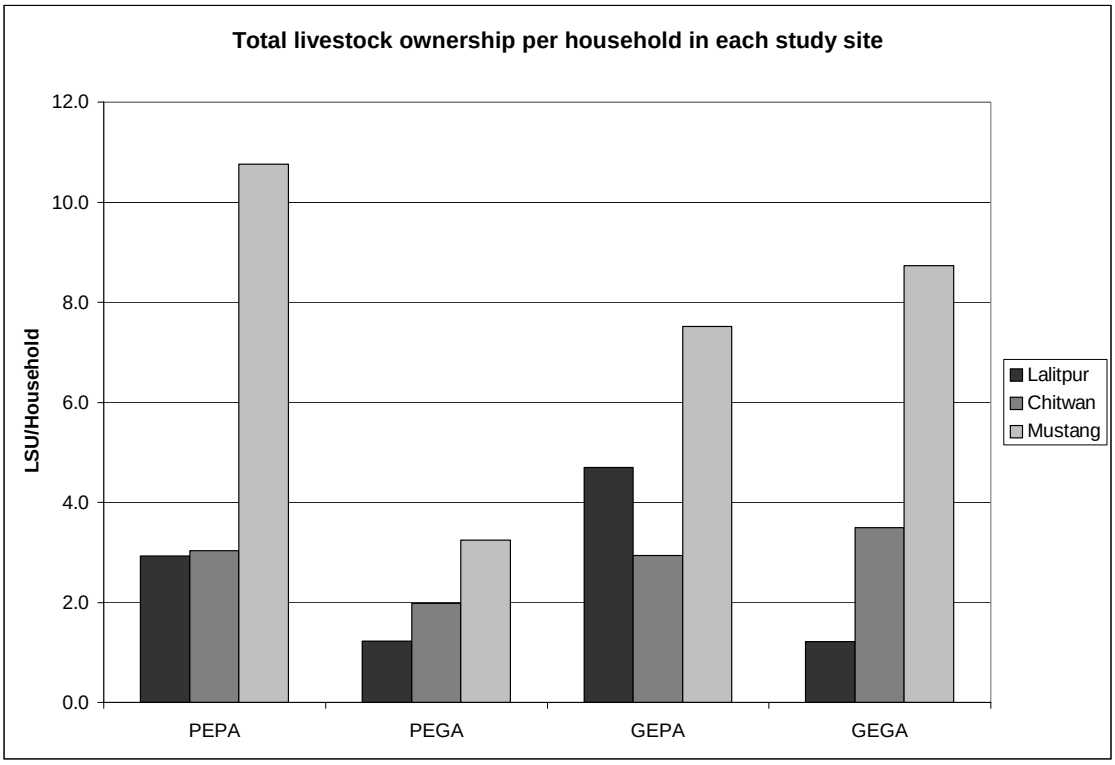
In Mustang virtually none of the animals are introduced breeds. In Chitwan introduced breeds are concentrated in good economy, good access (GEGA) village and are mainly buffalo followed by cattle. Cattle LSUs are dominated by bullocks. In Lalitpur a high proportion of cattle and buffalo are introduced breeds. The most important species by their contribution to livestock units are again the large species, cattle and buffalo in Lalitpur and Chitwan and cattle, horses and dzopa in Mustang. The one exception is the poor economy poor access village (PEPA) in Mustang where goats are more important (see Table 62).

Table 62. Number of livestock units per household by species and village type in the study areas.

District and species	Village type			
	PEPA	PEGA	GEPA	GEGA
Lalitpur	***Burunchuli***	***Jyalungtar***	***Manechaur & Lekdanda***	***Serphat***
Cattle	1.01	0.60	0.37	0.12
Buffalo	1.57	0.35	4.19	1.00
Goats	0.34	0.25	0.14	0.10
Poultry	0.00	0.03	0.00	0.00
Total	**2.92**	**1.23**	**4.70**	**1.22**
Chitwan	***Phujintar***	***Barowa***	***Anandchowk***	***Parashnagar***
Cattle	1.84	1.05	1.28	1.58
Buffalo	0.35	0.59	0.69	1.13
Goats	0.79	0.14	0.92	0.27
Poultry	0.06	0.03	0.05	0.51
Pigs	0.00	0.17	0.00	0.00
Total	**3.04**	**1.98**	**2.94**	**3.49**
Mustang	***Ghilling***	***Syang***	***Chhusang***	***Kagbeni***
Cattle	2.60	0.70	2.10	2.43
Equine	1.37	1.12	2.94	2.59
Dzopa	1.40	0.60	0.93	0.30
Goat	5.38	0.81	1.53	3.40
Poultry	0.01	0.02	0.02	0.01
Total	**10.76**	**3.25**	**7.51**	**8.73**

In general, the PEPA village types have higher LSU per household, which would agree with the secondary data observation that dependency on livestock is greatest where people are poorest (see Figure 3).

Figure 3. Total livestock ownership per household in each study site (LSU/household).



11.2.5 Livelihood Strategies and Livestock

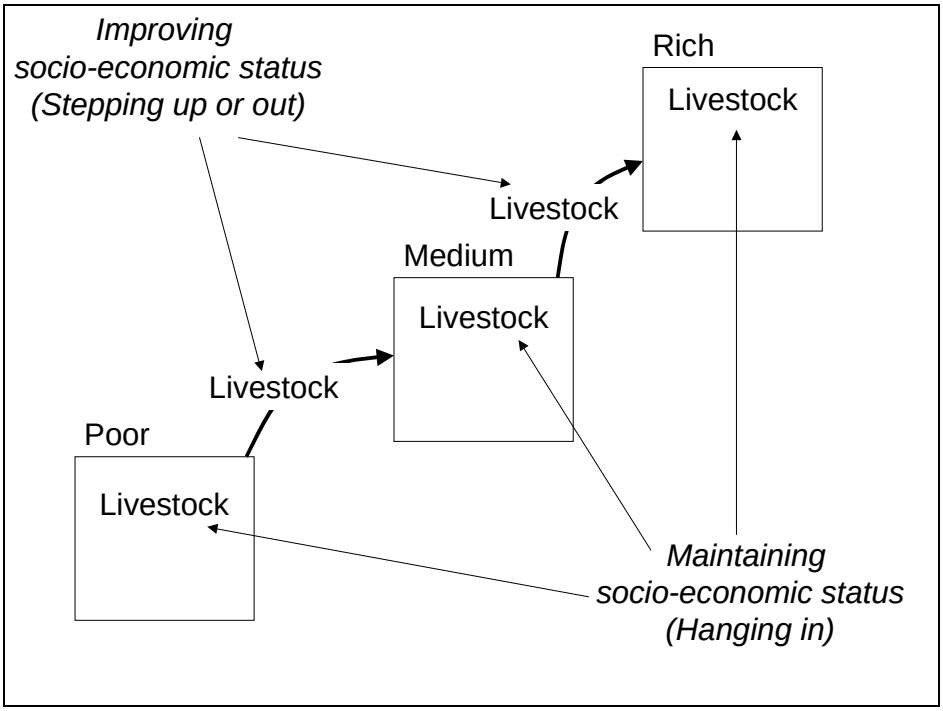
The analysis of the differences between socio-economic groups is important in terms of determining what characteristics these groups have and what types of livestock they own. However, it is important to develop this static view of the households into a dynamic one in order to investigate livestock functions in respect of household livelihood strategies. Livelihood strategies and livestock functions may be categorised as:

1. Livestock roles in the household economy in order to maintain livelihood status - "hanging in" strategies. Here families keep livestock, but they do not get richer or poorer by having and keeping them;
2. Livestock roles in order to improve livelihood status whilst maintaining economic activities – "stepping up". Examples include:
    a. A new livestock species is kept that has a higher profit so improves the status of the household.
    b. A new livestock management process is adopted that improves the profitability of an existing livestock keeping activity. These management changes may include better feed and fodder, better healthcare, better animal handling. They may also include processing of livestock products into more refined and higher value products

3. Livestock roles in order to improve livelihood status that change economic activities – "stepping out". Examples include
    a. The money generated from a livestock activity either through the sale of products or animals is used to invest in other activities that are more profitable and previous economic activities dropped
        i. Businesses – intra-generational;
        ii. Education of children to enable them to gain salaried job – inter-generational.

Figure 4 shows how livestock may be involved in dynamic socio-economic changes of households.

Figure 4. The roles of livestock in the livelihoods of the Nepalese households.



Livestock functions analysis indicates that across the study areas the poor families use livestock mainly for consumption and production purposes (principally for manure and urine), with very little evidence that livestock are important in terms of income activities in poor households. Richer households use livestock for a greater range of functions, but in the richest households the use of livestock as an insurance policy is less important as they have other assets.

Poor households show a preference for small livestock species. This preference relates to the quick turnover of these enterprises and lower amounts of time required to return their investment. Richer households prefer large species and in particular buffalo. This preference is related to regular income. Constraints are seen as market access and management in poor groups. In the richer households the main constraint was feed resources. In general, there is concern in all household groups about losses due to disease.

A summary of these results is presented in Table 63.

Table 63. The use of livestock in the livelihood strategies of the different socio-economic groups in the study areas.

Socio-economic status	Livelihood strategy		
	Hanging-in	Stepping-up	Stepping-out
Poor	Holdings too small for effective non-income functions. Livestock seen as costly, risky & difficult to market	Some evidence found as a component of strategies	Not an important component of strategies
Medium	Central to livelihoods for income, consumption & production.	Accumulation in herd. Technology changes. Market access driver. Services – work & transport	Buffering (education costs). Sales to buy other assets
Rich	Not important for non-income functions. Consumption important	Part of portfolio when complementary to other activities & strategies. Technology changes	Not a main component

A conclusion from the analysis is that the poor households in the sample have adopted strategies that maintain their socio-economic position, but do not have strategies to improve this position. Within these strategies livestock play only a minor role, which maybe due to:

- a lack of knowledge or skill in livestock keeping;
- poor access to critical resources; and/or
- institutional constraints i.e. these poor people are from social groups who will find it difficult to receive adequate returns from livestock keeping.

The household in the medium and high strata are using local breeds of livestock and traditional livestock management systems to maintain their socio-economic status and improved livestock and management systems to improve their status. The main investments to "step out" are in education for children and to begin businesses.

11.2.6 Adoption of Livestock Technologies

Confirming the results presented in the livestock ownership section above, the adoption of dairy technologies appears to be related to cultural and socio-economic status. All the villages in the Lalitpur and Chitwan Districts with the exception Jyalungtar, Lalitpur adopted the technologies on offer, but they were modified according to the socio-economic situation. The Jyalungtar village appears to be restricted by low land access and also has an important off-farm economy. In Mustang the adoption of the forage technology has been less successful (see Table 64).

Table 64. Adoption of technologies in the village study sites by ethnic group (prepared by the project field team).

	PEPA	PEGA	GEPA	GEGA
Lalitpur	**Burunchuli**	**Jyalungtar**	**Manegaun & Lekdanda**	**Sera Phat**
Adoption?*	Yes	No	Yes	Yes
If there was adoption by which group?:				
Brahmin	Medium		High	High
Chhetri	Nil		High	Nil
Newar	Nil		Nil	Nil
Tamang	Nil		Medium	Nil
Magar	Nil		Nil	Nil
Dalit	Nil		Nil	Nil
What were the objectives of this adoption?	Increase Income		Increase Income	Increase Income
Chitwan	**Phujintar**	**Barowa**	**Anandchowk**	**Parasnagar**
Adoption?**	Yes	Yes	Yes	Yes
If there was adoption by which group?:				
Brahmin	High		High	
Chhetri	High	Nil	High	High
Newar	High	Nil	High	High
Tamang	High	Nil	Medium	Medium
Magar	Medium	Low	Medium	Low
Dalit	Low	Nil	Low	Low
Tharu	Medium	High	Medium	Nil
Praza or Chepang	Medium		Medium	
Mustang	**Ghilling**	**Syang**	**Chhusang**	**Kagbeni**
Adoption?***	Yes/No	Yes/No	Yes/No	Yes/No
If there was adoption by which group?:				
Gurung	Low	Low	Low	Low
Bista	Low	Low	Nil	Low
Dalit	Nil	Nil	Nil	Nil

* Dairy technology

** Forage technology in Phujintar and Anandchowk, dairy and forage technology in the other villages

*** Forage technology

When looking at the adoption of exotic breeds, moving from poor to rich economic status, the number of adopting households and communities increases and the range of species adopted increases (see Table 65).

Table 65. Adoption of exotic breeds by study area, household status and species.

Household Status	Study Area		
	Lalitpur	Chitwan	Mustang
Poor	1 non-adopter community	3 non-adopter communities	3 non-adopter communities
	3 adopter communities	1 adopter community	1 adopter community
	2 buffalo (66, 75% HH)	Cow (33% HH)	1 Poultry (28% HH)
	1 Poultry (27%)		
Medium	1 non-adopter community	2 non-adopter communities	1 non-adopter community
	3 adopter communities	2 adopter community	3 adopter communities
	3 Buffalo (44,100,100% HH)	2 Buffalo (18,50% HH)	3 Poultry (20,31,66% HH)
	1 Poultry (17% HH)	2 Cow (18, 67% HH)	
	1 Cow (11% HH)	2 Goat (10,33% HH)	
		2 Poultry (8,10% HH)	
Rich	0 non-adopter community	2 non-adopter communities	3 non-adopter communities
	4 adopter communities	2 adopter communities	1 adopter community
	4 Buffalo (25,56,75,100% HH)	2 Buffalo (12,75% HH)	1 Poultry (29% HH)
	2 Poultry (11,25% HH)	2 Cow (37, 37% HH)	
	1 Cow (50% HH)	1 Goat (12% HH)	
	1 Goat (25% HH)		

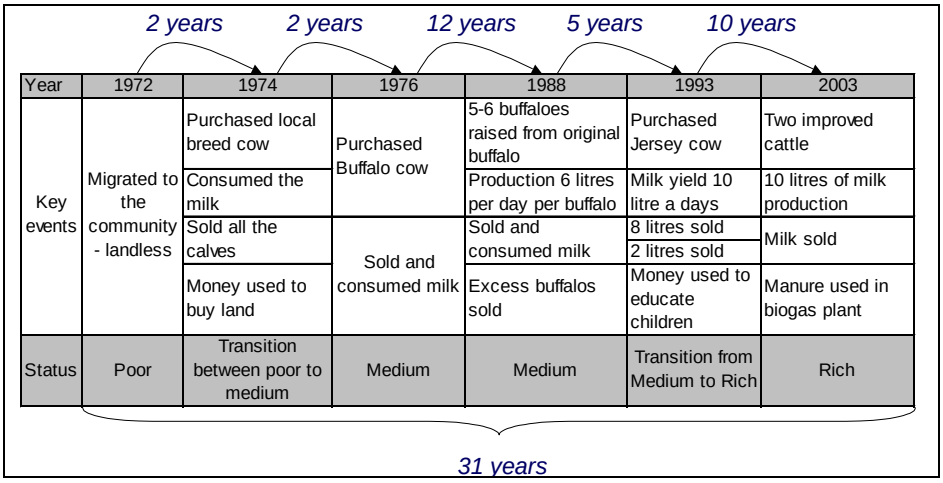
11.2.6.1 Dynamics of adoption - Timeline analysis

A number of interesting timelines have been taken during the data collection. They demonstrate that livestock can have an important role in improving the livelihood status of a family. However, these changes do not occur quickly and much more likely to happen over a period of 10 to 20 years. Whether they can be speeded up by better access to credit or more secure land tenure is difficult to judge, but it is suspected that even with a very favourable economic environment these changes are likely to take considerable time.[8]

Figure 5 presents the timeline of a family in the Chitwan area who moved from being poor to rich over a period of 31 years. Part of this progression was facilitated by the purchased of cattle and products they produced.

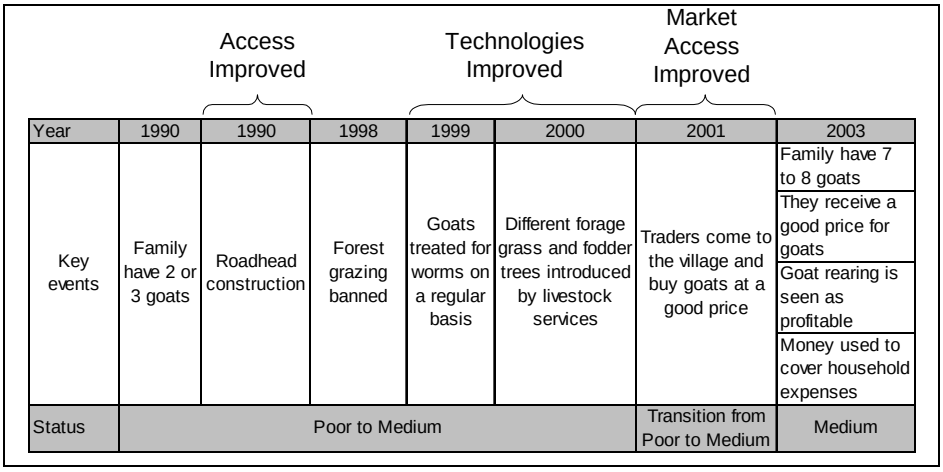
[8] The father of one of the British authors began working life as a farm labourer which was supplemented by keeping chickens. His family later moved to a small tenant farm of 25 acres with 8 cows, and it took a further 15 years to build the herd to 200 cows, but this continued to be run on tenanted land. This progression along the UK farming ladder took place during a period of farm subsidy support, growing economy, increasing per capita incomes and movement of the population from land based to urban based jobs.

Figure 5. Timeline for a family in Chitwan who moved from poor to rich using cattle and buffalo.



In another example a family were interviewed who seemed to have moved from being poor to medium over a period of just over 10 years in part with the use of goat production (see Figure 6).

Figure 6. Timeline for a family in Chitwan who moved from poor to medium using goats.



The interesting issue here is that a number of interventions seemed to have facilitated this progression with a combination of improved access, technology improvement and finally improved market access. These interventions were spread out over a 10 year period and the question is whether these family livelihood improvements could have been achieved in shorter time period if the interventions had been coordinated and run together.

11.2.7 Village Economies

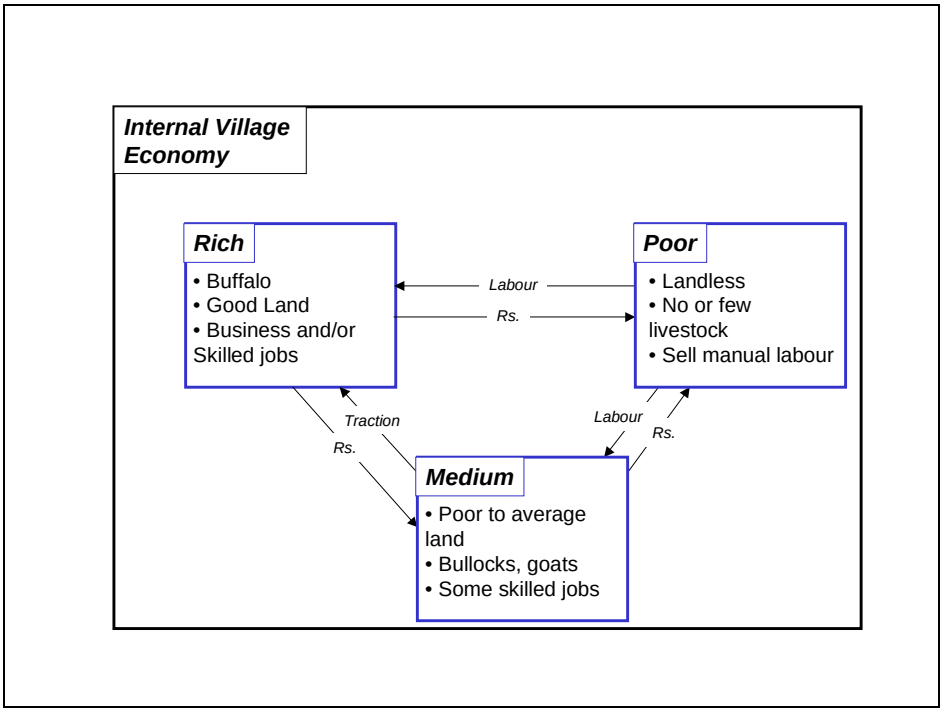
It is widely recognised that many development initiatives directly benefit certain social groups. Livestock are particularly prone to this bias as the ownership of large livestock species usually is by the richest groups in a rural society. However, development projects will also have indirect beneficiaries and multiplier effects, due

the creation of employment in livestock activities and increased local transactions by the livestock owners.

Given that dairy development is more likely to have impacts on a village economy an analysis was been carried out on the impact of two different dairy development interventions in terms of their impact at the village community level. The analysis is restricted to the development of conceptual models, as a basis to quantify some of the more important relationships identified. In effect this is using the conceptual framework of a SAM.

Figure 7 shows a representation of an internal village economy in a representative village with three socio-economic groups. There is interchange of labour, traction power and money. Interactions with the outside economy have been omitted from the diagram in order to reduce its complexity, but it is understood that there are important interactions in terms of selling labour, skilled and unskilled, to outside markets, selling of products and also money from either remittances or borrowing.

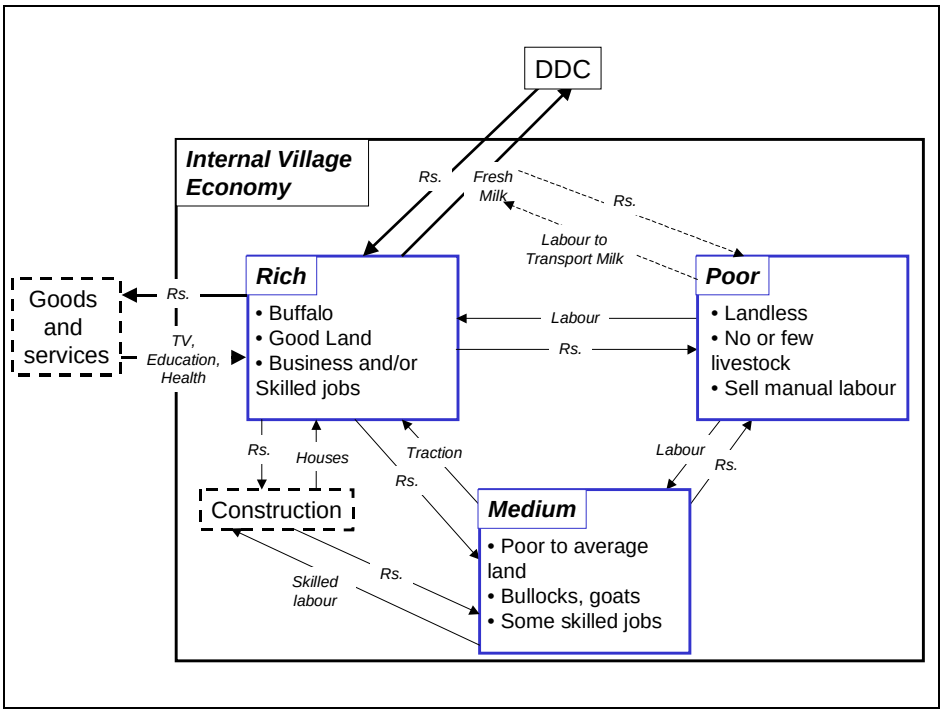
Figure 7. Conceptual model of an internal village economy.



Based on the knowledge gained from the data collection processes and the subsequent analysis the project team investigated what would happen in this village economy with the introduction of a market for fresh milk from the DDC. The direct beneficiaries are the rich households who possess milking animals and have experience in their management. These families sell the milk and receive cash payments. A large proportion of the income generated is spent on external goods and services such as electronic goods, education and healthcare. It was questioned whether these families would employ more labour within the dairy activity. The field staff's opinion was that there is a limit to the number of milking animals one family

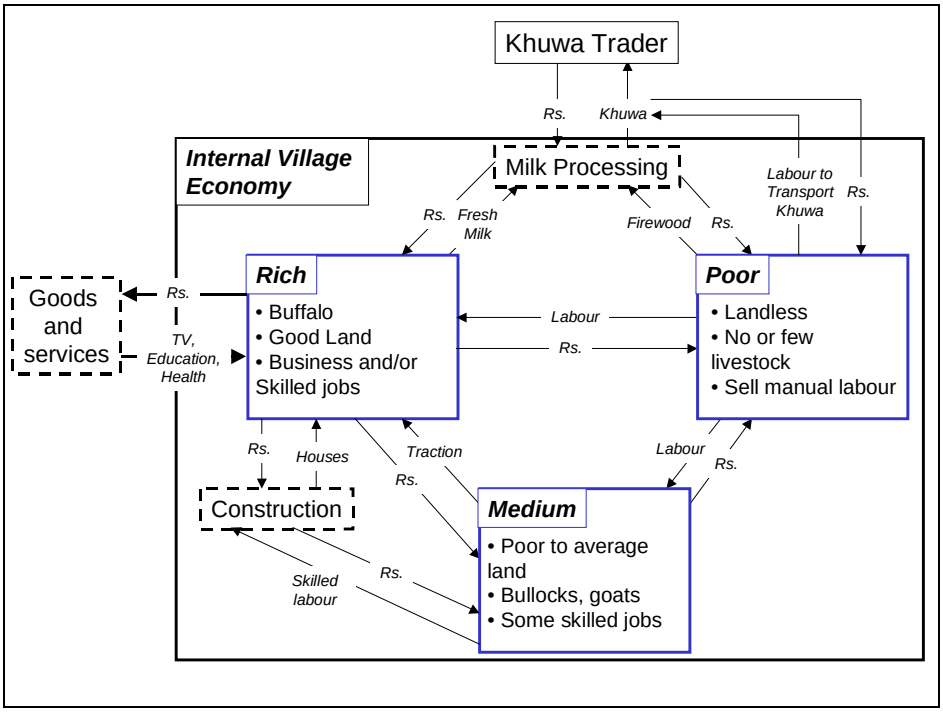
would keep (4 was the number stated) and that if they wanted to expand the herd further the head of the household would look to find an extra wife. These families do invest in construction and this generates labour opportunities for skilled builders who are in the medium socio-economic group. The only labour opportunities generated for the poorer groups was the need to transport milk to road heads, but this was only for villages that were some distance from road transport. Figure 5 shows a conceptual model of a village with the DDC buying fresh milk.

Figure 8. Village economy with DDC buying fresh milk.



The other possible dairy intervention investigated was contact of a village with a khuwa trader. These traders establish milk processing technology in the village with 1 or 2 families. The milk processing involves boiling the milk using firewood collected by poorer families. The khuwa produced is then transported to a road head by the poorer families. The money generated from the sale of milk, like the DDC village accrues mainly to the richer families who spend the money in similar ways as described for the previous village. The impact of the introduction of a khuwa market however generates a greater range of opportunities at village level than the DDC, which is due to the establishment of the processing unit with the village. Figure 6 presents a conceptual model of a village with a milk processing unit producing khuwa.

Figure 9. Village economy with a milk processing unit producing khuwa.



11.3 SUMMARY

The study has collected data from three very different regions of the country. Lalitpur District is predominantly urban with a small proportion of the households keeping livestock. Much of the development in the area is related to the expansion and activities of Kathmandu city. However, within this District there are still rural villages where livestock play an important role. Chitwan District is an important milk producing and agricultural region and it has one of the country's major tourist attractions. The economic activity in both Lalitpur and Chitwan districts has drawn people into these regions over the last 20 years with a rapid expansion of the human population and population densities.

Mustang District also has an important tourist attraction, but despite this economic activity the human population has remained stagnant over the last 10 years. It would appear that the difficulties of living in this region, along with more attractive alternatives in other parts of Nepal and further a field are drawing people from the District.

All the study Districts and villages show diversity in terms of economic activities and livestock holdings. The latter tends to be related to socio-economic status and cultural of the family and their access to resources, in particular land. Households of lower status, with less access to resources, keep or own fewer livestock. The ethnic and caste and the resource status also influence the adoption of livestock technologies, especially technologies that require access to land, credit and time. Despite these difficulties the project has collected data that demonstrate that

livestock can play a role in helping families to move out of poverty, but these changes tend to take place over a number of years.

Finally, examination of the impact of dairy policies at the local economy level raises questions about the impact on the poor in rural areas and also suggests that private dairy development initiatives may have a greater impact on the livelihoods of the poor.

The following chapter will discuss some of these issues in more detail and also critically examine the value of the methodology employed.

12 DISCUSSION

The discussion centres on two key issues:

1. The methodology and its potential usefulness.
2. Impact of livestock policies and technologies in Nepal.

12.1 HAS THE METHODOLOGY WORKED?

Some aspects of the methodology have worked very well for example:

1. The convening of, and dialogue with, the reference group was important in the orientation of the study and also created a forum to present and discuss results with people involved in setting and implementing policy. The reference group:
    a. Allowed for immediate dissemination of information generated by the project.
2. The collection and analysis of secondary data.
    a. The project has documented critical aspects of the Nepali livestock sector, which were not previously available.
    b. The analysis has shown the variation in livestock development and dependency across the country.
    c. Similar analysis could be applied at a VDC level within Districts to further highlight differences.
    d. This part of the general methodology is relatively simple to apply.
3. The examination of inter- and intra-differences at village level.
    a. This analysis has shown that there are large differences between and within villages.
    b. These differences demonstrate that pro-poor livestock technology interventions require ex-ante impact assessment and careful targeting.
    c. Such targeting in turn requires skilful use of wealth rankng methods for identifying groups within villages.
4. The presentation of some aspects of the data has a strong impact on audiences in particular:
    a. Timeline analysis; and
    b. Conceptual village models.

However, there is no doubt that the methodology and the present study could be strengthened. The issues highlighted are:

5. The original plan was ambitious in terms of proposed tools that were to be applied, particularly given the constraints on resources and more importantly professional time available from qualified livestock development specialists and economists.
6. More time should have been spent at the beginning of the project on a literature review and secondary data analysis. Nepal has been studied in

depth, particularly in the mountain areas, over long periods of time. While some of these studies are not livestock focussed they provide a strong background to livestock and livelihoods. In addition, Nepal has had very strong research and development inputs for the forestry sector, which as shown in the above review, make strong reference to the links between livestock keeping, forest products and forest access.

7. The quantitative data collection and analysis needs to be carefully reviewed in part to have a stronger basis to check the results generated by the qualitative analysis, but also add strength to the general methodology. The generation of gross margins, herd and flock models and simple household models would enhance the methodology (see Rushton et al. (1999), Rushton (2002) and Rushton (2003) for fuller discussion of these methods). Such additional analysis requires more professional time and was beyond the current study. Lessons could also be learnt here from the forestry work compiled by Richards *et al.* (2003). However, there needs to be a balance here between the costs of applying tools and the benefits of the extra detail generated. For example:
    a. PAMs are of greatest relevance for livestock sectors where there is a significant international trade in products and therefore would be of greatest relevance in Nepal for the milk and poultry sectors. The dairy sector has a PAM (Tulachan, 2004), which concluded that the government policy was not helping smallholder producers in producing more milk and being competitive in the market. This is despite the conclusions from Sharma (1994) that milk products were protected in Nepal mainly through subsidies on milk plant. A poultry sector analysis was outside the scope of the current project. However, given the conclusions by Prabakaran (2003) that the Nepali poultry sector lacks important inputs such as feed, credit and insurance, future analysis, including a PAM, would be very useful for this sector and its development.
    b. SAM is a tool that is very demanding in terms of data and professional skill. The additional benefits of quantifying local economies interactions versus the additional costs need to be carefully assessed before beginning such an exercise.
8. The use of wealth ranking of households within villages was central to the differentiated analysis. However, this method was not easy for the project field staff to assimilate and some found it difficult to leave to one side their own caste/ ethnic assumptions. This problem is particularly difficult where ethnic and socio-economic status interact in different ways across districts. The implementation of the method was not sufficiently uniform across all villages. A useful reference in this regard is Malla et al (2003). They describe issues of whereby family development and food security interact.

9. Further secondary data exist at VDC level. At the time of the study these data were inadequate to investigate the proportion of families who raise different species of livestock, and were a poor means of assessing livestock development impacts, particularly the differentiation between benefits for different families. However, there are data from the 2001 agricultural census which should be available soon and could be used to strengthen the secondary data analysis and reduce the need for primary data collection.

The opportunity to reflect on these methodological issues has also been a strength and it is suggested that an additional output from this study should be a working paper examining the current methodology and how it could be improved in the future (see Recommendations). Such a document would be useful guide to CLDP actions and the future analysis of livestock policies and technologies in South Asia. In particular the tools of greatest relevance to the CLDP in its initial stages of implementation are suggested to be the following

- Wealth ranking;
- Livelihoods assessments; and
- Community level economic assessments, in particular the impact of interventions.

12.2 IMPACT OF LIVESTOCK POLICIES AND TECHNOLOGIES

Technology adoption is influenced by a number of issues. Three are examined here:

1. The willingness and capability of people to adopt and adapt technology.
2. The appropriateness of technologies.
3. The enabling environment for technology adoption.

12.2.1 The ability of the Nepali people

A search of the literature on the Nepali agricultural and livestock sectors clearly demonstrates that the Nepali people are willing and able to adopt and adapt technologies (see Table 66).

Table 66. Successful technology adoption in Nepal.

Technology	Region	Source and date	Government Role	Comments
Potatoes	Sherpa region, but very widespread	Unknown, possibly 100 to 150 years ago. British Resident?	None	Become an integral part of the farming system. Important food product. Dried product used in trade
Apples	Mustang	Government project	Strong	Well adopted and supported
Use of draught animals	Sherpa region, but very widespread	Source unknown, but widespread adoption In the last 30 years	None	Change in cultivation practices relate to changes in labour costs since 1950s. When labour was cheaper land was cultivated by hand
Dzopa as a tourist pack animal	Mountain region	Local source, adopted in the last 30 years	None	Access to the areas by tourists requiring transport
Fodder crops	Sherpa region	Appears to local and in the last 30 years	None	This has been adopted in response to the nutritional needs of Dzopa which are greater than Yak
Cattle and dzopa	Sherpa region	Local source, adopted in the last 30 years	Government restrictions on the use of forest for goat grazing	In general this has been done by poor people with little land.
Wool carpet manufacturing	Kathmandu Valley	Tibet in the last 20 years	Minimal, monitoring and regulation of this sector has failed to avert problems of image	The industry grew very quickly during the 90s in response to world demand. This generating high levels of employment. Recently it has been affected by child labour issues and environmental concerns with types of dyes used
Credit for animal purchases	All	International and national from government and NGOs over the last 20 years	Strong	It is stated that the livestock sector and in particular the dairy sector has benefited from credit provision (Dhungana and Thapa, 1999). These initiatives have been supported by insurance policies
Exotic buffalo genetics	Hills and Terai	India, adopted in the last 20 years	Limited to AI and breeding bulls, which appear inappropriate in areas with high land pressure	Private traders import mature cows from India

The current study has also shown that people with access to resources, often related to their ethnic and/ or caste background (see below), and provided with economic incentives are willing and capable of adopting livestock technologies to either maintain or improve their socio-economic status. These technologies are not adopted without degrees of adaptation.

12.2.2 Appropriateness of Technologies Offered

The Nepalese livestock policies evaluated by the project have been based, and within the Tenth Plan continue to be focussed, on increasing production and increasing production per cow or milking buffalo – termed in most documents as "increased productivity". The main policy instruments to achieve these targets have been:

- provision of technology in terms of improved dairy breeds & crossbreeding;

- provision of fodder and feed technology;
- marketing of milk through the establishment of milk processing and storage plants, collection of milk through dairy cooperatives; and
- milk price setting.

The livestock sector is taken in isolation within the plans and programmes developed. There is little recognition of the link between livestock development and economic growth, which has been documented over the last five years by teams from IFPRI and FAO (Delgado *et al*, 1999). There is also a heavy reliance on the public sector to push dairy development, which ignores the important role and contribution of the private sector (including the informal sector) in providing investment, technology and skills (Anderson et al, 2004).

Productivity issues such as: returns per land area; returns per unit of forage resource used; and returns to labour appear to have been ignored. In addition, the competition of activities at household level for resources has not been taken into account. Here it is important to note that the main milkshed areas are also important zones for the production of crops and are close to cities where there is a higher demand for labour.

Such a production focus will have difficulties, because Ministry staff will be faced with farmers who are interested in productivity in terms of returns to limited resources, i.e. profitability. It is rare that a production focus will coincide with a profitability focus. This in turn means that technical field staff will become frustrated with farmers and farmers will become frustrated and/or ignore technical recommendations. It is only in the recent plans that there has been reference to food security and poverty reduction. These items are mentioned in the general objectives, but are not seen as key aspects of the strategies nor the outcomes.

These issues are best demonstrated by the data presented in Table 67 on less successful technology adoptions where the main cause is the inappropriateness of the technologies.

Table 67. Less successful technology adoption in Nepal due to the inappropriateness of the technology.

Technology	Region	Source and date	Government Role	Comments
Exotic milk breeds	Hills	International, in the last 20 years	Importation of semen, AI provision	Limited adoption (see later)
Exotic goat breeds	Hills	International, in the last 20 years	Importation of male animals	Economics of these species poorly understood
Introduced pasture varieties	All	International, in the last 50 years	Importation of seed, field station testing	Low returns in comparison to other land activities. Cheap sources of fodder from communal property key
Introduced fodder systems	All	International, in the last 50 years	Field testing of methods	

In a more specific example, the Lalitpur District has a high human population pressure and the landholdings are small. Livestock are integrated into the farming systems with manure and draught power being important inputs to cropping systems and crop residues being critical forage input for livestock. Dairying activities compete with crop, other livestock and off-farm activities for resources. The differences in

resource endowment of the households mean that families have different factor prices. There is also a difference in the levels of skills in dairy management and levels of education across the households.

In this District dairy technologies offered may be appropriate to certain cultural groups. In the villages studied the Brahmins, who traditionally are skilled in raising and looking after cattle and buffalo, were the key adopters of dairy technology. These groups have relatively good education levels, access to formal and informal sources of credit and are capable of drawing on the benefits from government projects. The key constraints to other groups entering the dairy development initiatives are a:

1. Lack of targeted extension;
2. Lack of knowledge and information;
3. Shortage of land and/or forage;
4. Poor access to credit; and
5. Perceptions of and attitudes to risk.

While this list is not new, the study has shown that there are strong differences between households access to knowledge, resources and credit that are related to socio-economic and ethnic and/ or caste differences. A family may be isolated from dairy development and dairy technologies maybe inappropriate, even if they have good physical access to markets. The response to this situation in the most "isolated" study village of Lalitpur was been to diversify into non-agricultural activities making full use of its proximity to Kathmandu and Lalitpur. In the case of Chitwan District, the villages were more involved in goat production.

Finally looking at the type of technology offered there is a need to examine the socio-economics of the area. For example in Lalitpur and Chitwan Districts improved genetic stock have been made available through artificial insemination or breeding bulls. In addition fodder and feed technologies have also been made available. It is reported and evidence is presented here that the use of AI and breeding bulls has not been successful in many areas of Lalitpur. In contrast livestock traders, who bring improved buffalo cows from India, find good markets for these improved breeds. Buffalos are sold in lactation and bought back from farmers when they are dry. It is reported that the dry buffaloes are then slaughtered. This livestock trading structure would indicate that Districts such as Lalitpur have very little breeding and rearing activity. A number of interesting issues come out of the development of such a system:

- Farmers have reacted rationally in not using their scarce feed and forage resources for rearing and breeding activities;
- The private sector plays an active role on the provision of genetic stock;
- The public sector interventions are not matching the economic needs of dairy producers and have been rejected;

- The slaughtering of dry buffaloes means that investments in genetic stock are immediately lost from Nepal. Investment in milking buffaloes brought from India is used only for them to produce one or sometimes two lactations of milk and then meat value.
- Government has not been a constructive actor in dairy technology provision, because of not examining the socio-economic constraints of the District.

12.2.2.1 The enabling environment

There are also technologies that have not been adopted easily by farmers and the private sector because of a poor enabling environment. Here the government has played a negative role (see Table 68).

Table 68. Less successful technology adoption in Nepal due to a poor enabling environment.

Technology	Region	Source and date	Government Role	Comments
Fertiliser	All, but particularly important in Terai and productive valleys	International over the last 30 years	Provided subsidies and controlled the importation and distribution. Incomplete privatisation process attempted in the early 90s	Government has not been able to supply fertiliser demanded in the right quantity or timing
Formal milk marketing systems	Chilling centres around the country. Main market in Kathmandu valley	International over the last 40 years	Importation of milk plant processing capacity. Organisation of farmers into cooperatives. Transport and chilling facilities	Hindered by privatisation processes that have not been completed and are in consistent in the sector
Cheese manufacture	Kathmandu Valley	Last 20 years	Restricted access to key input to the DDC (Winrock, 1994)	Trade regulation did not allow anyone except DDC to import rennin

The analysis of dairy policies and private sector initiatives demonstrates that there has been a combination of poor understanding of dairy and household economics and a lack of a good enabling environment in the adoption of dairy technologies. These issues are summarised in Table 69.

Table 69. Analysis of the dairy policies and private sector initiatives.

Policy and private sector initiatives	Technology	Adoption	Demand for technology	Economic Returns	Comments
Increase milk production and availability	Introduced dairy breeds	Limited	Richer households it is for buffalo, Poorer households it is for goats and poultry	Poor returns where there is no market for cull cows	Policy needs reviewing
	Forage	Limited		Dependent on land-use alternatives	Necessary to review on case by case basis
	Concentrate feed	Limited		Dependent on regularity of supply and product quality	What is the role of the public sector?
	Veterinary services	Limited		Good	Government policy on the control of contagious diseases needs to be strengthened
	Milk marketing	Limited		Where milk holidays there are problems	What is the role of the public sector?
Private sector initiative	Introduced buffalo breeds	High		Good	Need for a review of access to this technology by the poor Need to review the loss of imported buffalo genetics

Finally it is important to draw attention to an issue related to livestock and its potential to reduce poverty, access to land. Over the last fifty years there have been a number of changes to the Nepali land tenure laws and also a number of changes in the laws of access to communal land and forest areas. The former have been implemented with the intention of improving land distribution and equity in society and the latter often in response to environmental concerns. Unfortunately what they have also done is constrain the ability of the poor to use livestock as a means of coming out of poverty. As an example of this Table 70 provides an analysis of the amount of land and livestock required to achieve an average level of family income in the different regions of Nepal. Only in the Terai would a family be allowed to own and farm sufficient land to generate enough income from livestock to earn more than the average level of income in this area.

Table 70. Analysis of the land required to achieve an average level of family income from livestock.

	Terai and Inner Terai	Hills and Mountains	Kathmandu Valley	Nepal
Average family size	5.75	5.2	5.12	5.45
Average Income per Capita (PPP$)	1,267	858	2,059	1,237
Earnings per LSU (PPP$/LSU)*	1,018	1,018	1,018	1,018
LSU needed to achieve average income levels per family	7.16	4.38	10.36	6.62
Average LSUs per family	1.24	1.92	1.08	1.54
Hectares needed per LSU**	1.22	2.00	1.27	1.61
Hectares required to achieve average income levels per family from livestock alone	8.73	8.75	13.16	10.68
Average cultivated landholding per family	0.70	0.65	0.34	0.62
Average amount of land per family**	1.50	4.17	1.36	2.49
Maximum landholding	16.93	4.07	2.54	

*Excludes family labour (this estimate needs to be improved)

** Includes cultivated, pasture and forest land

Improving a livelihood through livestock usually requires a combination of having more livestock and that these livestock are more productive. To be able to achieve this, a household needs access to greater quantities of improved land, and/or the ability to purchase a greater level of purchased inputs. The current land tenure laws and communal and forest land access limit access to land by the poor and this inflexibility in the agricultural system in turn limits how effective livestock can be as a poverty reduction measure. The only effective means would be to adopt landless livestock systems such as intensive pig or poultry units or dramatically increase the productivity per hectare from livestock production. The latter process would also require families to have better access to concentrate feeds and/or chemical fertilisers.

12.2.3 Benefits of technologies offered

With regard to dairy development at the community level, where dairy production is taking place, the benefits from public and private sector interventions and technology provision appear to largely accrue to the higher caste groups and the households with relatively good resource endowments, in particular land. In general these ethnic and/ or caste groups have the skills and education levels to be able to exploit opportunities in the dairy sector. The money generated by dairy activities of such households is predicted to only partially improve local economies - either through the generation of labour activities, such as forage collection, collection of firewood for milk processing or carrying milk and milk products to road heads, or indirectly through the generation of labour activities in the construction industry. The private sector dairy interventions, that require community level processing, would appear to have a much more positive impact on the local economy than public sector dairy projects. The latter are focussed on moving fresh milk quickly from rural to urban areas and the processing being concentrated in large dairy plants. There are some

important implications from this analysis with regard to dairy policy aimed at poverty alleviation:

- The dairy development activities impact directly on the livelihoods of the richer and advantaged families, both in the physically accessible regions and the less accessible regions.
- The dairy activities outside the areas affected by the dairy development activities are also controlled by the relatively rich and advantaged families.
- The poorer and medium strata families may indirectly affected in the less accessible areas as there is processing of milk to a "khuwa" which requires firewood. The latter obviously needs to be collected.
- However, the impact in villages that are concentrating on fresh milk marketing the indirect impact is likely to be constrained to additional income generated from the milk activity by the richer families. Part of this money is spent on goods that are from outside the village economy so the knock on effects may be very small.
- There may be some labour effect if poorer and medium families are involved in labour activities relating to buffalo keeping, though there is little evidence of this.

In the leasehold forest projects the data collected by the project though limited, indicates that the Dalit families in the study villages are not strong adopters of forage technologies. However, in these villages the higher caste groups are strong adopters. This would raise questions on the effectiveness of the targeting carried out by the project.

Finally the forage project in the mountain areas appears to have had very little impact and probably demonstrates the difficulties of trying to improve communal pasture areas with outside interventions.

12.2.4 Summary

What is noticeable is that technologies adopted by the Nepali people are not limited to agricultural or livestock production practices, they include means of finance and also the use of processing and marketing systems. Some of the less successful technology adoptions appear to be related to either inappropriate technology for the socio-economic circumstances and in some cases policies that have impeded technology adoption.

The focus on production, rather than productivity or profitability, by the government policy makers creates problems with the general management of the plans, but in particular the livestock development plans. From documents of the TLDP the monitoring and evaluation structures are restricted to input targets rather output issues (TLDP, 2002). As mentioned above, reports on policy success limit themselves to production targets and cow or milking buffalo production. The constrained use of one productivity measure and a focus on the level of production without consideration of demand, leads to a focus that is not dissimilar to the models

of agricultural development adopted by countries such as the UK in the 1960s through to the early 1980s. These were based on increasing production through improved technology, but they were supported by:

1. Research;
2. Extension;
3. Subsidies on infrastructure;
4. Price supports;
5. Farmers and livestock keepers who are educated to a level where they can read and write and interpret recommendations and data analysis; and
6. Economic growth, per capita income increase and an increasingly sophisticated consumer demand.

These models are successful where societies are rich enough and are willing to pay money to support agriculture even to the extent of generating large surpluses of food. In Nepal support strategies 1 and 2 (above) have been available with the addition of support to improve milk processing and marketing technologies, but the other aspects of agricultural growth have not always been present. The above evidence has shown that for some dairy farmers subsidies, price support and training have been available, but that due to a lack of targeting of dairy development initiatives and other livelihood related constraints these farmers are not poor households.

13 CONCLUSIONS AND RECOMMENDATIONS

13.1 CONCLUSIONS

13.1.1 Methodology

The methodology can be improved through:

- Clearer selection of representative households.
- The use of quantitative analysis with an analysis of the additional costs and benefits.
- Lessons from forestry sector analysis.

The methodology has merits in particular the:

- Reference group.
- Secondary data analysis.
- The analysis to compare differences between and within villages.

The important questions raised during the project are identified as being:

- Is fieldwork justified in countries such as Nepal where so much has already been studied?
    - The interesting issue is that although there exists a large amount of documentation on Nepal, many of the important project findings have come out of further fieldwork. What probably could be improved is a more thorough review of available published and grey literature before beginning a study in such a country as Nepal to ensure that data collection is focussed on data gaps.
- How can the methodology be kept simple without losing value?
    - There are many methodologies available to analyse the impact of policies, but these require highly trained staff to implement and interpret the results. Whilst these may give academic credibility, the added value to a process of policy debate is not always clear. Here it is important to remember that "Everything should be made as simple as possible, but not simpler".[9]

13.1.2 Livestock and Poverty

The commercial livestock sector is concentrated close to areas of greatest economic development. For example, dairy animals are concentrated in the mid-hills districts surrounding Kathmandu city, because of high demand for fresh milk. However, the dependence on livestock in these areas is generally low as the economy is much more diverse than in other areas.

[9] Albert Einstein

The analysis of the national data for the livestock sector and poverty indices indicates that in the less developed regions there is a smaller livestock sector and economy in relation to the national livestock economy. The reason for the smaller size is that there are generally fewer animals (scale factor), but also that the output per animal is less. There is also greater dependency on livestock and higher levels of investment in these areas. This would indicate that although the livestock economies are relatively small at national level, they are relatively more important at regional or local level.

The project data supports the view that livestock dependence and investment are higher in the more remote areas. However, in addition other secondary data from previous field level studies and the findings from the project indicate that there are critical differences within regions and within communities. Here the relatively less well off families have fewer livestock and generally keep species that are smaller than the better off households.

Therefore the areas with the highest incidence of poverty have the highest dependence on livestock. This reflects the limited alternative economic opportunities in these regions. Within all regions and communities there are strong differences:

- Poorer households have few livestock and the livestock they have tend to be small species
- Relatively better off households have livestock and these tend to be both large and small species

Poorer households would like livestock, but are limited by access to resources and capital.

13.1.3 Technologies

There are clear examples of technology adoption by different ethnic groups, rich and poor. Government's role in many of these adoptions has been very limited. This indicates that Nepali people are capable and willing to adopt technologies. There are also clear examples where livestock technologies have been used to improve livelihoods

For the most important livestock programme, dairy development, our field data provides evidence that the socio-economic and caste/ethnic groups are critical factors in dairy technology adoption. Higher socio-economic and caste groups have taken advantage of dairy processing technologies. On the other hand, the lower socio-economic groups and lower caste such as Dalits and disadvantaged groups are left out in the process of dairy sector development.

Therefore there are socio-economic groups who have great difficulties taking advantage of livestock development initiatives either for reasons of a lack of knowledge, poor education, resources, credit or culture. The latter can be divided into: cultural barriers to producing and selling certain livestock products; and a lack of tradition in keeping dairy animals and producing milk products. The technologies offered by livestock development programmes, such as AI and breeding bulls, do not

seem to fit with the socio-economic reality of dairy keepers. For this reason they have been rejected in favour of a private sector solution of dairy animal trading, bringing milking animals from India. In other areas where pasture technologies have been offered there has in general been a poor understanding of land tenure and access issues. The leasehold forestry project has been an exception to this in that land tenure, livestock and fodder technology and credit have been offered in combination.

Technologies offered by government services have not always been appropriate which can be explained by either of the following:

- The socio-economics of the situation
- In general a lack of appreciation of working in mixed farming systems where there is competition for land, labour and capital from agricultural, non-agricultural and household activities.
- A lack of appreciation of the impact of competing sectors – tourism and urban based employment

In many cases the enabling environment has not encouraged adoption of some technologies. For example the combination of landholding ceilings with restrictions on communal forest areas restricts the number of livestock that can be kept. In a more specific example, restrictions on the importation of key ingredients for cheese making have limited the progress of the private sector (Winrock, 1994).

13.1.4 Agricultural Sector

The agricultural sector lacks flexibility due to:

- Land tenure laws (insecurity with regards land ownership leading to fears of losing land and ceilings on land ownership);
- A lack of social mobility – cultural constraints; and
- A constrained input sector.

In general there is stagnation of the sector due to:

- Government regulations;
- Incomplete privatisation of key input industries;
- Incomplete privatisation of key processing industries;
    - Existing facilities in the hands of the government are not allowed to make decisions on investment or pricing
    - Other private facilities are not monitored or regulated in terms of the quality of product produced.
- Incomplete liberalisation.

Despite these constraints there are continued calls for agriculture to lead economic growth (Mellor, 1999; UNDP, 2004). However, with the agricultural sector in its current state it is unlikely that the livestock sector can have much more than a small impact on poverty alleviation.

13.1.5 Policy Issues

There have been Government statements of pro-poor poverty plans. However, the livestock policies and programmes have failed to adopt policies of targeting resources to help families with greater dependence and investment in livestock. This has been recognised in the general objectives of the more recent plans, but the strategies within this plans does not include issues with regard to poverty reduction or food security. It is therefore of no surprise that the livestock policies and programmes have failed to adopt policies of targeting resources at micro level to help families with difficulties in adopting profitable livestock technologies. The exception is the leasehold forestry project, but results here seem to indicate that the poorest households are not the main beneficiaries.

The livestock policies and programmes have failed to promote technologies that relate to the economic reality of livestock keeping, the farming systems and household economics. This is a clear indication of past policy flaws in addressing poverty issues through the livestock sector. The policies have failed to use livestock as an entry point for poverty reduction because of past development programme biases towards the advantaged or richer farmers and their inability to address the root causes of poor and disadvantaged farmers who have poor access to formal credit and animal health services, and who have poor risk bearing capacity

Insurgency issues are not openly discussed, but it appears that the existence of the Maoists has focused minds on pro-poor actions. However, the present situation places at risk the poverty impact of livestock interventions. In general there have been incomplete changes in policy in terms of privatisation, liberalisation and pro-poor focus.

13.1.6 General Conclusions

The good news is that livestock keepers have adopted various technologies in Nepal from marketing systems, service provision, feeding and nutrition, processing to improved animal breeds and crosses. However, these adoptions in general are **NOT** the ones that were **PLANNED** or necessarily provided by the public sector. This can be seen in the summary of the technologies reviewed by this study (see Table 71).

Table 71. Summary of the technology interventions.

Technology area	Interventions & timing	Agencies involved	Objectives	Target groups or beneficiaries	Outcomes
Milk production & processing	Over a period of 40 years beginning in the late 1950s	Nepal Government, DANIDA and ADB	Increase milk supply from rural to urban areas	Dairy producers and consumers of dairy products	Only 10% of the milk is channelled through the formal dairies established. However this sector plays an important in price setting. Milk holidays are a concern.
Leasehold forestry and	During 1990s, officially began in 1993 should have ended 2003	Nepal Government, IFAD, Dutch Government and FAO	Reduce poverty and stop land degradation	Poor people with less than 0.5 hectares of land and below a minimum level of income	Has worked in some places, but constraints in terms of access to forest land will always be difficult to overcome. There needs to be further work on the beneficiaries.
Forage and pasture management	Late 80s early 90s	Nepal Government and UNDP	Improve communal pasture and pasture management	Livestock keepers in high mountain areas	Appears to have had minimal or no impact.

Evidence would suggest that some public policy and planning measures may be inhibiting livestock development, and in some cases are actually competing with the private sector. Also other policies may actually be having a negative impact on poor families and people's livelihoods[10].

The key question is how can livestock policies be improved in order to facilitate what are obviously strong private sector involvement in the livestock sector. The key issues would appear to be:

- Recognition of other policies and how they impact on the livestock sector interventions
    - Education policies – importance with regards:
        - Extension messages
        - Future labour availability for livestock rearing
    - Land tenure and local management of grazing resources
    - Land taxes

[10] Note the case of community forest management in Humla (Winrock, 2002) and the competition for resources by the state farm reported from the Khumba region (Brower, 1991) are particularly worrying examples.

    - Migration
    - Business regulation and support – dairy processing, slaughter capacity and regulations
    - Tourism
    - Decentralisation
    - Border control particularly in mountain areas
- Review of proposed public livestock interventions in order to determine:
    - Public and private sector roles through institutional economics
    - Identifying and assessing market failures
- Lesson learning and coordination with other programmes:
    - In particular the community forestry projects
- Community based actions and coordination of these actions through a network of fieldworkers. Information provision rather than top-down technology transfers.

These issues need to be placed in a context where the national government has slowly been losing influence and power in the rural areas over a period of 5-10 years. This has reached a point where its actions are concentrated in limited areas of the country. This dual situation would suggest the need to develop strategies of delivering services and actions in other areas where livestock are both a critical aspect of people's livelihoods and potential first step in alleviating poverty.

13.2 RECOMMENDATIONS

The "lessons learnt" from the study have identified:

- General recommendations that can be applied in other contexts
- Specific recommendations that can be applied to the Nepalese context
- Specific recommendations on the dissemination of the projects findings

13.2.1 General Recommendations

There is a strong need for the **coordination** of livestock policies and actions with other related sectors.

- **Forestry** is perhaps of greatest importance as access to forest areas is critical to poor people with livestock.
- Coordination with **agricultural policies** would merit further work.
- In the more general context, there is a need for **consistent** and **sound land tenure, infrastructure, credit and business policies** in order to support the development of the livestock sector.

Each **law, regulation and action** for the livestock sector needs to be **assessed** in terms of:

- Public and private **responsibility** applying concepts of public/private good generation, externalities and moral hazards.

- Increasing the **flexibility** of the livestock sector to provide opportunities to poor people.

Greater **flexibility** is required in the **provision of livestock technologies** and could be achieved by:

- Having less prescriptive lists;
- Field staff who work with families in identifying problems and potential solutions; and
- Adequate knowledge and financial support to help families adopt and adapt potential solutions.

These aspects are a strong component of LPP financed project "CALL" (DFID Project R7820) that has been implemented in Bolivia and Mexico between 2000 and 2004. Some of the findings from this project can be found in Rushton and Viscarra (2005) and the main project lessons will be written up during 2005.

13.2.3 Specific Recommendations

The continued existence of **contagious animal diseases** in Nepal calls for a strong focus in livestock projects on the **control**, and where possible **eradication** of such diseases. Such actions would benefit poor livestock farmers through **reducing risks** in livestock keeping.

Targeting of the poor and their needs in the implementation of the Community Livestock Development Project requires **training** in:

- Wealth ranking;
- Livelihoods assessments;
- Community level economic assessments, in particular the impact of interventions;
- Methods to identify technology demands of the poor; and
- Methods to supply technology to the poor.

Some of the important livelihood tools can be found in manual produced by the LPP financed Indicators project (Dorward *et al.* 2005).

There is a need to **disseminate** the findings from the LTIP project and related material and the following actions are suggested:

- Dissemination to all reference group members and key people in the DLS and NGOs by email of the:
    - LTIP Powerpoint presentation shown to LPP and PPLPF
    - LTIP final technical report[11]
    - LPP funded "Indicators" project manual (DFID Project R7823) (Dorward *et al.* 2005)

[11] Note this could be particular importance to the APP Support Programme who have recently commissioned a consultancy on agricultural sector polices.

  - Information from the "CALL" project (DFID Project R7820)
  - Livestock systems analysis produced by FAO (Otte and Chilonda, 2002; Rushton and Viscarra, 2004)
- Write up of two policy briefings (2-4 pages to be published as a joint LPP and PPLPF publication). The briefings would be disseminated through the LPP and PPLPF network in South Asia. The following are the suggested titles:
  - Adoption and adaptation of livestock technologies – the role of the government
  - Nepal livestock sector and policies
- Write up of a working document based on the key elements of the methodology from the LTIP project (15-20 pages to be published as a joint LPP and PPLPF publication). Again the document would be disseminated through the LPP and PPLPF network, but the audience would be international.

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15 ANNEX 1 – MEMBERS OF THE REFERENCE GROUP

Name	Post	Organisation
Pruna B Chemjong	TA Team Leader	Third Livestock Development Project, Dept Livestock Services, HMGoN – Asian Development Bank
Vinod Ahuja	Co-ordinator (South Asia)	Pro-Poor Livestock Policy Initiative, FAO
Krishna P Neupane	Director	National Agro-forestry Foundation
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Shreeram P Neopane	Head of Animal Breeding	Nepal Agricultural Research Council
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Jan Morrenhof	Programme Adviser	APPSP / MOAC / DFID
Laurent Chazee	Agriculture & Rural Development Specialist	Asian Development Bank
Gyan Prasad Sharma	Under-Secretary	National Planning Committee HMGoN
Sunil Neupane	Farmer	Chapagaon, Lalitpur
Mandip Rai	Assist Planning Officer	Third Livestock Development Project, Dept Livestock Services, HMGoN – Asian Development Bank

16 ANNEX 2 - GENDER ANALYSIS

By Kamala Gurung

16.1.1 Methodology

Gender analysis was carried out only in the Mustang field study site and within this site only the villages of Ghelling and Kagbeni (Gurung, 2004). The feminist political ecology approach was adopted that has evolved from different perspectives of biological, human, cultural and political ecology, eco-feminism and feminist environmentalism (Rocheleau, Thomas-Slayter and Wangari, 1996; Thomas-Slayter and Rocheleau, 1994). It treats gender as a critical variable in determining resource access and control, interacting with class, caste, race, culture and ethnicity that in turn influence processes of ecological change. This framework links gender with natural resources and institutional responses. Slayter and Rocheleau (1994) state that to address the condition of the natural resource and management and utilization process, it is imperative to focus on institutional system of the communities.

The general analysis data collection was carried out in June to August 2004. Published/unpublished books or journals, official reports or records and websites were extensively reviewed for secondary data collection. During the fieldwork, qualitative data were collected using the Participatory Rural Appraisal (PRA) tools: wealth ranking, key informants, group discussions, individual testimonials, and timelines. A daily diary was maintained on personal observations and informal talks/discussions.

The semi-structured questionnaires were developed from the Harvard Analytical Framework, which is designed to collect data at the community and household level. This Framework allow the identification of:

- resources people use to carry out activities;
- access by women or men to resources;
- who controls the use of a resource; and
- who controls the benefits of a household's and community's use of resources.

It is noted that access simply means that you are able to use a resource but this says nothing about whether you have control over it (Thomas-Slayter, 1995; and adopted from Thomas-Slayter, 2003) or whether you can benefit from the access or control.

The data collection tools were used to answer the following research questions (see Table 72).

Table 72. Gender analysis data collection matrix.

Topic of Key Question	Methods of Data Collection				
	Wealth Ranking	***SSQ***	***Gender Calendar***	***Observation***	***Time line***
To what extend do women's **participation and decision-making** in intra and inter household system related to various livestock and pastureland management activities?		*	*	*	
What are women's roles in **access to and control** over the household and community resources?		*	*	*	
What are the different activities that are carried out by different socio-economic group of women?	*	*	*	*	
What are the livestock technology changes that have occurred over the last 20 years?		*		*	*
Are there differences in the roles and participation of women between the two communities of Ghelling and Kagbeni		*	*	*	

16.1.2 Results

Gender analysis was carried out in Gelling and Kagbeni villages. The key questions identified for the gender analysis were as follows:

- What are the women's roles in access to and control over the household and community resources?
- What are the women's participation in intra and inter household system related to various livestock and pastureland management activities?
- What are the women's roles in decision making related to pastureland and livestock management at intra and inter household level?

A summary of the results is presented in Table 73 and clearly shows that women have a role in basic activities such as food preparation for the household, caring for livestock in terms of feeding, herding activities and hygiene of the sheds. However, they are not involved in aspects such as veterinary care, animal sales and marketing nor the use of income from livestock. In addition, they either have a very weak or no role in community based decisions from planning of agricultural activities, pasture management to the selection of village representatives.

Table 73. Assessment of women's access and control of resources, participation in activities and role in decision making for the Gelling and Kagbeni villages in the Mustang study site.

Strength	Resources				Activity Participation		Decision making	
	Inter Household		Intra Household		Inter Household	Intra Household	Inter Household	Intra Household
	Access	Control	Access	Control				
Strong	Pasturelan d		Livestoc k Feed	Crops and grains	Seasonal migration	Collecting forage, cleaning animal shed, grazing close to the house	Seasonal migration, religious ceremonie s	
Weak			Credit	Livestoc k income, Credit	Social work	Livestock sales		Taking loans, sale of livestock, livestock input purchase
No		Irrigate d land		Land and livestock	Community representation , conflict resolution	Trade, business and animal health	Selection of village council, cropping activities	Trade, business, credit, investmen t

In terms of women's involvement in technology adoption, in the case study villages their role has been with implementation of activities. The success of these activities has been variable and is likely to be combination of factors from economic returns of the technologies to the importance and recognition of women's role (see Table 74).

Table 74. Gender analysis of technology adoption.

Technology	Source	Women's Participation	Benefit to Women	Outcome
Improved grass species seed distribution--- *Medicago falcate*	Exogenous	Sowing in the field bunds	Direct	Failed
Maize farming for feed Resources	Endogenous	Labour contribution in cultivation and harvesting	Direct	Adopted
Changed in goat breeding timing	Endogenous	No involvement because of the cultural & religious matter	Indirect	Adopted
Introduced dipping tank to treat ecto-parasites for goat	Exogenous	Some women-headed household involved	Indirect	Adopted (Kagbeni village) & Failed (Ghilling village)

17 ANNEX 3 - LIVESTOCK POPULATIONS BY DEVELOPMENT REGION AND AGRO-ECOLOGICAL ZONE

Table 75. Cattle Population by Development Region and Agro-Ecological Zone

Agro-ecological zone	Development Region					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	Population ('000 head)					
Mountain	212	168	9	187	245	821
Hill	738	651	914	720	371	3,394
Terai	901	642	421	440	360	2,764
Total	**1,851**	**1,461**	**1,344**	**1,347**	**976**	**6,979**
	Proportion of National Population					
Mountain	3.0	2.4	0.1	2.7	3.5	11.8
Hill	10.6	9.3	13.1	10.3	5.3	48.6
Terai	12.9	9.2	6.0	6.3	5.2	39.6
Total	**26.5**	**20.9**	**19.3**	**19.3**	**14.0**	**100.0**

Table 76. Buffalo Population by Development Region and Agro-Ecological Zone

Agro-ecological zone	Development Region					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	Population ('000 head)					
Mountain	111	100	0	41	106	358
Hill	303	475	795	291	188	2,052
Terai	355	331	213	207	185	1,291
Total	**769**	**906**	**1,008**	**539**	**479**	**3,701**
	Proportion of National Population					
Mountain	3.0	2.7	0.0	1.1	2.9	9.7
Hill	8.2	12.8	21.5	7.9	5.1	55.4
Terai	9.6	8.9	5.8	5.6	5.0	34.9
Total	**20.8**	**24.5**	**27.2**	**14.6**	**12.9**	**100.0**

Table 77. Cattle, buffalo and milking animal populations by agro-ecological zone.

	Cattle		Milking cows		Buffalo		Milking Buffalo		Milking animals	
Zone	Total	%	Total	%	Total	%	Total	%	Total	%
Mountain	821	11.8	103	12.1	358	9.7	84	8.8	187	10.3
Hill	3,394	48.6	456	53.5	2,052	55.4	577	60.2	1,033	57.0
Terai	2,764	39.6	293	34.4	1,291	34.9	298	31.1	591	32.6
Nepal	**6,979**	**100.0**	**852**	**100.0**	**3,701**	**100.0**	**959**	**100.0**	**1,811**	**100.0**

Table 78. Cattle, buffalo and milking animal populations by development region.

Region	Cattle		Milking cows		Buffalo		Milking Buffalo		Milking animals	
	Total	%	Total	%	Total	%	Total	%	Total	%
Eastern	1,851	26.5	246	28.9	769	20.8	200	20.9	446	24.6
Central	1,461	20.9	179	21.0	907	24.5	234	24.4	413	22.8
Western	1,344	19.3	148	17.4	1,008	27.2	288	30.0	436	24.1
Mid Western	1,346	19.3	143	16.8	538	14.5	105	10.9	248	13.7
Far Western	976	14.0	136	16.0	479	12.9	132	13.8	268	14.8
Total	**6,978**	**100.0**	**852**	**100.0**	**3,701**	**100.0**	**959**	**100.0**	**1,811**	**100.0**

Table 79. Sheep Population by Development Region and Agro-Ecological Zone

Agro-ecological zone	Development Region					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	Population ('000 head)					
Mountain	40	49	22	179	62	352
Hill	71	43	148	124	3	389
Terai	11	3	16	46	23	99
Total	**122**	**95**	**186**	**349**	**88**	**840**
	Proportion of National Population					
Mountain	4.8	5.8	2.6	21.3	7.4	41.9
Hill	8.5	5.1	17.6	14.8	0.4	46.3
Terai	1.3	0.4	1.9	5.5	2.7	11.8
Total	**14.5**	**11.3**	**22.1**	**41.5**	**10.5**	**100.0**

Table 80. Goat Population by Development Region and Agro-Ecological Zone

Agro-ecological zone	Development Region					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	Population ('000 head)					
Mountain	277	268	39	204	116	904
Hill	723	833	995	710	283	3,544
Terai	760	663	256	285	194	2,158
Total	**1,760**	**1,764**	**1,290**	**1,199**	**593**	**6,606**
	Proportion of National Population					
Mountain	4.2	4.1	0.6	3.1	1.8	13.7
Hill	10.9	12.6	15.1	10.7	4.3	53.6
Terai	11.5	10.0	3.9	4.3	2.9	32.7
Total	**26.6**	**26.7**	**19.5**	**18.2**	**9.0**	**100.0**

Table 81. Pig Population by Development Region and Agro-Ecological Zone

Agro-ecological zone	Development Region					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	Population ('000 head)					
Mountain	82	13	0	0	3	98
Hill	229	140	99	64	3	535
Terai	115	43	24	68	51	301
Total	**426**	**196**	**123**	**132**	**57**	**934**
	Proportion of National Population					
Mountain	8.8	1.4	0.0	0.0	0.3	10.5
Hill	24.5	15.0	10.6	6.9	0.3	57.3
Terai	12.3	4.6	2.6	7.3	5.5	32.2
Total	**45.6**	**21.0**	**13.2**	**14.1**	**6.1**	**100.0**

Table 82. Poultry Population by Development Region and Agro-Ecological Zone

Agro-ecological zone	Development Region					Nepal
	Eastern	Central	Western	Mid Western	Far Western	
	Population ('000 head)					
Mountain	601	487	14	127	225	1,454
Hill	1,442	6,079	2,210	1,234	212	11,177
Terai	1,930	3,978	846	1,519	467	8,740
Total	**3,973**	**10,544**	**3,070**	**2,880**	**904**	**21,371**
	Proportion of National Population					
Mountain	2.8	2.3	0.1	0.6	1.1	6.8
Hill	6.7	28.4	10.3	5.8	1.0	52.3
Terai	9.0	18.6	4.0	7.1	2.2	40.9
Total	**18.6**	**49.3**	**14.4**	**13.5**	**4.2**	**100.0**

18 ANNEX 4 – SOCIO-ECONOMIC CHARACTERISTICS OF THE HOUSEHOLDS IN THE STUDY VILLAGES

Table 83. The characteristics of the different socio-economic groups in the study villages of the Lalitpur District.

Village, VDC	Poor	Medium	Rich
Burunchuli, Devichaur (PEPA)	• Entirely depend on labour based activities • Working as a domestic helpers • Landless & having few lands	• Food secured from own field production • On-farm & off-farm labouring activities • Farming and bullock ploughing • Some goat keeping	• Having agricultural lands • Having improved livestock (buffaloes and goats) • Having TVs, radios, VDCs etc • Strong economic status and self satisfaction • Having services, business and shops
	45%	20%	35%
Jyalungtar, Chapagaun (PEGA)	• Landless except for home & small kitchen garden • Entirely dependent on labour based activities • Caste based occupations[12]	• Labour is main economic activity & agriculture & livestock are secondary economic activities • Bullock ploughing • Service provider	• Households are food secure from agriculture and goat keeping • Bullock ploughing • Carpentery • Service provider • Business and shop keepers
	30%	60%	10%
Manechour + Lekdapa, Ghusel (GEPA)	• No agricultural lands apart from house and yards • Need to earn money from labour based activities • Caste based occupations • Lack of awareness on health and education • Food insecure	• Service providers • Few livestock keeper (except buffaloes) • Own less cultivable lands • A little saving	• Having agricultural lands & livestock • No need of loans • Livestock especially having more than two improved buffalo • Having business, shops & service providers • Having improved cows • Provide Vet. Services
	25%	30%	45%
Sera Phat, Chapagaun (GEGA)	• No agricultural lands (except house and yards) • Need to earn from hiring out labour • Food insecure • Caste based occupations	• Able to save money • Service provider • Own some cultivable land • Own livestock mainly goats and ducks	• Having mill, business and shop • Own agricultural lands and mushroom farming • No need of loans • Own livestock especially improved buffalo • Service provider

[12] An occupation assigned by caste into which you are born

	20%	45%	35%

Table 84. The characteristics of the different socio-economic groups in the study villages of the Chitwan District.

Village, VDC/Municipality	Poor	Medium	Rich
Phujintar, Shaktikhor VDC (PEPA)	• Small land size (< 7 Kattha) • Food secured 5 to 6 Months • Sales labour • Forage depend on community forest • Caste based occupation	• Medium land holding • Skill labour • Forage available for 4 – 5 months • Abroad employment • Sales livestock • Sales human and animal Labour	• Larger land holding • 12 months food secured • Animal holding in large scale • Forage sufficiency • Sales forage
	57%	29%	14%
Barowa, Bharatpur (PEGA)	• Labouring is major source of economic activities • Jobless/ No employment • Food security problem • Landless and rented agricultural land • Migrated from outside • Uneducated • Some ducks, poultry and sheep raiser • Lived in hut, having straw roofing	• 6 months food secured • Literate family • Having land less than 10 Kattha • Local cow and goats raiser • Having simple house • Little bit involved on labour based activities	• Food secured throughout the year • Land having more than 10 Kattha • Having employment/business/Mill/ Tractors • Educated and job holder • Improved breed Cow and Buffalo raiser • Having well managed house • Working in foreign country
	35%	35%	30%
Anandchowk, Shaktikhor (GEPA)	• Small land size (< 7 Kattha) • Food secured 5 to 6 Months • Sales labour • Sales goat and chickens	• Medium land holding (9 – 10 Kattha) • Skill labour • Involved in trade/business • Forage available for 4 – 5 months • Sales animal labour • Sales livestock • Breeder goats holder	• Lager land holding (>2 Bigha) • 12 months food secured • Sales food grains • Sales livestock and livestock products • Service holders • Involved in trade/business • Large number of livestock holders • Forage sufficiency
	17%	32%	51%

Parashnagar, Bharatpur (GEGA)	• Having 1 – 5 Kattha Land and Landless • Rented Agricultural Land • Having few local breed livestock (1 – 2) • Migrated from outside • Small and Wooden/Mud House and Toilet • Jobless • Labouring is main economic activities • Food Secured up to 3 months in a year	• Having 10 Kattha to 1 Bigha land • Having few livestock (2 – 5) • Part time job or seasonal job holders • Food secured upto 8 months in a year • Having government or private job	• Having more than 1 Bigha land • Having more livestock and as a commercial livestock keeping • Food secured around the year • Job/service holder • Income from business and shops
	15%	45%	40%

Table 85. The Characteristics of the different socio-economic groups in the study villages of the Mustang District.

Village, VDC	Poor	Medium	Rich
Ghelling, Ghami VDC	• Few Land holders/ No Lands • Food deficiency • Labouring and Herder	• 50 and less goat raiser • Food secured about 3 months from their own farm products and remaining months from other economic activities • Less cultivable land holders	• Having more than 60 goats • Having more/enough land holding • Enough food (more than 6 months food secured from their own farm products • Having business
	40%	30%	30%
Chhusang, Chhusang VDC	• Land having less than 10 Roppani • Not involved in raising goats and mules • No wealth from father's period • Only 3 months food secured • Involved in labour based activities	• Having land 10 – 15 Roppani • Less no. of livestock holders • Few wealth from the father's period • Less no. of goat raiser • 6 months food secured	• Land having more than 25 Roppani • In large scale goats, mules and dzopa raiser • Having lots of wealth from father period • Abroad for job
	31%	48%	21%
Kagbeni, Kagbeni VDC	• Migrated from outside • Rented house & Land • Few no. of cattle holders • Work as a helper in rich HHs	• Less land holders • Less no. of goats raiser • Raised mules and horses however having loans	• Large no. of land • Abroad for job • Large number of goats raiser • Having good tourist hotel • Horses and Mules raiser
	20%	40%	40%
Syang, Marpha VDC	• Major income generation activities is caste based occupation and labouring activities • Involved in crop farming, vegetable farming and fruit farming • Less land/ No land Holders	• Major income generation activities is crop farming • Also involved in vegetable and fruit production • Having small tea shops	• Major income generation activities is Hotel/Restaurant and Other Business • Large number of goat raising • Having mules and good riding horses
	20%	50%	30%

19 ANNEX 5 – INCOME SOURCES

Table 86. Sources of income for the families interviewed in the Jyalungtar village, Lalitpur District.

	Agriculture or livestock based				Non-agricultural					Other		
	Cropping/ Vegetables	Livestock	On-Farm Labour	Total	Off-farm Labour	Tailoring	Musician	Services	Total	Remittances	Borrowing	Total
Number of families	3	7	2	8	10	5	4	2	19	4	2	7
% of families	12.0	28.0	8.0	32.0	40.0	20.0	16.0	8.0	76.0	16.0	8.0	28.0
Average income in that group	46.7	32.9	40.0	56.3	87.5	62.0	40.0	42.5	85.8	68.8	22.5	51.4

Table 87. Sources of income for the families interviewed in the Phujintar, Shaktikhor VDC, Chitwan District.

	Agriculture or Livestock Based				Non-agriculture Based				Other	
	Crop Farming	Livestock	On-farm Labour	Total	Services	Off-farm Labour	Utensils Making	Total	Remittances	Total
Number of families	3	13	22	27	5	7	2	14	1	1
% of families	10	53	73	90	17	23	7	47	3	3
Average income in that group	28.3	11.2	80.7	74.3	76.0	66.4	55.0	50.3	40.0	40.0

Table 88. Sources of income for the families interviewed in the Barowa, Bharatpur Municipality, Chitwan District.

	Agriculture or Livestock Based				Non-agriculture Based						Other	
	Crop Farming	Livestock	On-farm Labour	Total	Pension	Services	Off-farm Labour	Business	Tailoring	Total	Remittances	Total
Number of families	24	15	10	28	1	4	2	2	1	10	6	6
% of families	80	50	33	93	3	13	7	7	3	33	20	20
Average income in that group	45.6	17.3	62.0	70.5	70.0	68.8	95.0	65.0	50.0	71.5	51.7	51.7

Table 89. Sources of income for the families interviewed in the Anandchowk - 6, Shaktikhor VDC, Chitwan District.

	Agriculture or Livestock Based					Non-agriculture Based				
	Crop Farming	Livestock	Vet-service	On-farm Labour	Total	Business	Pension	Services	Off-farm Labour	Total
Number of families	14	16	1	10	25	3	2	8	2	14
% of families	47	53	3	33	83	10	7	27	7	47
Average income in that group	49.3	18.6	90	74.8	73.0	86.7	70.0	78.8	72.5	83.9

Table 90. Sources of income for the families interviewed in the Parashnagar, Bharatpur Municipality, Chitwan District.

	Agriculture or Livestock Based				Non-agriculture Based					Other		
	Crop Farming	Livestock	On-farm Labour	Total	Pension	Services	Off-farm Labour	Wine Business	Total	Remittances	Borrowing Loan	Total
Number of Families	26	24	4	29	1	10	3	2	14	2	2	4
% Of families	87	80	13	97	3	33	10	7	47	7	7	13
Average Income in that group	50.4	30.0	37.5	75.2	15.0	42.0	25.0	80.0	47.9	55.0	20.0	37.5

Table 91. Sources of income for the families interviewed in the Ghilling Village, Ghami VDC, Mustang District, 2004.

	Agriculture or Livestock Based					Non-agriculture Based					Other	
	Crop Farming	Vegetable	Livestock	On-farm Labour	Total	Business	Hotel Restaurant	Off-farm Labour	Utensils Making	Total	Remittances	Total
Number of Families	20	1	18	6	21	11	1	2	1	14	1	1
% Of families	95	5	86	29	100	52	5	10	5	67	5	5
Average Income in that group (%)	42.5	5.0	28.1	39.2	76.0	25.9	20.0	42.5	95.0	34.6	20.0	20.0

Table 92. Sources of income for the families interviewed in the Syang Village, Marpha VDC, Mustang District, 2004.

	Agriculture or Livestock Based						Non-agriculture Based								Other			
	Crop Farming	Vegetable	Fruit Farming	Livestock	On-farm Labour	Total	Business	Hotel Restaurant	Service	Off-farm Labour	Tailoring	Shoe Making	Metal Fabrication	Total	Remittances	Borrowing Loan	Monk	Total
Number of families	25	9	3	17	3	27	1	8	5	3	1	1	1	19	2	4	1	7
% of families	83	30	10	57	10	90	3	27	17	10	3	3	3	63	7	13	3	23
Average income in that group	48.4	34.4	16.7	18.2	36.7	71.1	30.0	31.9	39.0	23.0	100.0	100.0	50.0	42.1	25.0	15.0	100.0	30.0

Table 93. Sources of income for the families interviewed in the Chhusang Village, Chhusang VDC, Mustang District, 2004.

	Agriculture or Livestock Based			Non-agriculture Based							Other		
	Crop Farming	Livestock	Total	Business	Hotel Restaurant	Services	Off-farm Labour	Tailoring	Utensils Making	Total	Remittances	Borrowing Loan	Total
Number of Families	18	16	20	1	2	1	1	1	1	7	3	1	4
% of families	90	80	100	5	10	5	5	5	5	35	15	5	20
Average income in that group ((%)	49.4	31.3	75.3	15.0	50.0	50.0	5.0	90.0	60.0	45.7	50.0	25.0	43.8

Table 94. Sources of income for the families interviewed in the Kagbeni Village, Kagbeni VDC, Mustang District, 2004.

	Agriculture or Livestock Based							Non-agriculture Based					Other	
	Crop Farming	Vegetable	Fruit Farming	Brewery Producing	Livestock	On-farm Labour	Total	Business	Hotel Restaurant	Off-farm Labour	Tailoring	Total	Remittances	Total
Number of families	20	2	3	1	16	6	21	5	8	10	2	19	8	8
% of families	87	9	13	10	70	26	91	22	35	43	9	83	35	35
Average income in that group	22.5	7.5	8.3	40.0	18.1	38.3	48.6	30.0	58.1	35.0	50.0	56.1	26.9	26.9

20 ANNEX 6 – LIVESTOCK OWNERSHIP

Table 95. Cattle and buffalo ownership of the families interviewed.

Village	Species	Number of Households	Local				Improved				Total
			Cow		Young	Bull	Cow		Young	Bull	
			Milking	Dry			Milking	Dry			
Jyalungtar (PEGA)	Cattle	13	1	0	1	-	6	4	9	0	21
	Buffalo	6	2	0	2	-	2	0	3	1	10
Phujintar (PEPA)	Cattle	25	5	18	17	39	-	-	-	-	79
	Buffalo	6	6	1	6	-	-	-	-	-	13
Barowa (PEGA)	Cattle	14	7	5	8	10	8	1	4	-	43
	Buffalo	9	7	2	7	-	3	2	-	-	21
Anandchowk (GEPA)	Cattle	17	4	8	12	31	-	-	-	-	55
	Buffalo	12	8	3	15	-	-	-	-	-	26
Parashnagar (GEGA)	Cattle	19	6	5	11	-	18	6	14	2	62
	Buffalo	19	8	2	5	-	15	2	5	-	37
Ghilling (PEPA)	Cattle	20	34	11	30	3	-	-	-	-	78
Syang (PEGA)	Cattle	12	10	6	10	2	2	-	-	-	30
Chhusang (GEPA)	Cattle	16	15	16	28	1	-	-	-	-	60
Kagbeni (GEGA)	Cattle	21	21	27	32	-	-	-	-	-	80

Table 96. Goat, sheep, pig and poultry ownership of the families interviewed.

Village	Species	Number of Households	Local			Improved			Total
			Adult		Young	Adult		Young	
			Male	Female		Male	Female		
Phujintar (PEPA)	Goats	25	61	89	87	-	-	-	237
	Pigs	1	-	1	-	-	-	-	1
	Poultry	17	25	30	113	-	-	-	168
Barowa (PEGA)	Goats	16	7	18	13	-	3	-	41
	Sheep	7	3	23	9	-	-	-	35
	Pigs	4	-	13	7	-	-	-	20
	Poultry	17	-	36	62	-	2	-	100
Anandchowk (GEPA)	Goats	23	64	94	118	-	-	-	276
	Pigs	1	-	-	1	-	-	-	1
	Poultry	14	25	32	84	-	-	-	141
Parashnagar (GEGA)	Goats	23	12	30	15	1	6	8	72
	Poultry	6	-	3	32	-	1,500	-	1,535
Ghilling (PEPA)	Goats	18	281	568	280	-	-	-	1,129
	Sheep	-	-	-	-	-	-	-	-
	Poultry	9	2	12	-	-	-	-	17
Syang (PEGA)	Goats	17	48	112	82	-	-	-	242
	Sheep	1	-	1	-	-	-	-	1
	Poultry	10	16	11	-	3	27	-	57
Chhusang (GEPA)	Goats	6	135	98	72	-	-	-	305
	Sheep	-	-	-	-	-	-	-	-
	Poultry	8	-	-	-	2	39	-	41
Kagbeni (GEGA)	Goats	7	275	405	101	-	-	-	781
	Sheep	-	-	-	-	-	-	-	-
	Poultry	6	-	6	7	-	3	11	27

Table 97. Horse, mule, dzopa and donkey ownership in the families interviewed.

Villages	Species	Number of Households	Local			Total
			Adult		Young	
			Male	Female		
Ghilling (PEPA)	Horses	14	18	20	3	41
	Dzopa	18	59	-	-	59
Syang (PEGA)	Horses	4	4	3	1	8
	Mules	5	23	17	-	40
	Dzopa	16	33	3	-	36
Chhusang (GEPA)	Horses	14	13	3	-	16
	Mules	8	48	20	-	68
	Dzopa	16	19	18	-	37
Kagbeni (GEGA)	Horses	13	16	3	1	20
	Mules	9	51	11	-	62
	Dzopa	9	13	1	-	14
	Donkey	2	-	3	-	3

21 ANNEX 7 - LIVELIHOODS ANALYSIS

21.1 LALITPUR

The use of livestock in livelihood strategies was investigated with the project team for the Lalitpur study site and they were asked to complete a matrix for each study village indicating the livelihood strategies adopted by each socio-economic group for each study village (see Tables 98 to 101).

Table 98. Livelihood strategies in the study villages of Jyalungtar, Chapaguam VDC (developed by the project team).

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Dalit	Low	Selling chickens & goats to pay for health care and schooling costs.		
	Medium		Selling goats to buy a sowing machine	
Tamang	High	Hiring out ploughing services		
Chhetri			Investing in buffaloes to improve incomes	
Brahmin		Exchanging dung for fodder	Investing in buffaloes to improve incomes	(Inter-generational) using income from milk sales to educate sons & daughters

Table 99. Livelihood strategies in the study villages of Seraphat, Chapaguam VDC (developed by the project team).

Caste	Strata	Hanging-in	Stepping-up	Stepping-out	Comments
Dalit	Low	Still in Tailoring and Labour Based work	-	-	Only 3 HHs from Dalit ethnic group
Tamang	Medium	Still have some local livestock & labour based work	Started to raised improved buffalo for milk	-	
	High	Still have some local livestock & have few cultivated land	-	Educate sons & daughters, Major economic source of income is service	
Newar	Medium	Still have some local livestock	Started to raised improved buffalo for milk and started mushroom farming	Educate sons & daughters, Have service and small business	
Brahmin	Medium	Still have some local livestock	Started to raised improved buffalo for milk and started mushroom farming	Educate sons & daughters	
	High	-	Started to raised improved buffalo for milk & improved chicken for meat and started mushroom farming	Educate sons & daughters, Have service	Only 1 HHs have 1 improved cow out of 14 sampling HHs of this study area

Table 100. Livelihood strategies in the study villages of Manegaun & Lekdanda, Ghusel VDC (developed by the project team).

Caste	Strata	Hanging-in	Stepping-up	Stepping-out	Comments
Dalit (Damai)	Low	Involved in Tailoring and Labour Based work	-	-	Only 1 HH in this study area
Tamang	Low	Have Local Livestock and depend on labour based work	Started to raised buffalo due to having milk market	-	
	Medium	Traditional system keeping livestock	Started to raise 2 or more than 2 improved buffalos	Educate sons & daughters, Major economic source changes from Farming to Livestock raising	
Chhetri	High	-	Raised more than 2 improved buffalo, Learnt proper technology of livestock keeping	Having service at some office and some businesses not related with livestock keeping, Educate sons & daughters	2 HHs in this study area
Brahmin	Medium	-	Raised improved buffalos also have milking cow	Educate sons & daughters, Having services in some institutions	
	High	-	Raised 4 to 8 improved buffalos also raised improved milking cow (Jersey) and well trained on livestock keeping	Educate sons & daughters, Have service & some business and also provides veterinary service to other	Only 1 HHs have 1 improved cow out of 14 sampling HHs of this study area

Table 101. Livelihood strategies in the study village of Burunchuli, Devichaur VDC (developed by the project team).

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Tamang	Low	Still depend on labour based work	-	-
	Medium	Keep local goats and cow, still in On-farm labour	Started buffalo raising	Educate sons & daughters
	High	Still involved in livestock keeping	Increases number of improved buffalo	Started small hotel, tea shops & retail shops, involve in services and educate sons & daughters

21.2 CHITWAN

The caste/ethnic groups play important roles on livestock based livelihood strategies in first two study villages -- Parasnagar and Baruwa. The three caste groups such as Brahmin, Chhetries and Newars who are mostly rich and medium economic strata are either stepping up (mostly) or stepping out (in a few cases). Through livestock and other agriculture income, they are providing good education and health care to their children. They are also buying concentrate feeds and modern agricultural equipments/tools to enhance the livestock and agricultural production.

The disadvantaged caste/ethnic groups such as Tamang, Tharu, and Gurung in the community are just hanging in. Since they do own few livestock, Livestock raising may not necessarily become source of HH income. Livestock raising for these people is for socio-cultural occasions than for economic purpose. The condition of tribal people called "Praza" is the worst since majority of them depend on wage labour earnings.

The analysis of the data would suggest that livelihood strategy of the three socio-economic groups can be defined as follows (see Tables 102 to 105):

a) Poor: They are hanging in and small size of livestock seem to contribute to their daily subsistence.

b) Medium: Some are hanging in and livestock contribute to their daily needs and food security. In some farm families, livestock contribute to cash income generation that is being used of educating children and health care; so they are stepping up.

c) Rich: The rich are the ones benefiting the most from livestock keeping. In Parasnagar, adoption dairy and forage technology have benefited this group and they stepping up and stepping out by virtue of having commercial dairy farms. On the other hand, in two study villages in the Shaktikhor VDC where users groups are active in using community lands to grow forage grasses and fodder trees, the rich have been able to take much more advantage by having more number of goats being raised on their farms. They are taking maximum advantage from the common property resources/lands where the user farmers' groups have cultivated forage grasses and fodder trees They are able to send their family members abroad for overseas employment due the income from livestock Thus, there are more examples of farm families stepping up and stepping out in this socio-economic strata.

Table 102. Livelihood strategies involving livestock keeping in Parashnagar Village, Chitwan District.

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Baitha Deshi	Low	Producing and selling vegetables on rented land for health, education, and foods		
Tharu	Low	• Producing foods unrented for health and education • Labouring to his boss • Livestock Sharing		
Gurung	Low	Producing foods on rented land & selling some goats & other livestock and labouring poor health and education		
Tamang	Low	Labouring and selling local wine for Health, education and foods, clothes etc		
Newar	Low	Labouring, selling goats and chickens for health, educations, clothes etc.		
	Medium		Selling animal and its products and foods to buy a TV and to built Gobar gas and new livestock	
	High			Intergenerational: using income from poultry selling to educate sons and daughter
Chettries	Low	Labouring and selling goats, chickens, milk for health and education		
	Medium		Selling fresh milk and foodgrain and livestock to buy electronic and manufactured goods, New livestock, to install gobar gas etc	
Brahmins	Low	Labouring at others farm for health and education, clothes		
	Medium		Selling fresh milk and foodgrain and livestock to buy electronic and manufactured goods, New livestock, to install gobar gas etc	

	High			Saving income for new generation for education and other betterment

Table 103. Livelihood strategies involving livestock keeping in Baruwa Village, Chitwan District.

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Tharu	Low	Labouring and selling sheeps, goats, poultry for foods, clothes, health and education		
	Medium		Selling the old/local livestock and purchasing new livestock for health and education	
	High			Intergenerational saving from trade/business/ mill and earning from abroad
Magar	High			Intergenerational saving from abroad earning for all necessities
Dalit (Pariyar)	Low	Earning from tailoring for health and education		
Brahmin	Medium		Selling local livestock buy new improved livestock for health and education	
	High			Saving from earning for intergenerational health and education

Table 104. Livelihood strategies involving livestock keeping in Anandchowk village, Chitwan District

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Puja	Low	Selling labour		
	Medium	Selling labour		Left livestock keeping because there were nobody to look after family
	High	Selling crops , selling goats for health and schooling fees		
Tamang	Low	Hiring out ploughing service, selling goat and chicken for schooling and health		
	Medium	Hiring out ploughing service, selling goat and chicken for schooling and health.		
	High		Selling milk and goat to improve incomes	
Newar	Medium	Hiring out ploughing service, selling goat and chicken for schooling and health		
	High		Selling milk and goat and chicken to improve income	
Chhetri	High		Selling live animal to increase income	

Table 105. Livelihood strategies involving livestock keeping in Fazintar Village, Chitwan District

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Bishwakarma	Low	Hiring ploughing out selling goat chicken for food, health, cloth and schooling		
	Medium	Hiring out ploughing selling goat and chicken for schooling and health		
Newar	Low	Hiring out ploughing selling goat and chicken for schooling, health cloth and food		
	Medium	Hiring out ploughing selling goat and chicken for schooling, health cloth and food		
	High		Selling milk and goat to improve income	
Chhetri	High		Selling goat and milk to increase income	
Brahmin	High		Selling goat and milk to increase income	

21.3 MUSTANG

Based on the above conceptual framework, the project team prepared the use of livestock in livelihood strategies and completed a matrix for each study village indicating the livelihood strategies adopted by each socio-economic group for each study village in the Mustang District.

First, it is to be noted that there are mainly one ethnic group called Gurungs (earlier they used to be called Bhoteyas), except a few Dalits such as blacksmiths and tailors (occupational castes) to carry out some skilled tasks, which are not done by the local people. Therefore, while carrying out the analysis of livestock based livelihood strategies the HHS by economic status become critical. The analysis suggests that the rich and medium HHs, who own more livestock number, are the ones stepping up and stepping out. Livestock income has contributed in building hotels (in Kagbeni) for tourism. On the hand, in Upper Mustang in Ghelling it has contributed in sending family members in foreign employment. Therefore, there are some cases of stepping out with the income generated from livestock enterprises. There are also cases in both Upper and lower Mustang study villages where farmers have stepped up through the livestock income that has contributed to sending their children to schools in city areas outside the district and sending sick people for medical treatment in Pokhara and Kathmandu, the major cities of Nepal. Nonetheless, medium (mostly) and poor households are just hanging in with livestock farming.

The poor households livelihood strategy is not much affected from livestock raising activity since they own no livestock or even they own they own a few head. For example, they own one or two heads of unproductive local cows (lulu).

The analysis of the data would suggest that livelihood strategy of the three groups can be defined as follows (see Tables 106 to 109):

- Poor: They are hanging in and small size of livestock seem to contribute to their daily subsistence
- Medium: Some are hanging in and livestock contribute to their daily needs and food security. In some farm families, livestock contribute to cash income generation that is being used for educating children and health care; so they are stepping up. There are one or two examples of stepping out from livestock enterprises into hotel and businesses.
- Rich: The rich are the ones benefiting the most from livestock keeping. They are taking advantage of open common property resources such as free and open pasture areas. Most of them own large livestock holdings and own businesses/ hotels/ restaurants. They are able to send their family members abroad for overseas employment due the income from livestock. The have sent their children to good schools in major cities of Nepal. Thus, there are more examples of farm families stepping up and stepping out in this socio-economic strata.

Table 106. Livelihood Strategy by Socio-Economic Groups in Ghilling Village, Ghami VDC, Mustang District.

Socio-economic Groups	Hanging-In	Stepping-up	Stepping-out	Comments
Poor	• Involve in farm labor wage • Rented agriculture land from rich neighborhood • Raise 5-10 goats, cows		Sending school their children	• only one Dalit family work as their occupational caste (black smith) also falls under the poor status
Medium	• Traditional way of livestock raising • Raised 40-60 goats • Raise 2-3 local cows • Raise 2-3 dzopa (cross between cow and yak) • Raise 2-3 Horse	some of the farmers are upgraded as a goat trader	• Seasonal migration • Establish business/hotel • Educating their children	• # of goat raising > 50
Rich	• Traditional Livestock Keeping • Raised 100-200 goats • Raise 4-5 local cows • Raise 5-7 dzopas • Raise 5-9 Horses		Sending school their children Some has able to send abroad ---USA to work Out migration for the business purposes	• # of goat raising > 100 • 2-4 goat traders

Table 107. Livelihood Strategy by Socio-Economic Groups in Chhusang Village, Chhusang VDC, Mustang District.

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Gurung	Low	• Maintain their livelihood from different activities; farm, on and off farm labor		
	Medium	• Maintain their household activities by applying traditional technologies-- farming and livestock raising	• Business traders of using mules • Replace donkies/ goats	• Start educating their children • servicing
	High	Do	Do	• Trading/Business/Hotels • Start to educate • Abroad working
Magar	Low	• Maintaining by laboring and traditional technologies.	-	• Seasonal labor work in neighboring district--magdi (about 4 months)
Dalit	Low	• Maintaining livelihood by laboring and caste occupation (tailoring, metal—woods)		

Note: Only one HHs is Magar groups and Dalit group--- Black smith and tailor which migrated from outside

Table 108. Livelihood Strategy by Socio-Economic Groups in Kagbeni Village, Kagbeni VDC, Mustang District.

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Gurung	Low	• Maintain their livelihood from different activities; farm, on and off farm labor		
	Medium	• Maintain their household activities by applying traditional technologies-- farming and livestock raising	• Business traders of using mules • Start educating their children outside the district • Better health care	• Oversees employment • Hotel and restaurant and shop business
	High		• Business traders of using mules • Start educating their children outside the district • Better health care	• Hotel and restaurant and shop business • Trading/Business • Oversees employment
Magar	Low	• Maintaining by laboring and traditional technologies	-	• Seasonal labor work in neighboring district--magdi (about 4 months)
Dalit	Low	• Maintaining livelihood by laboring and caste occupation (tailoring, blacksmiths work, metal—woods)		

Note: Only one Dalit and one Blacksmith and two Magar HHs are migrated from outside

Table 109. Livelihood Strategy by Socio-Economic Groups in Syang Village, Marpha VDC, Mustang District.

Caste	Strata	Hanging-in	Stepping-up	Stepping-out
Dalit	Low (2 HHs Damai and Sarki)	• Caste based occupation like tailoring and shoe makings • Not involved in livestock raising		• Started to working as a on farm and off farm labouring activities • Started to educate son and daughter
Chhetri	Low	• Traditional type farming system • Have only some cows • Labour based occupation		
Gurung	Low	• Traditional type farming system • Before did not have any livestock • Have service as a peon		• Started to raise some goats
Thakali	Low	• Traditional type farming system • Having small no. of livestock holding (cows, goats and poultry)	• Started to raise routes for transporting business • Started to raise dzopas for providing ploughing service	• Started to educate their sons and daughter
	Medium	• Traditional type crop farming system • Mixed type animal raising (cows, dzopo goats, and poultry) and no adoption of modern technology	• Involved in fruit farm and vegetable production Note: vegetable production and fruit farming is major source income of medium HHs and they do trading of vegetable and fruit	• Educating their sons and daughters • Started to open small tea and coffee shop • Having job is some HMG offices and adopted teaching profession • Left mules raising due to loss in transporting business
	High	• Traditional type farming system but in small scale above same case in livestock keeping system except case of goat raising	• Started to raising mules for transporting business and transporting recognized food stuff to their own tourist hotels • Goats are raised for its trading purpose	• Started to conduct some tourist hotel at Jomsom • Educating their own son and daughters

Note

- *In medium HHs, most of households now left out mules raising because of loss over the past three to four years because of introduction of tractors in lower Mustang to carry out goods and services. So, Mules raising is very difficult, need to feed food grains and required good man to look after so that it is the case of stepping out but there is no contribution for promoting households economy*
- *Rich HHS of Thakali Ethnic groups: major source of households economy is tourist hotels at jomsom so they are going to left out farming and livestock keeping.*