

Livestock Composition in the Himalayan Mountain

Introduction

In the Himalayan subtropical mountains, particularly those of Nepal and India, the majority of farmers operate mixed crop-livestock farming systems. There are a great many different types of agro-ecosystems in this region. Geographic and topographic variations (mountain specificities – Jodha *et al.* 1992) have combined to provide a microcosm of the earth's vegetation types and farming systems. Landholdings are small and fragmented, consisting mostly of marginal uplands. The most common livestock species in mixed crop farming are cattle¹, buffaloes, sheep and goats (Annex 3 summarises typical management practices).

The raising of livestock is integrated with food crop production. While crops provide feed and fodder, livestock provide meat, milk and milk products such as cheese and 'ghee' (clarified butter) for subsistence and as a source of cash income. Livestock also supply draught power to till the land and provide power for other agricultural operations such as threshing and transport.

In this farming system there is a dynamic relationship between common property resources, livestock and crops. It is clear that livestock depend to a certain extent on fodder and grass growing on CPRs: the animals then return the fodder, grass, and crop residues to the cropland via manure. Indeed, livestock are integral to the sustainability of hill and mountain farming. However, this relationship is now under increasing pressure from different sources.

¹ The author has used the term cattle here to mean strictly cows and bulls and not all domesticated quadrupeds, or all species in the *Bos taurus* category.



There are now varying degrees of commercialisation within these mixed crop-livestock farming systems. In fact, livestock production systems are becoming quite dynamic in certain pocket areas of the mountains with accessibility to road networks and a market for milk. Farmers are being provided with a strong incentive to keep livestock; not just to fulfill the traditional role of providing

◆ Livestock also supply draught power to till the land

draught power, milk, meat, and manure for households; but also to generate cash income through the sale of milk and meat. In these areas there has been a shift in management practices, with linkages to common property resources (CPRs) beginning to break down.

Two types of specialised livestock production systems may be noted today. The first is in valley areas with good access to markets. Here, a specialist cattle milk production system based on Jersey cross-bred cattle is emerging. Some areas in Himachal Pradesh (HP) practise such specialisation.

The second specialised system is emerging in the middle hills of Nepal where smallholdings close to the main roads depend mostly on crop residues and fodder/grasses grown on private land and CPRs to feed livestock. In these areas, commercial smallholder dairy farming is becoming common. These places are on (or close to) roadheads where government organizations and private dairies establish milk collection centres. There is an increase in the trend for feeding animals purchased concentrate feed, an especially common practice with farmers who are raising improved cross-bred cows or improved buffaloes. Thus, dependency of dairy animals on common property resources is minimal in these areas, and stall feeding is the key management practice. Linkages between crops, livestock, and the forests have weakened. Farmers now rely more and more on private land to meet fodder needs, and there is a decline in the relative importance of farmyard manure (FYM)/compost in the nutrient management system. This decline has to some extent been compensated for by the use of chemical fertilizer. Chapter 4 discusses the issue in detail.

Population Growth and Land Fragmentation

As a result of growing human populations in the HKH mountains, land resources per household are decreasing, with subdivision and fragmentation of land over the generations. Sharma (1993) compiled data on trends in population growth and per capita cultivated landholdings in selected areas of the HKH. The magnitude of reduction in per capita cultivated land is as high as 46.7 per cent within a decade in the case of the Central Himalayas (see Table 2.1). Similarly, the reduction in per capita landholdings in the Western Indian Himalayas and Nepal is also significant. In all likelihood, this trend grew throughout the 1990s.

Table 2.1: Population Growth Trend and Per Capita Cultivated Land (ha) in Selected Areas of the HKH

| Country/region | Year | Population growth trend | Per capita cultivated land (ha) | Percentage decrease in landholding |
|---------------------------|------|-------------------------|---------------------------------|------------------------------------|
| India Himachal Pradesh | 1961 | 1.66 | 0.220 | 39.1 (as of 1961) |
| | 1971 | 2.09 | 0.190 | |
| | 1981 | 2.15 | 0.134 | |
| UP (8 districts) | 1971 | 2.40 | 0.30 | 46.7 |
| | 1981 | 2.38 | 0.16 | |
| Nepal | 1971 | 2.07 | 0.173 | 23.1 |
| | 1981 | 2.66 | 0.133 | |

Source: Sharma 1993

Although the head of livestock per household is decreasing, the number of livestock overall has not decreased enough to match the reduced per capita resource availability. This is because livestock are an integral part of a large majority of subsistence households and must be maintained at a certain minimum threshold.

Trends in Livestock Population and Herd Composition

In the mixed crop farming systems of the middle mountains of Nepal, pressure from livestock is heavy. In relation to the amount of arable land per person, the livestock population is one of the highest in Asia (LRMP 1993). The population of livestock in Nepal in 1996 was estimated to be about 6.5 million head of cattle, 3.4 million buffaloes, 5.9 million goats, and 0.9 million sheep

(Agricultural Statistics of Nepal 1996/97). Livestock contribute 20 per cent of household cash income in the hills and mountains , without taking home consumption of livestock products into account (Nepal Rastra Bank 1988). On average, a mountain/hill household raises six to 10 head of livestock, including large and small ruminants (Shrestha and Sherchan 1998).



The analysis of livestock data in Nepal reveals that the most noticeable change in the hills is the significant increase in the buffalo and goat population between 1988/89 and 1996/97 (see Table 2.2). Percentage changes in the number of buffaloes and goats are a positive indication of their importance, while the change in cattle and sheep is negative and shows their decreasing importance in the total herd composition and

◆ On average, a mountain/hill household raises six to 10 head of livestock.

in the economy. The most noticeable change in the mountains is the considerable decline in the sheep population in total herd composition.

Table 2.3 reveals that between 1984/85 and 1989/90 there was significant growth in the pig population in both the mountains and hills of Nepal. Conversely, the population grew at

Table 2.2: Livestock Population and Composition in the Mountains and Hills of Nepal (%)

| Livestock classes | Mountains | | Hills | |
|-------------------|--|--------------------------------------|--|-------------------------------------|
| | Change in Population (1988/89 - 1996/97) | Change in Share* (1988/89 - 1996/97) | Change in Population (1988/89 - 1996/97) | Change in Share (1988/89 & 1996/97) |
| Cattle | +3.17 | +0.89 | +5.77 | -0.51 |
| Buffaloes | +0.58 | 0 | +8.30 | +0.21 |
| Sheep | -9.59 | -1.70 | -2.53 | -9.59 |
| Goats | +2.87 | +0.80 | +9.37 | +2.87 |

Sources: (1) Agricultural Statistics of Nepal (1990) and Statistical Information on Nepalese Agriculture (1996/97), HMG Ministry of Agriculture, Agricultural Statistics Division, Singha Durbar, Nepal
* [Percentage share of individual species in total livestock population (Cattle + Buffaloes + Sheep + Goats)]

Table 2.3: Population Growth Rate (%) of Poultry and Pigs in the Hills and Mountains of Nepal

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

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

a rate of slightly more than one per cent annually between 1991/92 and 1997/98.

The number of poultry grew significantly between 1984/85 and 1991/92, at a rate of 10.4 per cent and 7.1 per cent in the hills and mountains respectively. This growth stagnated in the hills between 1991/92 and 1997/98, but still grew at an annual rate of 2.5 per cent in the mountains

In Himachal, the poultry population increased very significantly by 145 per cent from 1972 to 1982. The increase continued between 1982 and 1992. On the other hand, although the population of pigs increased by 179 per cent from 1972 to 1982, it decreased by 14 per cent from 1982 to 1992. In the Kumaon areas (Uttar Pradesh hills), the poultry population has increased since 1972 (see Table 2.4).

Table 2.4: Trends in Population of Poultry and Pigs in Himachal Pradesh and UP Hills, India

| Himachal Pradesh | | | | | | | |
|-------------------|---------|---------|------------------------------|---------|------------------------------|---------|----------------------------|
| | 1972 | 1982 | % Increase from 1972 to 1982 | 1992 | % Increase from 1982 to 1992 | | |
| Poultry | 188,649 | 461,285 | 145 | 664,039 | 31 | | |
| Pigs | 2,906 | 8,107 | 179 | 7,105 | -14 | | |
| UP Hills (Kumaon) | | | | | | | |
| | 1972 | 1978 | % Change between 1972-1978 | 1982 | % Change between 1978-1982 | 1986 | % Change between 1982-1986 |
| Poultry | 178,978 | 213,864 | +19.5 | 335,596 | +56.9 | 363,416 | +8.29 |

Source: Himachal, 'Livestock Census Himachal Pradesh, 1972, 1982, 1992': UP Hills, in R. Swarup (1991) "Agricultural Economy of Himalayan Region."

Data from the Indian Himalayas have shown that a large proportion of livestock is raised under the mixed cropping system. Cattle are most common (47.5%), followed by goats (15.8%), buffaloes (12.3%), and sheep (10.4%) in mixed crop farming in the central and eastern Himalayas (Rao and Saxena 1994). Under this system, the landholdings are small and livestock provide a critical supplement to farm incomes. According to studies on livestock conditions, livestock pressure is increasing in the Western Himalayas of India.

In Himachal Pradesh, cattle population during the past two decades has remained at the same level, whereas the buffalo population grew more rapidly. Composition of the cattle population in the state showed improvement as a result of an increase in the share of milch cows and a decrease in the share of dry cows and young stock. Population of in-milk bovines increased at a faster rate than that of other categories of bovine animals and livestock. These changes indicate that livestock owners were replacing low productivity cattle and buffaloes with more productive animals (Chand 1997).

Furthermore, in Himachal about 75–80 per cent of rural households keep milch cattle and over 90 per cent keep either milch or draught animals. Buffaloes are kept by about 50 per cent of households in Mandi District. Smallholder farms commonly keep one to two draught cattle and two to four milch and growing cattle or buffaloes; although the number of households owning two or more milch animals has been declining. Overall, about 40–50 per cent of households keep sheep and goats. This proportion increases to 60–70 per cent in highland areas.

An analysis of temporal changes in livestock population and composition from 1978 to 1988 in the UP Hills and in Himachal Pradesh from 1982 to 1992 (Table 2.5) shows that, whereas the cattle population has declined, the buffalo population has greatly increased. Among small ruminants, the sheep population has declined. It is interesting to observe that there has been a significant increase in the goat population. The percentage share of cattle and sheep has gone down in the overall herd composition, while the percentage of buffaloes and goats has increased.

Table 2.5: Livestock Population and Composition in the Indian Himalayas

| Livestock species | Central Himalayas (Uttarakhand) 1978–1988 | | Western Himalayas (Himachal Pradesh) 1982–1992 | |
|-------------------|---|-------------------------|--|-------------------------|
| | % increase in population | % change in composition | % increase in population | % change in composition |
| Cattle | -5.2 | -3.0 | -1.06 | -0.71 |
| Buffalo | +15.1 | +2.5 | +13.64 | +1.62 |
| Sheep | -9.1 | -1.0 | -8.15 | -1.91 |
| Goats | +7.1 | +1.4 | +5.25 | +1.00 |

Source: Directorate of Land Records (1992), Livestock Census, Government of Himachal Pradesh, Shimla. Revenue Department, Livestock Census, Govt. of UP, Lucknow, India

To conclude, trends in the population of various livestock classes in high-pressure areas under study — Himachal Pradesh, Uttarakhand, and Nepal — are summarised in Table 2.6.

Table 2.6: Trends in Livestock Population and Composition in the Himalayan Region

| Province/State/Region | Population | | | | Composition | | | | Year |
|-----------------------|------------|----------------------|--------|------|-------------|----------|--------|-----------|---------|
| | Cat-tle | Buf-falo | She-ep | Goat | Cat-tle | Buf-falo | She-ep | Goat | |
| Himachal Pradesh | ↓ | ↑↑↑ | ↓ | ↑ | ◆ | ↑ | ↓ | ↑ | 1982–92 |
| Uttarakhand | ↓ | ↑↑ | ↓ | ↑↑ | ◆ | ↑↑ | ↓ | ↑↑ | 1978–88 |
| Nepal (Mtns) | ◆ | ◆ | ↓ | ↑↑ | ◆ | ◆ | ↓ | ↑ | 1988–96 |
| Nepal (Hills) | ↑ | ↑ | ↓ | ↑↑ | ↑ | ↑ | ↓ | ↑↑ | 1988–96 |
| | ↑↑ | Significant Increase | | | | | ↓ | Decrease | |
| | ↑ | Increase | | | | | ◆ | No change | |

Land Fragmentation and Changes in Livestock Composition

The growth in population has led to an increased number of farm households, but with a decreased farm size. The present trend sees more livestock but fewer animals per household. The increased number of livestock overall has put pressure on natural resources and has necessitated that land be cultivated for animal feed. The following section analyses available data related to this issue.

Field investigations were carried out to ascertain the changing trend in livestock management practice and farmers' perceptions on the state of livestock feed resources. Land fragmentation and the corresponding household-level adaptation emerged as the main

issue. There was clear evidence of significant, ongoing changes over the past two decades. This time frame also coincides with the period of active implementation of government policies to control access to common property resources. Table 2.7 shows that, with the shift towards the nuclear family, there has been extensive fragmentation of landholdings. Thus, while holdings increase in number they decrease in size. The person-land ratio has risen significantly over the area as a whole. Arable land has remained much the same, and there is little prospect for increasing it. With more effective community protection of common property resources, it is logical to conclude that land-based feed resources for livestock are becoming more and more difficult to provide under the prevailing system. These factors have led to the present reduction in the number of livestock in individual farm households. Labour shortages and the change to productivity-enhancing management practices have further contributed to the reduction in livestock numbers at the household level.

Table 2.7: Change in Land and Family Size in Selected Households of Kabhre VDC, Dolakha, Nepal

| Farmer | Land Size (ha) | | Family Size | | % Decrease in Holding Size |
|---------------|----------------|------------|--------------|------------|----------------------------|
| | 20 Years Ago | At Present | 20 Years Ago | At Present | |
| Danima Sherpa | 5 | 2 | 14 | 6 | 57 |
| Krishna | 1.75 | 1.5 | 8 | 6 | 25 |
| Ram P. Dahal | 2.9 | 1.3 | 6 | 2 | 122 |
| Nuru Sherpa | 2.5 | 1.25 | 12 | 6 | 50 |

Source: Field Survey, Dolakha 1998

Farmers in the area have reduced the number of large ruminants while increasing feed resources (privately planted trees, shrubs, and ground grass) to sustain small ruminants (Table 2.8).

Table 2.8: Change in Composition of Livestock in Selected Households of Kabhre VDC, Dolakha, Nepal

| Farmer | Cattle | | Buffaloes | | Sheep | | Goats | |
|----------------|--------------|-----|--------------|-----|--------------|-----|--------------|-----|
| | 20 years ago | Now | 20 years ago | Now | 20 years ago | Now | 20 years ago | Now |
| H. P Lamichane | 30 | 12 | 20 | 5 | 20 | 8 | 12 | 20 |
| Nuru Sherpa | 3 | 2 | - | 2 | - | - | 2 | 8 |
| B.K. Chaulagai | 2 | - | 5 | 2 | - | - | 6 | 2 |
| R. P Dahal | 4 | 1 | - | 2 | - | - | 4 | 8 |

Source: Field Survey, Dolakha 1998

Box 2.1

TWO FARMERS FROM DOLAKHA DISTRICT

Case 1: Damina Sherpa from Thuloban of Dolakha District

Damina Sherpa's family had 90–100 *ropani* (4.5–5 ha) of land 20 years ago and now has approximately 41 *ropani* (2 ha) left. There were 14 family members in his family 20 years ago, and now there are six members. The total livestock population has increased due to the change from a joint to a nuclear family, which entails individual families possessing their own livestock. A remarkable increase in the total population of goats has occurred for this reason. According to the farmer, the population of sheep has declined due to a lack of pasture land. The price of selected livestock has been increasing. A goat with a live weight of 20–25 kg presently sells for Rs 2,000–3,000 (farmgate price).

Case 2: Krishna from Sisneri Village of Dolakha District

Krishna lives in Sisneri. His family had 35 *ropani* (1.75 ha) of land 20 years ago. Now he has only 20 *ropani*. Family size has increased from six to twelve. This particular farmer had a total of 26 livestock 20 years ago, consisting of cattle, buffalo, and goats. Goats accounted for most of his livestock. Currently, he has a total of 11 head of livestock. He states that the livestock population has decreased due to lack of feed/fodder and medical facilities. The animals in his household are fed on fodder from his own land or from fodder which he purchases. (A bundle of hay costs Rs 100). One of the two buffaloes is of an improved breed. Cattle are mostly raised for manure and goats for meat. In Krishna's opinion, the forest has decreased because of the increase in population. However, many grass species are now grown in private forests. These include napier, *Settaria*, pine, *Ulnus*, bamboo and broom grass. In times of fodder scarcity, Krishna gets fodder for his livestock from private land.

The practice of planting fodder on private land has increased in recent years because of decreased access to public land. Goats are easily managed because they feed on a wide range of fodder, grass, and shrub species that are planted around the homestead. Because of their size, their feed requirements are also nominal compared to large ruminants such as buffaloes. Goats also have an advantage in that they can be tended by children. The villages are close to the main highway, i.e., the Lamoshangu-Jiri Road, that provides ready access to large markets. As a result, households are keeping more goats and reducing the number of large ruminants (see Table 2.8).

Keeping fewer animals with more output (milk) by replacing local stock with high-yielding animals and through stall feeding has become an established trend in the middle hills. Stall feeding of animals has increased over the last ten years. One of the disadvantages of this system is the big demand for human labour to tend the animals. The human labour available in the middle hills is increasingly allocated to home-based livestock-rearing activities such as stall feeding.



The changes in farming conditions are also affecting the use of draught animal power. For instance, paddy requires more bullock-pair days than other food crops. The shift to plantation crops in Himachal Pradesh has reduced the demand for draught power. Consequently, the numbers of draught animals declined in six districts of the state during 1972–1992. The shrinkage in the average size of holdings from 1.53

There has also been a significant improvement in agricultural mechanisation hectares in 1971 to 1972 to approximately 1.20 hectares in 1991 to 1992 has also contributed to a reduction in the draught animal population in the state.

There has also been a significant improvement in agricultural mechanisation in the low-lying districts and in the valley areas of Himachal Pradesh during the last two decades. Singh (1996), however, points out that vegetable cultivation, as opposed to

orchards, is labour-intensive, requiring large inputs of both human and animal labour.

“One assumes that fruit farming (apple orchards, for instance) requires no draught animal power (DAP) input. But the fact is that the area under fruit trees is used extensively for vegetable cultivation. As a result, it has been noted that the orchard-vegetable cropping system demands more DAP than a cereal-based system” (Vir Singh [1998]).

The number of draught animals has increased in areas under commercial crops, such as potatoes and off-season vegetables, that require more bullock-pair days for the preparation of the field than traditional crops. However, there has been an overall decline in the draught animal population. This is a positive development towards a reduction in the overall pressure of livestock on land resources in mountain areas.

