

Chapter 10

Livestock Production and Management Strategies in the Mixed Farming Areas of the Hindu Kush-Himalayas, Asia

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Introduction

The Hindu Kush-Himalayas (HKH) is a diverse region, both physically and socioeconomically. It is inhabited by many people of different ethnic origins with different social and cultural values. The region extends 3,500 km from east to west. A majority of the farmers in the HKH region practise mixed crop-livestock farming, particularly those with farms at altitudes below 2000 masl. This paper focuses on those 'high pressure' areas of the HKH (places where livestock densities are high in terms of the area of cultivated land, grazing land, and forest) where mixed crop-livestock farming systems predominate.

The last few decades have seen considerable changes taking place in livestock population, structure, and management systems in the areas of the HKH where mixed crop-livestock farming systems predominate. These changes have altered the relationship of livestock to the overall farming systems and to natural resources' management. In addition, changes in the natural resources themselves have also had an impact on how livestock are managed. In general, the change has been greater in the 'hill' or mid-mountain regions of Nepal and in the western Himalayas, where there has been rapid population growth leading to decreased farm size and increased land fragmentation.

This paper describes the results of a study that was carried out in high population pressure areas of Nepal and India. The key objectives of the study were to examine

the present trends and patterns in the livestock population and composition, and to compare subsistence and commercial production systems. The study also tried to identify the processes leading to adoption of improved livestock; to explore linkages between livestock management, the environment, and soil fertility maintenance; to identify issues of gender in livestock management; and to outline the key constraints and strategies for the management of livestock production in mixed farming systems in the HKH. The main geographic focus was on the hills and mountains of Nepal and the central and western Indian Himalayas. Informal and key informant surveys were conducted in Parbat and Kaski districts of Western Nepal and Dolakha district of Central Nepal.

Information was gathered from other parts of the HKH, in particular Bhutan, the Yunnan and Sichuan provinces of China, and the North-West Frontier and Balochistan provinces of Pakistan, to enable analysis of trends in livestock population and composition mountain areas across the HKH.

The Value of Livestock in Mountain Areas

An important source of income

Livestock are an important source of income in the hills and mountains. Figure 10.1 shows the share of agricultural income that comes from livestock in different regions of Nepal. Livestock contribute proportionately more to agricultural income in hill and mountain areas than in lowland areas. In the hills and mountains, this income is mainly from fresh milk and meat, and to a lesser extent from products like wool and hides.

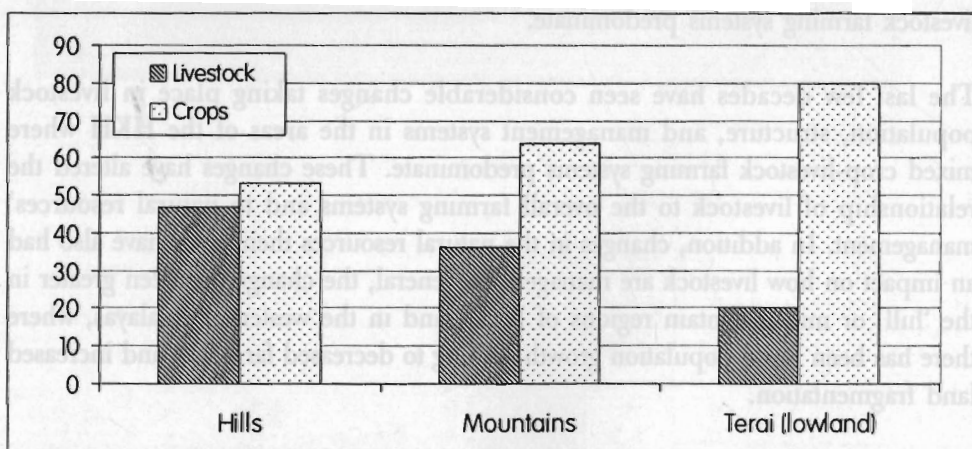


Figure 10.1: Percentage contribution of livestock and crops to total agricultural income of farm households in three ecoregions of Nepal

Source: Shrestha and Sherchand 1988

Key source of organic manure

Chemical fertiliser is not easily available or affordable for the large majority of farmers in the hills and mountains of the HKH, thus farmyard manure (FYM) is crucial as it is the only input available in abundance to maintain soil fertility. An average 5-10 tonnes per hectare of FYM are applied annually to maize, millet, and wheat fields. Livestock are the key source of this manure and will continue to play an important role in supplying it. Dung from livestock is also used as a cooking fuel in many households in higher altitude areas.

Source of draught power in the hills and mountains

Landholdings in the mountains are small and fragmented and mechanisation of agriculture is difficult. Draught animals are the most economical and easily available source of energy in rural mountain areas. Livestock provide the draught power for ploughing fields and are also used in post-harvest activities like threshing.

Trends in Livestock Population and Household Livestock Composition

Large livestock

Table 10.1 shows the results of an analysis of trends in the population and composition of livestock kept under mixed farming systems in different areas of the HKH over the last 10-20 years. Overall the number of cattle has either declined or remained stagnant in most places whereas the number of buffalo has increased. Similarly, the number of goats has increased while the number of sheep has gone down. Similar trends were seen in terms of

Table 10.1: Trends in livestock population and composition in mixed farming systems in the HKH

Province/ State/Region	Population				Composition				Year
	Cattle	Buffalo	Sheep	Goats	Cattle	Buffalo	Sheep	Goats	
Balochistan (Pakistan)	◆	↑	↑↑	◆	↓	◆	↑	↓↓	1984-94
NWFP(Pakistan)	◆	◆	↓	↓	◆	◆	↓↓	↓	1976-86
Himachal (Western Indian Himalayas)	↓	↑↑	↓	↑	◆	↑	↓	↑	1982-92
Uttarkhand (Central Indian Himalayas)	↓	↑	↓	↑	↓	↑	↓	↑	1978-88
Nepal (mountains)	◆	◆	↓	↑	◆	◆	↓	↑	1988-96
Nepal (hills)	↑	↑	↓	↑↑	↓	↑	↓	↑↑	1988-96
Bhutan (whole country)	↓	-	↓	↑↑	↓	-	↓	↑↑	1986-96
Sichuan (China)	↑	↑	◆	↑↑	↓	↓	↓	↑	1986-97
Yunnan (China)	↑	↑↑	↓↓	↑↑	◆	↑	↓	↑	1986-97
Tibet (China)	◆	-	◆	↑↑	◆	-	↓	↑	1986-97

↑ increase, ↑↑ significant increase, ↓ decrease, ↓↓ significant decrease, ◆ stagnant

Source: Tulachan and Neupane 1999

overall herd composition, overall there is a higher proportion of buffaloes and goats, and lower proportion of cattle and sheep. Thus it seems that overall buffaloes and goats are becoming more important in HKH mixed farming systems.

Micro-livestock

Table 10.2 shows the growth rate of populations of poultry and pigs in the hills and mountains of Nepal from 1984/85 to 1989/90 and from 1991/92 to 1997/98. There was a significant growth in the populations of both pigs and poultry in both the hills and mountains up to 1990, but the growth rates fell considerably thereafter to almost zero for poultry in the hills and only one per cent for pigs in the mountains.

	1984/85 to 1989/90	1991/92 to 1997/98
Poultry		
- Hills	10.4	0.2
- Mountains	7.1	2.5
Pigs		
- Hills	2.1	1.4
- Mountains	3.4	1.1

Source: Statistical Information on Nepalese Agriculture Series (1984/85 to 1997/1998), HMG Ministry of Agriculture, Nepal

Livestock Production Systems in Accessible and Inaccessible Areas

Livestock production systems in mixed farming areas in the hills and mountains differ according to whether the area is connected to the market by road or not. Figure 10.2 illustrates some of the basic differences between the two systems. Livestock

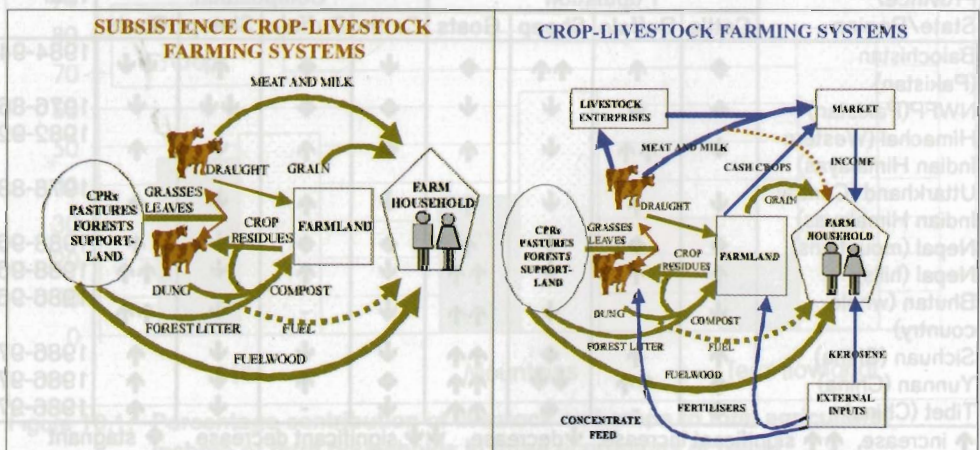


Figure 10.2: Livestock producing systems in accessible and inaccessible areas

production in inaccessible areas is usually part of a 'closed' or integrated subsistence type of farming system. In these places farms depend on livestock for soil-fertility and draught power, and the livestock depend on farmland for crop residues as a feed to supplement feed from common property resources (CPRs). Most of the meat and milk produced is consumed by the household; if there is any surplus, it is sold in the market.

In contrast farms in accessible areas are better linked to the market, and thus farmers are more able to sell their produce for cash and to buy inputs from outside. In these areas livestock are fed more concentrate feed, and chemical fertilisers are used in addition to farmyard manure. There is increased sale of milk and meat products for cash income. For these households, cash security leads to increased food security.

Adoption of Improved Livestock

Promotion of improved breeds needs to be based on the appropriateness of the animals in the situation prevailing in a particular area. This includes factors like access to support facilities and markets, available feed supplies, climate, and culture. Two cases, one from Nepal and one from Himachal Pradesh, provide an example. Blanket promotion of a single type of improved cattle, as has happened in the past, does not work in the diverse conditions prevailing in the mountains.

Buffaloes in Nepal

The Nepal livestock statistics for 1996/97 (Table 10.3) show that the overall milk productivity of buffaloes is higher than that of cows. Although there are only half as many buffaloes as cattle (although slightly more milch animals), they produce more than twice as much milk. Almost 70% of the milk in Nepal is produced by buffaloes. The average annual milk yield for buffaloes is almost two and half times that for cows (807 kg and 317 kg, respectively).

When mountain farmers in Nepal are given the opportunity to adopt improved livestock, the majority of those practising mixed crop-livestock farming choose improved buffaloes rather than improved cows. This is in part a response to the lack

	Total Population	Milch animal population	Milk production (tonnes)	Share of total milk produced	Milk yield (Av. of district values)(kg/year)
Buffalo	3,362,000	857,000 (25%)	702,000	69 %	807
Cattle	6,932,000	816,000 (12%)	310,000	31 %	371

Source: Statistical Information on Nepalese Agriculture, 1996/1997, HMG Nepal

of veterinary health support and constraints in availability of quality feed. Table 10.4 summarises some of the key factors influencing the choice. Essentially, improved buffaloes are more appropriate because they are hardier than crossbred cows, and adapt better to the locally available feed, as well as giving better milk yields than local cows.

There is an interesting relationship between road access and buffalo population in the mountain district of Dolakha in Nepal. The buffalo population is concentrated around the road network indicating that buffaloes are gaining importance in the livestock economy in areas with market access. The soaring demand for buffaloes among farmers has also increased the trade of buffaloes from the lowlands of India to the hills and mountains of Nepal. At present 200-300 buffaloes are sold monthly in one area in Kaski district, Nepal; a two-fold increase over the last decade according to one trader.

Crossbred cows in Himachal Pradesh

Crossbred cows have been doing well in some areas of Himachal Pradesh. Although the population of local cows still exceeds that of crossbred cows, the proportion of crossbred animals has increased over the last decade. In 1982 less than one quarter of cows in milk were crossbred cows, by 1992 nearly half of all cows in milk were crossbred. The increase in crossbred animals is particularly noticeable in the more accessible areas where there is better access to the necessary support services and inputs as well as to markets. The distribution of crossbred cows within HP is clearly correlated with the existence of veterinary service facilities, which is also a measure of access (Figure 10.3). Access to such facilities encourages farmers to adopt crossbred

Table 10.4: Reasons for preferring improved buffaloes

Improved buffaloes	Improved cows
<ul style="list-style-type: none"> • Milk has higher fat content (1.4% higher) and fetches a higher price per litre • High salvage value: old buffaloes sell for Rs. 8000 to 10,000 per head. • Well adapted to local feed sources, such as poor quality roughage and agricultural residues • Comparatively more resistant to disease • Provide more manure than cows • Irrigation and cultivation of quality fodder not a prerequisite • Affordable 	<ul style="list-style-type: none"> • Low fat content so milk fetches lower price per litre • No salvage value for cows or bulls • Require quality fodder (legumes) and higher amounts of concentrates • Comparatively more vulnerable to disease • Less manure output • Irrigation and diversion of scarce land resources to fodder production • Expensive

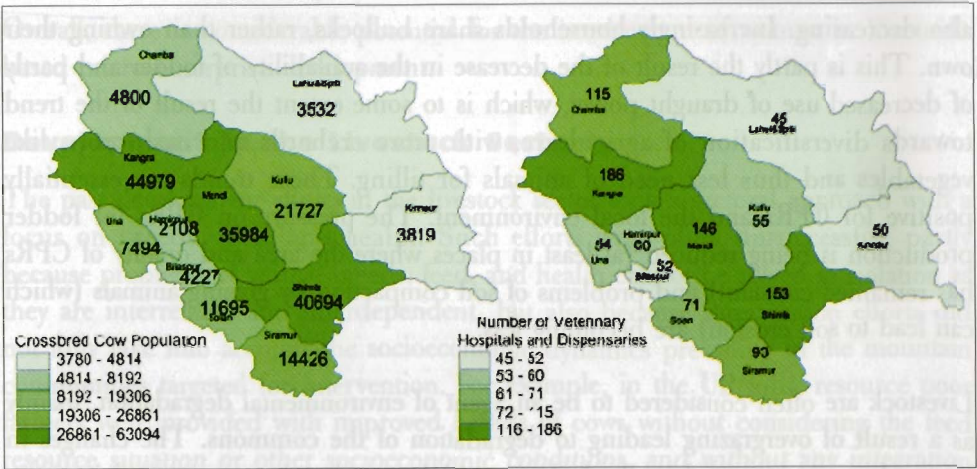


Figure 10.3: Distribution of crossbred cows and availability of veterinary services in Himachal Pradesh

animals, and the presence of such animals in a district provides more opportunities for veterinarians to set up practice.

Changing Livestock Management Strategies and the Implications for Common Property Resources and the Environment

There are many changes taking place in livestock management systems across the HKH. This is particularly evident in those areas that have increased access to markets and inputs as a result of having a better road infrastructure. The effect of the changing strategies for livestock management on CPRs and the environment is an important concern for policy-makers. Some of the main trends and their likely impact are summarised in Table 10.5. One clear trend seen in the more accessible areas is the diminishing size of herds; farmers are keeping fewer animals, but of better quality. The emphasis has shifted from open grazing to stall-feeding, and farmers are making increasing use of external inputs (purchased feed, particularly concentrate from the lowlands). Keeping animals in stalls has also encouraged farmers to make use of wasteland and plant fodder trees around their fields to facilitate easy collection. Although draught animals are important in mountain agriculture, their numbers are

Factor	Trends	Implications for	
		CPRs	Environment
Herd size	Decreasing	Less use	Positive
Management	Stall feeding	Less use	Positive
Quality of animals	Improving	Less use	Positive
Draught animals	Decreasing	Less use	Positive
Concentrate feeds	Increasing	Less use	Positive

also decreasing. Increasingly households share bullocks, rather than owning their own. This is partly the result of the decrease in the availability of fodder and partly of decreased use of draught power, which is to some extent the result of the trend towards diversification of agriculture, with more orchards and cash crops like vegetables and thus less need of animals for tilling. These trends are essentially positive for CPRs and the local environment. The pressure on CPRs for fodder production is being reduced (at least in places where the area and quality of CPRs has remained constant) and problems of soil compaction by grazing animals (which can lead to soil erosion) are becoming less.

Livestock are often considered to be an agent of environmental degradation, mainly as a result of overgrazing leading to degradation of the commons. The changes in livestock management described above, which are already pronounced in some accessible areas, should help to avoid this in the future.

Gender Concerns in Livestock Production Management

Although it is clear that women play an extremely important role in livestock management in mountain areas, there have been very few studies of this. Studies in Nepal have shown that women contribute 70% of the work in raising livestock and are more knowledgeable than men about treating sick animals (Sharma and Awasthi 1993; Tulachan 1994). Women contribute about 62% of the total labour for collection of fodder and bedding materials, 52% of that for cleaning sheds and making compost, 68% of that for application of FYM, and 61-75% of that for crop production as a whole (HMG/ADB 1993). In spite of this, women are excluded from extension, marketing, credit, and other activities critical to increasing livestock productivity and income.

Women's needs (for time-saving technology, for example) are not considered when conducting research, nor is the extension education system tailored to women farmers. Despite the fact that women farmers contribute the most work in raising livestock, their knowledge of and ideas about problems have hardly entered the mainstream perception; it is only men who have a say.

In the past, there was less empowerment of women; most of the income from livestock went to the male head of household. Nowadays women increasingly take control of cash earnings. They can be seen walking for three hours or more to sell milk, and with the money they earn they buy what they need for their children and their households. Women also play a significant role in raising micro-animals such as goats, poultry, and pigs, and are receiving a considerable cash income from sales of these animals. This is true to some extent over the entire HKH, and is particularly common in Nepal, India, Bhutan, and China.

Overall, there is considerable potential for the involvement of women in livestock-based micro-enterprise development.

Development in the Livestock Sector

The past development efforts in the livestock sector took a sectoral approach with a focus on breeds, feed, and health. Such efforts were often unsuccessful, partly because problems of animal breeds, feed, and health cannot be solved in isolation as they are interrelated and interdependent, but also because intervention efforts did not fully take into account the socioeconomic dynamics prevailing in the mountain communities targeted for intervention. For example, in the UP hills, resource poor farmers were provided with improved breeds of cows without considering the feed resource situation or other socioeconomic conditions, and without any integration with the market. As a result, the animal breed improvement programme failed.

Clearly there were many gaps in the priorities set in the past by those concerned with policy, research, and development in the livestock sector. Since the focus was on breeds, feed, and health, many conservation and socioeconomic issues were overlooked. The potential of indigenous species of animals and forage plants was not studied in depth and no attempts were made to preserve them. Species that performed well in other parts of the world were vigorously promoted in the mountains. This process not only failed to provide the expected results, it also contributed to the loss of animal and forage biodiversity. Similarly, livestock niches were not taken into account to any great extent – blanket promotion was more commonly practised than specific intervention based on location. Planners and policy-makers failed to recognise the crucial roles of extension (through farmers' groups), of the efficient supply of inputs (credit and veterinary services, irrigation), and of integration with markets, all of which need to proceed hand-in-hand for improved practices to be adopted. The important role of women in livestock rearing and the need to ensure that they benefited equally from livestock development was also overlooked. The unique characteristics of mountains – the mountain specificities – need to be recognised by those concerned with mountain livestock development.

The Main Constraints to Livestock Development in the Mountains and Highlands, and Issues and Challenges for R&D

The main constraints to livestock development in mountain and highland areas and the challenges these set for R&D are summarised in Table 10.6. The first and foremost constraint in the Himalayas is the shortage of feed and fodder, especially in

Table 10.6: The priority constraints, and R&D challenges

Priority constraints	Primary reasons	R&D challenges
Shortage of feed/fodder	<ul style="list-style-type: none"> - Small farm size - Limited access to CPRs - Limited use of CP land for growing fodder grass - Lack of group action on CP land 	<ul style="list-style-type: none"> - Efficient use of available feed resources - Planting of grass/fodder trees on very marginal land (private land) - Participatory management of CPRs to improve animal feed resources - Better understanding of land intensification and farm economics
Low productivity (in terms of milk production)	<ul style="list-style-type: none"> - Poor feeding - Inappropriate breeds of animals - Low milk price 	<ul style="list-style-type: none"> - Genetic improvement of indigenous animals - Improvement of management practices and feed technologies - Price incentives for milk and milk products - Product diversification
Shortage of veterinary services, medicines, and vaccinations	<ul style="list-style-type: none"> - Lack of private enterprises dealing with veterinary medicines and vaccines - Poor upland-lowland linkages 	<ul style="list-style-type: none"> - Provision of veterinary training to local people - Sustainability of paraveterinary enterprises
Lack of quality animals	<ul style="list-style-type: none"> - Inaccessible/expensive - Government restriction on animal trade (esp. improved cattle) in some areas 	<ul style="list-style-type: none"> - Encourage private sector in trade of live animals - Remove restrictions to movement of animals across borders
Rising price and poor quality of concentrate feed	<ul style="list-style-type: none"> - Lack of quality control - Increasing price of feed ingredients - Lack of competition in the animal feed market 	<ul style="list-style-type: none"> - Monitoring of feed quality - Market intervention - Promote competition
Stagnating price of milk	<ul style="list-style-type: none"> - Excess use of improved milk powder - Limited private processing facilities - Lack of product diversification 	<ul style="list-style-type: none"> - Discourage excessive use of imported milk powder for processing - Encourage maximum use of raw milk for processing - Dairy product diversification through extensive training - Use of drudgery reduction technologies
Shortage of farm labour	<ul style="list-style-type: none"> - Poor niche assessment - Out-migration, increasing off-farm wages - School education 	<ul style="list-style-type: none"> - Encourage/mobilise community - Provide concessional loans to community credit and savings' schemes
Lack of credit and savings	<ul style="list-style-type: none"> - Too few field-based government credit institutions - Cumbersome and time-consuming process for credit collectors - Inadequate group credit/savings' mobilisation 	<ul style="list-style-type: none"> - Encourage/mobilise community - Provide concessional loans to community credit and savings' schemes
Poor harnessing of livestock niches and under utilisation of niche opportunities	<ul style="list-style-type: none"> - Poor niche assessment - Lack of product diversification 	<ul style="list-style-type: none"> - Identify specific niche areas for specific livestock - Integrate livestock farming with agriculture and horticulture
Risk, uncertainty, instability of livestock	<ul style="list-style-type: none"> - Lack of marketing - Natural hazards - Lack of animal insurance 	<ul style="list-style-type: none"> - Formation of milk producers' associations (MPAs) - Community-based savings and credit mobilisation - Promote marketing/widen market areas

Table 10.6: The priority constraints, and R & D challenges (cont'd)

Priority constraints	Primary reasons	R&D challenges
Lack of gender concern	<ul style="list-style-type: none"> - Insensitivity of planners - Insensitivity of local institutions to gender needs and concerns - Lack of participatory approach 	<ul style="list-style-type: none"> - Better understanding of issues related to livestock and gender development in the context of changing socioeconomic conditions - Sensitise planners - Sensitise local institutions to gender needs and concerns - Involve women staff/ formulate programmes based on knowledge of gender concerns
Lack of mountain sensitive policies	<ul style="list-style-type: none"> - Lowland perspective - Misperception of livestock and environmental interactions - Lack of understanding and knowledge of mountain farming systems 	<ul style="list-style-type: none"> - Better understanding of emerging socioeconomic conditions, natural resource management concerns, and livestock niches - Sensitise policy-makers to mountain perspectives - Make policy-makers aware of the fact that livestock are an integral part of mountain farming and livelihood systems
Food insecurity of marginal farmers	<ul style="list-style-type: none"> - Small farm size - Marginal land - Limited opportunities 	<ul style="list-style-type: none"> - Explore appropriate livestock management options for marginal farms - Better understanding of how the income from different livestock options can be used to improve the food security of marginal farm households

winter. This is mainly the result of small farm size, limited access to CPRs (including common land for growing fodder grass), the lack of group action on common property land, and the increasing needs of the growing population. Thus, one potential issue for R&D is the identification of fodder (grass) varieties that provide a maximum output from marginal lands, which at present are underutilised. Participatory management of common property resources has worked well in many parts of Nepal. As yet, however, these programmes have not given due attention to fodder resource development, and this is another issue that should be addressed.

The low price of milk in the market is a disincentive for farmers to pursue dairy farming. While this issue needs to be looked into, there is a lot of scope for farmers to diversify into milk products like cheese, flavoured milk, flavoured yoghurt, and condensed milk, in order to get better value for the milk they produce.

Poor animal health poses a great threat to animal productivity. The adoption of improved breeds is severely affected by inaccessibility of veterinary services. Improved breeds are an expensive investment, and if animals die of disease (often

partly as a result of their relative vulnerability) farmers are discouraged. In the past, animal health improvement programmes focused on basic science and technology. The challenge for the next millennium is to widen the scope of research and tackle the enormous problems faced in the dissemination of technology, treatments, and knowledge already generated in the field. In Nepal, the chief problem is the dearth of trained veterinary technicians. In the hills of Nepal, the ratio of veterinary doctors to livestock is 1:42,000 (Shrestha and Sherchand 1988). One possible approach to overcoming this problem would be to encourage the private sector to become more active. At village level, the concept of village animal health worker should be promoted, and more village-level animal health workers trained.

It is clear that livestock will remain an integral part of mountain agriculture. Their importance for mountain households is generally more than for households in the plains that have crop-dominated systems and better accessibility to inputs and markets. Even so, policies for the livestock sector are largely oriented towards the plains; they are not framed with the mountains in mind. Blanket policy recommendations fail to consider the unique problems or potential of mountain areas like inaccessibility, niche areas, and diversity. Research and development in the livestock sector need to focus on the mountain situation if they are to be of benefit to the large majority of mountain households.

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