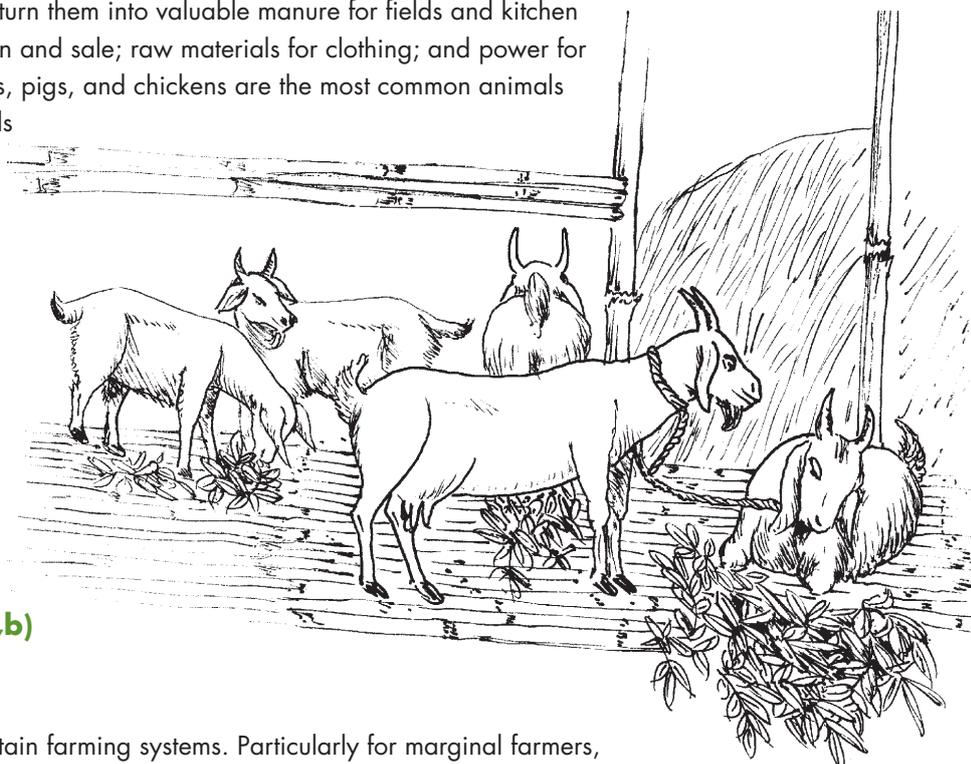


Livestock and Fish

Livestock are an integral component of the mixed farming system practiced by the great majority of farmers in the hill and lower mountain regions of the Hindu Kush-Himalayan (HKH) region. Livestock eat crop and food processing residues and vegetation from areas that cannot be used for crops and turn them into valuable manure for fields and kitchen gardens; milk, meat, and eggs for consumption and sale; raw materials for clothing; and power for ploughing and transport. Cattle, buffalo, goats, pigs, and chickens are the most common animals kept in the mid hills. Until recently most animals were kept for subsistence purposes, but in recent times farmers are looking increasingly at livestock as a source of income, and have started rearing other animals like ducks, rabbits, and fish for income generation.

ICIMOD's livestock-related activities at Godavari focus on new approaches for using livestock for income generation, taking advantage of the experience of ICIMOD's partners in other countries.



Animal Husbandry (Map Site 6.1a,b)

Goat husbandry (Map Site 6.1a)

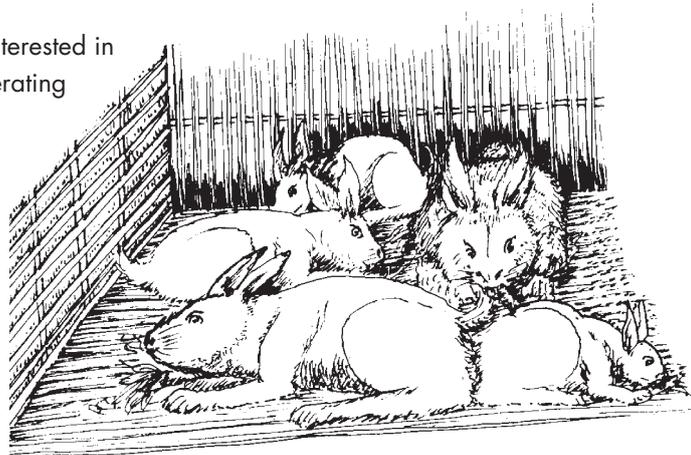
Goats are part of the farm household in mountain farming systems. Particularly for marginal farmers, they have significant advantages over cows and buffalo. They are docile, clean and friendly animals; they require smaller capital investment, which also means less risk per animal; and they multiply faster and require less feed than the larger animals. Goats can be bred for milk or meat. Dairy goats can produce 1-2 litres of milk per day; the milk has smaller particles of fat and protein than cow or buffalo milk and so is easily digestible. It is recommended for drinking by infants and the elderly, and especially for those who have difficulty digesting cow's milk. Goat's milk can help build resistance to gastro-intestinal and respiratory disorders. Goat meat does not have inter-muscular fat and is recommended for consumption by people with cardiovascular diseases like high blood pressure and heart disease.

Local goat breeds are less productive than improved breeds, but they are hardy and suited to local conditions. The Godavari trials are aimed at crossing to optimise improvements in goat performance whilst retaining the benefits of local breeds. They also focus on stall feeding methods as a way of supporting natural vegetation regeneration, since goats are acute grazers if left to roam. Two pairs of pure-bred Nubian and Boer goats have been obtained from the Asian Rural Life Development Foundation (ARLDF) in the Philippines. Nubians are goats bred for milk production, yielding about two litres of milk per day. The Boer is an improved goat bred primarily for meat; a mature ram can weigh from 110-135 kg (240-300 lbs) and a ewe from 90-100 kg (200-225 lbs). The pure bred goats have been crossed with the local breed to obtain the optimum level of performance plus hardiness for the conditions in the HKH mid hills. The male goats are used to service the goats of local farmers, with nearly 1400 offspring produced as a result so far. The aim is to demonstrate how optimising breeds can improve income and other benefits with little outlay.

Angora rabbits (Map Site 6.1b)

Angora rabbits produce a high quality wool which is soft, silky, light, and warm and has a good market. They thrive in temperate climates, and can survive well at temperatures from -2°C to 35°C, with the ideal range from 15-25°C. These rabbits are mainly bred for their wool, but after three years they can be culled and used for meat and their pelt. The paws and tails are often made

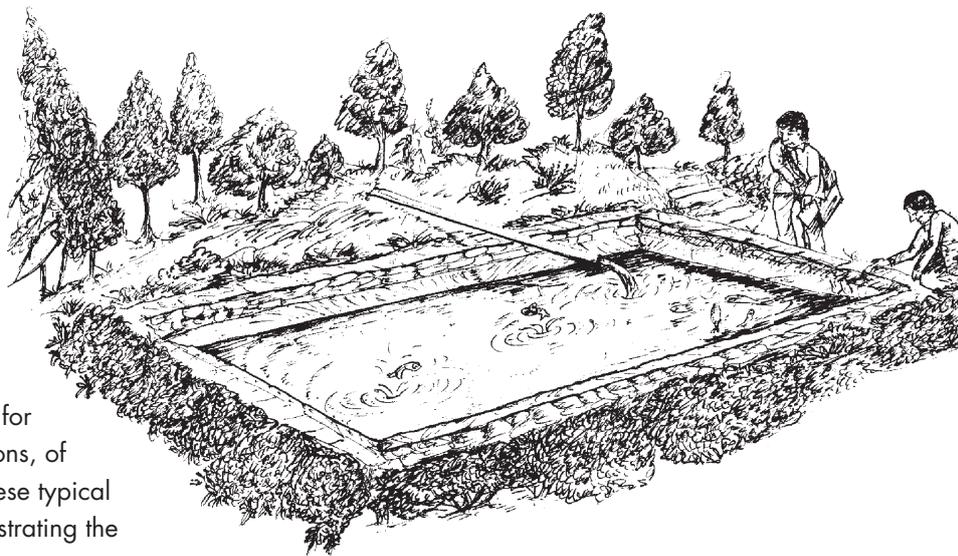
into trinkets. In recent years, farmers in the HKH region have become interested in keeping Angora rabbits as an easy and relatively low cost way of generating income. A number of breeding pairs of German Angora rabbits are maintained at Godavari to demonstrate the ease and advantages of keeping these rabbits. The German Angora rabbit is a high wool-producing breed; individuals weigh around 3-4 kg and produce 0.6-1.0 kg of wool per year. The offspring of the rabbits are provided and sold to farmers and organisations in Nepal and Pakistan and others, close to 90 breeding pairs have been distributed so far.



Pisciculture (Map Site 6.2)

Mountain farmers in the HKH region have caught, dried, smoked, eaten, and sold fish from flooded paddy fields, rivers, and lakes since time immemorial. Actually farming fish is a more recent activity, however, mostly confined to the lower and warmer foothill areas and mainly using carp. Interest is now increasing in farming more exotic fish, which have more stringent requirements but also provide higher returns. There is a growing market for more refined and expensive food of this sort in the ever-expanding urban districts of the region, and fish farming offers a new opportunity for income generation for farmers in cooler niche locations with running water high up in the mid hills.

At Godavari, ICIMOD is using the water collection reservoirs with continuous inflow and outflow (see Sheet 4: Water Management) to breed Japanese rainbow trout (*Oncorhynchus mykiss*), an exotic carnivorous cold water fish species. Rainbow trout were introduced to the Fisheries Research Centre, which is also in Godavari close to ICIMOD's site, in 1988 from Miyazaki prefecture, Japan. In natural water, this fish lives on aquatic insects, small crustaceans, and small fish, but in captivity it needs high protein quality feed, which increases the breeding cost. Rainbow trout are more expensive than other fish, but they are tasty and easy to eat as they have no small Y-bones. They can live at water temperatures of 0-25°C, with the best feeding habits and growth at temperatures of 13-18°C in water containing more than 7 mg/litre of dissolved oxygen and a pH value of 6.5-8.0. Sufficient water of good quality and a constant water temperature are very important for successful culture of trout. Properly maintained and fed, 5-10g fingerlings can reach a size of 200-300g ten months after stocking. The trout become fully mature after 2-3 years and will then spawn 2000-2500 mature eggs per kg of fish. They breed once a year in winter (December to February).



The demonstration pond at Godavari serves as a means of investigating the precise conditions for maintenance and range of tolerance of conditions, of calculating the cost/profit relationship under these typical conditions for the HKH mid hills, and of demonstrating the methodology to interested groups.