

Chapter 4

Livestock Resource Management System for Local Planning/Decision-making in the Hills of Nepal: a Case Study from Kaski District

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Livestock-raising has always been an integral part of sustaining mountain agriculture and livelihoods in Nepal. Development of livestock can help to generate farm employment and incomes, and save the foreign exchange currently spent on importation of livestock products. For example, Nepal annually imports milk powder worth over NRs¹ 1 billion, buffaloes worth NRs 240 million, and goats worth NRs 225 million.

Study methodology

Kaski District was selected for study using the Livestock Database Inventory – a simple GIS-based analysis tool. Two study sites were chosen within the District in consultation with researchers at Lumle Agricultural Research Station, the key agricultural and livestock research and extension centre for the Western Development Region of Nepal. Selection was based on accessibility criteria. Hemja was easily accessible and Kaskikot was relatively inaccessible. Prior to carrying out the household survey, informal discussions were held in both sites. A final structured survey questionnaire was developed after pre-testing of a draft. Twenty farm households in each study site were surveyed with the help of trained field assistants from Lumle Agricultural Research Station.

Socioeconomic background of sampled households

The average household size was 6.6 in Hemja and 7.9 in Kaskikot (Table 1). The male to female ratio was 1.22 in Hemja and 1.04 in Kaskikot. The literacy rate was 61% in Hemja and 34% in Kaskikot. The average landholding per household was 0.48 ha (9.3 ropanis) in Hemja and 1.1 ha (21.4 ropanis) in Kaskikot.

Table 1: Socioeconomic data

	Hemja	Kaskikot
Average household size (individuals)	6.6	7.9
Male to female ratio	1.22	1.04
Literacy rate (%)	61	34
Average total land per household (ha)	0.47	1.09
Average lowland per household (ha)	0.35	0.74
Average upland per household (ha)	0.13	0.35
Caste and ethnic composition (%)		
Brahmin	50	50
Chhetri	40	26
Newar	10	0
Other	0	24

¹ US\$1 = approx. NRs 75 at the time of this study (1999-2000)

Lowland per household in Kaskikot was more than double that in Hemja; and the upland area nearly three times higher. Both areas were dominated by the Brahmin and Chhetri caste groups. Among ethnic groups, there were some Newars in Hemja, and some Magars and Gurungs in Kaskikot.

Land ownership

In Hemja, most farmers owned less than 0.5 ha (10 ropanis) of land (Table 2). In Kaskikot, more than half owned more than 0.5 ha of land, and 20% more than 1.5 ha.

In both areas, 15% of farmers did not own any unirrigated land (bari) and 10% did not own any irrigated land (khet), but more than half the farmers in Kaskikot had more than 0.5 ha irrigated land and only 15% of those in Hemja.

Table 2: Land and livestock holdings

Landholding area (ha)	Irrigated land (khet in %)		Unirrigated land (bari in %)		Total	
	Hemja	Kaskikot	Hemja	Kaskikot	Hemja	Kaskikot
0	10	10	15	15	–	–
0.05 – 0.5	75	35	85	65	70	25
0.5 – 1	15	35	–	20	20	30
>1	–	20	–	–	10	45
Livestock	Improved (%)		Local (%)		Average heads per HH ¹	
Cattle	0	90	100	10	1.0	1.45
Bullocks	0	0	100	100	0.25	0.9
Buffalos	66	30	34	70	2.05	2.0
Goats	0	0	100	100	2.0	1.6
Poultry ²	0	0	–	–	1.95	0

¹ HH : Household ² Commercial

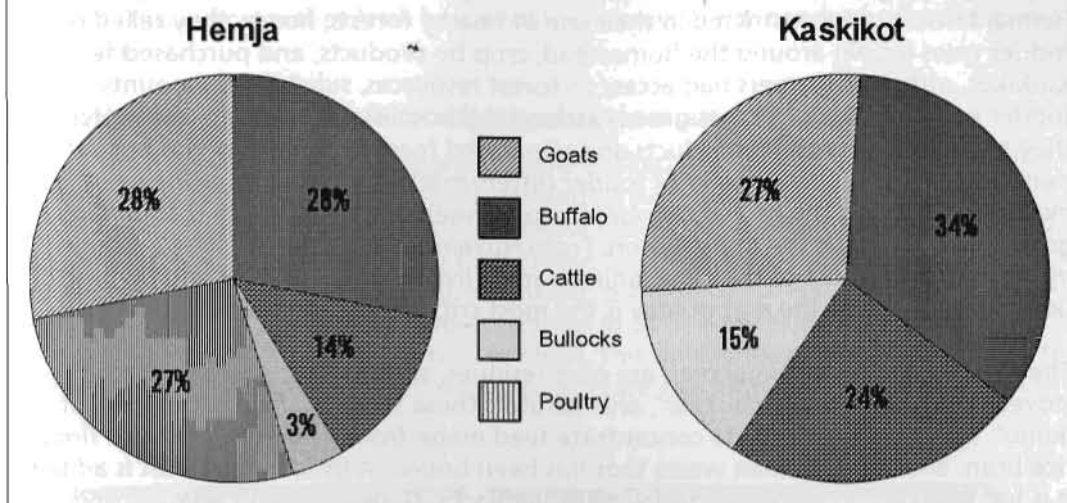
Livestock holdings

Ownership

The average livestock holdings per household are shown in Table 2. Overall buffaloes, goats, and poultry were the most numerous in Hemja (Figure 2) and buffaloes in Kaskikot. On average farmers in Kaskikot had the same number of buffaloes fewer goats and more cows than those in Hemja. In Hemja, all livestock were local breeds except for buffaloes; 66% of buffaloes were improved. In Kaskikot, 30% of buffaloes and 90% of cattle were improved.

Both large and small animals play important roles in farming systems. While buffaloes and cows are important dairy animals, goats bring in good cash returns. Since Hemja lies close to markets, poultry played an important role in cash generation. In Kaskikot, which is relatively inaccessible, poultry does not seem to offer an income-generating opportunity.

Figure 2: Share of different livestock in the total livestock population (in 2000)



Purchase and sale

The farmers in Hemja sold more livestock of all types than they purchased (Table 3), whereas in Kaskikot farmers purchased more bullocks and cattle than they sold.

Table 3: Purchase and sale of livestock from 1999-2000

	Hemja		Kaskikot	
	Purchased	Sold	Purchased	Sold
Buffalo	4	11	3	3
Bullocks	0	3	8	5
Cattle	0	0	8	2
Goats	0	8	4	6
Poultry	0	11	-	-
Total	4	33	23	16

Livestock production systems

In both areas, livestock production systems were small scale. None of the farms surveyed had a large dairy herd raised for commercial purposes. The most common management practice involved stall-feeding using family labour. Livestock feed usually comprises green grass, crop by-products, fodder tree leaves, and purchased feed. Stall-feeding is common for several reasons including restrictions on forest use and shortage of labour for herding of grazing animals.

Cows and buffaloes are mostly stall-fed. Although goats are stall-fed during the rainy season, they also graze fallow land, roadsides, and water canals in the winter and dry season. Poultry scavenge feedgrains.

Livestock-rearing has strong links with forest resources for fodder supply and nutrient recycling. Forage from fodder trees provides a significant amount of crude protein. In Hemja, farmers were restricted in their use of nearby forests; hence, they relied on fodder trees grown around the homestead, crop by-products, and purchased feed. In Kaskikot, although farmers had access to forest resources, substantial amounts of fodder were provided by trees grown around the homestead. Like farmers in Hemja, they too relied on crop by-products and purchased feed when fodder was not sufficient. In both areas, availability of fodder differs markedly throughout the year. From mid-June (Asad) to the end of October (second week of Kartik), there is abundant green grass, as this is the rainy season. From November to February, feed becomes more scarce. For most of this time, animals must live on crop residues and by-products. From March to the end of May is the most critical time for feed availability.

The major sources of animal feed are crop residues, such as paddy straw and maize stovers, purchased feed, 'chokkar', and 'dhuto'. These feeds are fed in the form of 'kudo'. Kudo is a home-made concentrate feed made from a mixture of maize flour, rice bran, and some kitchen waste that has been boiled. A little mineral salt is added. It is fed to lactating buffaloes and working bullocks. Generally, crop residues and green grass are fed to dry livestock especially cows and goats. Lactating and working livestock are fed with concentrate feed and purchased feed. These feeds are rich in protein, and are a major portion of feed for working bullocks and lactating buffaloes during the winter and dry season. Dry buffaloes are mainly fed crop residues. Young goats are fed some grains during the growing period. Poultry and laying hens receive adequate feedgrain.

Sources of income

The income of all household members was aggregated. In Hemja, remittances sent by family members working abroad (India, Middle East, and others) were the largest single source of income, 26%, followed by income as salaries and wages (25%); sale of vegetables (21%); sale of livestock and livestock products (18%); and sale of crops, mainly paddy (rice) and wheat (10%). In Kaskikot, sale of crops brought in 57% of total household income, sale of livestock and livestock products 36%, remittances from abroad 4%, and salaries and wages 3%. In Kaskikot, vegetables are only grown for household consumption. This indicates that farmers in accessible areas (Hemja) opt for off-farm activities to earn income (remittances, and salaries and wages), while farmers in inaccessible areas (Kaskikot) depend more on livestock for their livelihoods.

The smaller the size of the farm, the greater the land allocated for vegetable production. In Kaskikot, livestock as a source of income was predominant in all categories of farm-size. This reinforces the conclusion that farmers in inaccessible areas, such as Kaskikot, depend more on livestock for their livelihood than farmers in accessible areas, such as Hemja.

Per capita food availability

The main crops grown in both areas were rice, maize, wheat, and millet. Food availability per capita per year in Hemja was 90-360 l (1-4 muris) for 60% of households, 450-720 l (5-8 muris) for 35% of households and 810-900 l (9-10 muris) for 5% of households. Food availability per capita per year in Kaskikot was 90-360 l (1-4 muris)

for 35% of households, 450-720 l (5-8 muris) for 55% of households and 810-900 l (9-10 muris) for 10% of households. Food availability was comparatively better in Kaskikot. This indicates that farm households in Hemja are dependent on purchased foodgrain.

Decision-making in livestock production and marketing

During the household survey, respondents were asked about decision-making within the household regarding livestock-related matters such as selection of breed and type, marketing of livestock products, purchase of inputs, credit and investment, and spending income from livestock products (Table 4). It was found that in both Hemja and Kaskikot, men dominated decision-making, but the role of women varied considerably. In Hemja, 28% of women were involved in decision-making, in Kaskikot 12%. Joint decision-making was rare or non-existent. This difference might be attributed to women's level of education. The overall literacy rate was higher in Hemja (61%) than in Kaskikot (34%).

Table 4: Farm household decision-making regarding livestock (%)

	Hemja				Kaskikot		
	Male	Female	Joint	Never	Male	Female	Joint
Breeding selection	35	5	10	50	90	10	0
Livestock type	65	10	10	15	90	10	0
Marketing of products	60	20	20	0	90	10	0
Inputs purchase	65	20	5	10	90	10	0
Credit and investment	70	15	10	5	90	10	0
Use of income from livestock products	60	25	15	0	90	10	0
Average	60	16	12	12	90	10	0

Milk production and marketing

Both areas have milk production associations with milk collection centres from where milk is collect by tankers and delivered to the Pokhara Dairy Development Corporation for processing. Vendors carry milk containers for 2-3 hours to reach roadheads where a tanker collects milk. In Kaskikot, households produced an average of 6.4 l of milk per day, while Hemja, households produced 3 l per day.

In Hemja, milk was produced mainly for household consumption although some was sold to local tea shops. The price of milk was NRs 18-20 per litre (NRs 10-12 per mana [0.56 l]). Improved buffaloes were the main lactating animals; some 33% were lactating.

In Kaskikot, cow milk was sold at NRs 14 per l and buffalo milk at NRs 16-18 per l. Milk was taken to the collection centre. The lactating animals were mainly improved cows and buffaloes; 54% of buffaloes were lactating and 44% of cows.

Livestock feed resources

Fodder

The most common species of fodder trees found in both areas were *Ficus subincisa* (berulo), *Artocarpus lakoocha* (badahar), *Litsea monopetala* (kutmiro), and *Ficus glaberrima* (pakhure). Farmers had varying numbers of fodder trees on their own farms. There was a community forest in Hemja, but it was not operational. Farmers were seen bringing fodder from the forest of an adjoining village. Some farmers purchased fodder in bulk from a distant village.

Table 5: Fodder trees on farm (% of farmers)

Number of trees	Hemja	Kaskikot
None	40	–
1-10	30	23
11-20	15	7
21-30	5	8
31-40	5	7
41-50	5	25
>50	–	30

In Hemja, about 40% of farmers did not have any fodder trees on their farm; they had shrubs and bushes only. About 30% of farmers had 1–10 trees and only 5% had more than 40 trees (Table 5). In Kaskikot, farmers planted more fodder trees on their own land; they needed reliable sources of fodder, since they were more dependent on livestock for their livelihoods. More than 20% had 1–10 trees, and over half had more than 40 trees.

Feed

Farmers largely depended on home-made feed made from paddy straw and maize flour. They also purchased concentrate feed of (chokkar) every month to meet the feed requirements of dairy animals. In Hemja, farmers purchased an average of 1–2 sacks (50–100 kg) of feed per month. In Kaskikot, farmers purchased an average of 2–3 (100–150 kg) sacks of feed per month. Farmers in Kaskikot relied more on purchased concentrate feed because they had improved cows; in Hemja, the main dairy animals are improved buffaloes that require less purchased feed.

Animal health and services

In both areas, larger animals (cattle, buffaloes, and bullocks) were prone to diseases such as bhyagute (cold), pneumonia, mate, khorand, dhande, eye infection, and digestive disorders. Respondents could not recall an outbreak of any serious epidemic among livestock.

In Hemja, farmers took sick animals to the nearby veterinary doctor for treatment. In Kaskikot, farmers first tried to treat sick animals by themselves; if they were unable to find a cure, they would take them to the veterinary doctor. As a precaution, farmers tested dung every six months to detect illnesses. Some farmers regularly provided their livestock with vitamins and calcium. Male members of the household were usually responsible for taking sick animals to the vet.

Use of biogas technology

Biogas was mainly used for household energy needs. Farmers used fuelwood to prepare feed for livestock in the afternoon. In Hemja, use of biogas in the household was fairly recent. Most biogas plants were found to be about a year old. Users said that 80–95%

of fuelwood needs were substituted with biogas. Some households were able to use biogas only for eight months in a year and others could use biogas for the whole year. In Hemja, 45% of households had installed a plant. Biogas was functional for 7–12 months a year and, according to users, 30–100% of fuel needs were filled by biogas. In Kaskikot, only one household had biogas and had been using it for five years. Kaskikot was higher and a little colder, so biogas plants could not function so well.

Training

Respondents in both areas were asked whether they had received training in any area of livestock production and management such as breeding, feeding, nutrition, fodder and forage management, and animal health services. There had not been much training in either area. In Hemja, a few people had received training in other subjects such as biogas maintenance, knitting (from Rural Development Project), and drinking water supply. In Kaskikot, a few had received training on livestock production and management. One respondent had received a seven-day training on milk product processing in 1999. Others had received training on goat-rearing, animal health, and credit services.

Constraints to livestock production and marketing

In Hemja, the limited availability of feed and fodder was mentioned by farmers as the main constraint to livestock-rearing. This discouraged them from expanding their numbers of livestock. In winter, fodder shortage was more severe than in other seasons. Another constraint was shortage of labour.

In Kaskikot, labour shortage and lack of technical know-how hindered farmers from taking greater advantage of livestock-rearing. In addition, farmers face a feed and fodder shortage from January to May. Inadequate credit services prevented poor and marginal farmers from purchasing improved or local breeds. According to farmers, the existing credit service did not allow loans for more than one animal.

In both study sites, knowledge of product diversification was lacking (except for traditional knowledge). Local farmers think that they could benefit from knowledge of techniques for product diversification with value addition.

Implications for development of planning tools

Accessibility of an area to roadheads influences the socioeconomic status of farmers. This, in turn, impinges on other values of farmers' lives including the livestock they raise. This is illustrated by the fact that Hemja, which is traversed by a highway, has a high population density and highly fragmented landholdings. Farmers have opted for vegetable farming and dairying with improved buffaloes for income generation. Kaskikot, which is relatively inaccessible, with some parts lying 3-4 hours walking distance from roadheads, has average farm sizes larger than in Hemja. There the main sources of household income were selling foodgrain and milk. The main dairy animals were improved cows and local buffaloes. Differences in the kinds of dairy animals (improved cows vs. improved buffaloes) raised by farmers in Hemja and Kaskikot is an outcome of several factors such as availability of fodder and grass, market assurance for the sale of livestock and livestock products, access to veterinary services, and socio-cultural values.

In Kaskikot, abundant fodder and grass is available from private land and nearby forest areas. Households had an average of 23 fodder trees. As a result of this, farmers have opted for improved cows as the main dairy animals. In Hemja, lack of animal feed posed a problem for farmers. Lack of access to nearby forest and community areas owing to restrictions imposed by forest user groups has caused fodder and feed scarcity. To adjust to poor-quality local feed resources, farmers in Hemja have opted for improved buffaloes as these buffaloes are well adapted to poor feed. In addition, dairy buffaloes that are old or not lactating have a high sale value for Hemja farmers compared with improved dairy cows that have zero sale value for meat purposes.

Market assurance for livestock and livestock products also plays a critical role in choices made by farmers. In Hemja, one of the prime reasons for farmers opting for buffaloes is that they have high salvage value and can fetch a good price at market. In Kaskikot, the establishment of milk production associations has facilitated the selling of milk to the Dairy Development Corporation in Pokhara. Market assurance for raw milk has encouraged many farmers to raise improved cows for cash generation.

Another factor for raising improved cows in Kaskikot seems to be the religious sentiment that confers high respect for cows. Therefore, when a government programme introducing improved livestock was implemented, Brahmin farmers used this opportunity to acquire improved cows rather than improved buffaloes.

The other notable fact is that no pigs were being raised in either Hemja or Kaskikot. In rural Nepal, there are social and religious reasons for keeping livestock. In Hindu culture, cattle are considered sacred animals and are worshipped. During Dasain, the most important Hindu festival in Nepal, goats and poultry are sacrificed, and during Tihar, another festival, a day is devoted to the worship of cows. In other religious ceremonies, people donate cows to their Brahmin priests. Socio-cultural values play an important role in determining the types of livestock raised by farmers. Thus, the absence of pigs in the study areas is explained by the fact that, according to Hindu religion, Brahmins should never raise or touch pigs because they are considered unclean and unfit for consumption. In both study villages, Brahmin households owned more cattle than households of other castes or ethnic groups.

Livestock planning cannot be done in isolation since it is an integral component of mixed farming systems. It is well recognised that local-level planning hinges on four key indicators: feed resources, market demand, health services, and socio-cultural values. While dairy animals play a critical role in generating household income as well as in nutrient recycling and draught power, the role of small animals such as goats also seems to be important for income generation since there is a ready market when farmers need cash. This is more evident in Hemja. It appears that farmers in Kaskikot although they have the feed resources for raising goats do not have the market for them. The success of biogas in Hemja should be taken as a model that can be replicated in other areas.