

NATURAL RESOURCE MANAGEMENT PAPER SERIES

Number 5

November 1987

**ANIMAL NUTRITION AND PASTURE FODDER
MANAGEMENT:**

The Case of Mahespur

Bandana Pradhan Kayasta

HMG-USAID-GTZ-IDRC-FORD-WINROCK PROJECT

STRENGTHENING INSTITUTIONAL CAPACITY IN THE

FOOD AND AGRICULTURAL SECTOR IN NEPAL

FOREWORD

This Natural Resource Management Paper Series is funded through the project, "Strengthening Institutional Capacity in the Food and Agricultural Sector in Nepal," a cooperative effort by the Ministry of Agriculture (MOA) of His Majesty's Government of Nepal and the Winrock International Institute for Agricultural Development. This project has been made possible by substantial financial support from the U.S. Agency for International Development (USAID), the German Agency for Technical Cooperation (GTZ), the Canadian International Development Research Centre (IDRC), and the Ford Foundation.

One of the most important activities of this project is funding for problem-oriented research by young professional staff of agricultural agencies of the MOA and related institutions, as well as by concerned individuals in the private sector. This research is carried out with the active professional assistance of the Winrock staff.

The purpose of this Natural Resource Management Paper Series is to make the results of the research activities related to natural resources available to a larger audience, and to acquaint younger staff and students with advanced methods of research and statistical analysis. It is also hoped that publication of the Series will stimulate discussion among policymakers and thereby assist in the formulation of policies which are suitable to the development of Nepal's agriculture.

The views expressed in this Research Report Series are those of the authors, and do not necessarily reflect the views of their respective parent institutions.

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Bandana Pradhan Kayasta*

INTRODUCTION

The agricultural economy of Nepal is a combination of crop cultivation and animal husbandry. Although these two activities are closely associated, each is dependent on a different resource. Crop cultivation is dependent on good land and livestock farming on pasture. Agricultural activity in Nepal is still concentrated on the direct production of food--mostly cereals for human consumption. There is a tendency for more fertile land to be used for crop cultivation, and the most unproductive land--river banks, road sides and very steep slopes--to be used as natural grazing for ruminants. Natural grazing land is in short supply and cannot meet the demands for animal production. What is available is often of poor nutritional value. Good grazing land has been overgrazed. If the quality and quantity of such land continues to decrease and deteriorate, fewer animals will be kept, less manure fertilizer will be produced and eventually crop yields will decline (Poffenberger, 1980).

The Problem

The importance of livestock farming has not yet been fully recognized. Stall feeding is not widespread and the animals have to search for fodder. Neither the Tarai people nor the hill people generate fodder crops of any importance. Most of the grassland and forests are needed to keep the animals at subsistence level.

A large animal population is important to Nepal. There is a need for large quantities of low cost meat and milk, particularly for the rural poor, to meet the growing demand from an expanding tourist industry, and to save precious foreign currency that is being spent on importing powdered milk.

Animals are multi-purpose investments which provide protein foods such as milk and meat, biological energy for traction, organic waste which can be used as fuel and fertilizer, and hides for industrial use.

Pasture fodder, a renewable natural resource, is a basic component of livestock development. There is an interactive relationship between animals and pasture. Animals influence pasture productivity and they, in turn, depend upon pasture quality and quantity.

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Ruminants require both protein and minerals from their feed to maintain reasonable levels of production. They obtain these from fodder and forage crops. The availability of fodder varies according to precipitation levels. This are high in the summer season and yields increase but during the winter months, green fodder is scarce.

The rural communities have always had a good empirical knowledge of how to control natural resource utilization, but traditional methods of resource management and social controls are breaking down, as a result of population growth and outside influences. Therefore, it is essential to develop new methods by which the rural communities can achieve the necessary levels of fodder production, to replace the old. This is particularly urgent in the rural Tarai areas.

Objectives

The general objective of the present study is to assess current practices of animal raising and pasture fodder management adopted by a rural community. Specifically the study aims to:

- assess animal raising conditions;
- explore the available pasture fodder; and
- analyze the impact of socioeconomic problems on animal raising.

Study Area

This is a case study of one Tarai village in Mahespur village panchayat in Bara district. It was chosen because it is an important center of livestock farming, supplying most of the fresh milk consumed by Kalaiya town.

Location. Mahespur village panchayat covers 621 hectares, and lies northeast of Kalaiya town, the headquarters of Bara district. It is separated from Kalaiya by two kilometers of weather road. It is surrounded by Sahajauli, Bhojada, Inarwasisuwa, and Ganjbhawanipur villages.

Physical Characteristics. The village rests on a fertile alluvial plain that is the result of the continuous sedimentation in relatively recent times from rivers flowing from the Himalayas. The soil is a mixture of pale brown clay, loam and sand (Karan, 1960). There is one small river called the Pengarhar, which flows from northwest to southeast. The river is perennial but little water remains in the winter months. The climate is humid and subtropical. The winter is cool (average 15 C) with occasional showers, but the area receives more than 1500 mm of rain during the summer season. Temperatures are high enough (average 35 C), for tropical, moist deciduous plant growth all year round. Much of the forest has already been cleared, except for a few scattered patches of fruit trees around the village. Other species that still exist are sal (Shorea robusta), sissoo (Dalbergia sissoo), khair (Acacia catechu), simal (Bombax malabaricum), amp (Mangifera indica), lichi (Litchi chinensis), katohar (Artocarpus integra), bans (Dendrocalamus strictus), bar (Ficus infectoria), and pipal (Ficus religiosa).

Economic Activities. Agriculture is the dominant economic activity in Mahespur. People subsist on crop production. Grains such as rice and wheat are by far the most widespread. Others include corn, sugarcane, oilseeds, pulses, beans, peas, peanuts, yams, melons and a wide variety of vegetables and fruit. Interculture and multiple cropping is widely practiced. With the former, different beans or legumes are grown in among the pulse, and with the latter, rice is followed by rice again, or wheat or oilseeds.

The farmers are highly dependent on monsoon rain. Various traditional devices are employed to irrigate the fields, rather than the modern tubewell and boring. Farming methods are based on human labor. Agricultural implements are often rather crude and the farms are usually small, so the yield per farmer is low. However, the total yield is enough to meet the needs of the local people. Ninety-eight percent of the total area is under crop cultivation and the other two percent is grazing land (including both government and public grazing land).

Although agriculture is the mainstay of the village economy, it does not provide regular jobs for the farmers all year round, particularly for peasants who have very little land. They go to find jobs in nearby Kalaiya. Most of them were found to be engaged in construction work, loading and unloading, and porter work. In the village, some castes perform traditional jobs such as vegetable farming, fishing, pottery, dairy farming, pig raising, and bamboo basket making.

Population and Settlement. This panchayat has a population of 3447, living in 477 households: an average of seven people per household. The two main villages are Mahespur itself and Sisuwa. The individual farm dwellings are all grouped within enclosures. These clusters usually involve between 40 and 100 households and are called dormitory settlements. It is a striking feature of such farm villages that single, one-family residences are transformed into a one-family village. The social caste system plays a significant role in the formation of these settlements. Castes other than schedule castes, are often grouped together, but schedule caste members are isolated from the main village, and form a satellite village. The many castes and ethnic groups, are mostly of Indian origin (Table 1), resulting in a mixture of habits and customs that are unique to the Tarai.

Table 1. Sample Households by Caste

Caste	Number of Households
Yadav	46
Muslim	25
Shah/Das	10
Kumar	5
Brahmin/Chhetri	6
Others (including Thakur, Mahato, Giri, Chaudhari, Lohar and Chamar	8
Total	100

Source: Field Survey

Literature Review

It is vital to understand traditional resource base strategies of the local people before attempting to develop new management techniques. Traditional measures adopted by village communities serve as a control mechanism for the maintenance and regulation of the relationship between man and nature (Gurung, 1981). It is also important to study the interaction between resource use and the associated social system, taking into consideration the ecological constraints of the bio-logical and physical environments in which they exist. For this, it is essential to know the indigenous methods used by a village community to maintain livestock farming on the available pasture. All this must be researched as a basis for government financial investment and appropriate technological assistance. This study attempts to fill these requirements.

METHODOLOGY

This study is based on primary data collected through a field survey. The data was collected by interviews and observations. An observation schedule was drawn up to discover quantities and types of animal feeds, and water and grazing land availability and location.

Interviews were used to gather information on animal husbandry and pasture management. A sample of 100 households was chosen, and each was given a questionnaire. The form was divided into family information, animal raising habits, fodder management, and social and economic aspects of daily life. Additional information was obtained from local household heads, panchas, and government officers.

Household Selection

Of the 477 households in Mahespur village, a representative sample of 100 households was selected, or approximately one in five. There were 746 people in the sample; 55 percent male and 45 percent female.

Methods of Analysis

This is an exploratory study. Analysis is descriptive, and laboratory works have been attempted. A herbarium was prepared using locally collected fodder plants that had been identified in a laboratory with the help of standard literature on the flora of Nepal and India. Fodder plants were dried in the sun and packed in polythene bags which were then dried again in ovens for 24 hours. They were powdered, making it possible to conduct biochemical analysis of them.

Limitations of the Study

All the households in the sample raised one or more ruminants. They were questioned about problems related to their pasture management. The carrying capacity of pasture is usually measured by comparing actual use with potential of the pasture to support the livestock population. This requires information on pasture productivity, which may be obtained by counting the number of animals being grazed on a particular piece of land. The actual yield of pasture is difficult to ascertain since the grass grows wild and the animals are grazed all year round. No effort is made to cultivate the necessary grasses.

ANALYSIS OF DATA

Utility of Livestock

The prosperity of Tarai farmers depends on the number of livestock available for domestication. Livestock raising is done for socioeconomic and cultural reasons. Animals often form the main capital investment of rural people and multiplying their numbers is an obvious way of increasing one's wealth. Manure production, meat and milk products, and draft power provide sound economic reasons for accumulating animals. Most of the manure is used as a fertilizer on the crops, and the rest is used as fuel. Meat and milk are generally sold, and are major money earners. Bulls and male buffaloes are used to till the soil and pull carts. They are also regarded as status symbols and are revered by the farmers, who recognize their value and role in life.

Livestock Distribution

The sample households owned a total of 817 animals, of which 48 percent were cattle, 26 percent buffaloes, and the remaining 25 percent goats. Fifty households owned both cattle and buffaloes, 41 had only buffaloes, and nine had only cattle. Seventy-two households owned goats. Average livestock holding per household was eight. The estimated livestock population of the whole of Mahespur was 3397 (Table 2). Sixty-five percent of the buffalo population was owned by Yadavs; they also owned 61 percent of the cows and 49 percent of the goats (Table 3).

Table 2. Estimated Livestock Population*

Type of Animal	Number	Percentage
Cow	1889	48.5
Buffalo	1006	25.8
Goat	1002	25.7
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Total	3897	100.0

* Livestock population for the whole Mahespur panchayat is estimated on the basis of livestock holding per sample household.
Source: Field Survey

Table 3. Livestock Distribution by Caste

Caste	Cattle	Percent	Buffalo	Percent*	Goat	Percent
Yadav	243	61.4	138	61.4	103	49.0
Shah/Das	53	13.4	9	4.2	29	13.8
Brahmin/Chhetri	26	6.6	5	2.4	1	0.5
Muslim	31	7.8	32	15.2	45	21.4
Kumar	10	2.5	13	6.2	11	5.2
Others	33	8.3	14	6.6	21	10.0
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Total	396	100.0	211	100.0	210	100.0

Source: Field Survey

Stock Characteristics

Bulls are kept for ploughing and traction purposes and cows are kept to procreate and produce milk. Slaughter is prohibited in Hindu society. There are 396 cattle, of which 16 percent are milch cattle and 43 percent are bulls. It is cheaper to rear cattle than buffaloes. Generally, cattle spend less time being stall-fed and can be grazed for longer periods on marginal common grazing land.

Buffaloes are kept mainly for milk production. Thirty-seven percent are milch buffaloes which are the most important. A striking characteristic is the comparatively high percentage of milch animals that do not give milk; 41 percent of the cattle and 39 percent of the buffaloes. This abundance of seemingly unrewarding stock is a product of the cult of the cow. Another striking feature is the difference in the male/female ratio between cattle and buffaloes, the latter considerably lower than the former. The contrast also lies in the fact that cattle are not slaughtered for meat.

All the animals are local breeds. In the past there has been little systematic effort to produce better quality animals, either by the local people or by the veterinary hospital.

Milk Production

Milk is the chief daily source of income for livestock farmers, but production varies greatly over a given period of time depending upon the percentage of mature stock.

From the sample, 26 households were without either a milch cow or buffalo. There were 144 milch animals in 74 households, producing 357 kg of fresh milk per day (Table 4). The average daily milk yield per milch animal was 2.5 kg. Productivity varies between cattle and buffaloes. The yield per milch buffalo was 3.6 kg, with a maximum of 12 kg and a minimum of 1 kg. This was three times the yield per cow which only reaches 2 kg at the maximum and 0.2 kg at the minimum. The highest producer of milk keeps two buffaloes, which produce 24 kg per day, and the lowest produces only 8 kg from eight cows.

Table 4. Daily Milk Production

Milch Stock	Number	Milk Yield (Kg)
Buffalo	79	282
Cow	65	75*
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Total	144	357

* The milk yield from cows could be higher; some Yadav families leave the milk for their young calves.

Source: Field Survey

Buffaloes contribute 79 percent of the milk and cows 21 percent and daily expenditure per head on feed and herders is much higher for buffaloes than for cattle. The market for buffalo milk is larger and

better established; almost all restaurants were found to prefer buffalo milk for making sweetmeats and tea since its basic water content is relatively low compared to cow milk. This is also an advantage because it can be diluted, thereby increasing the quantity, with less risk of detection. This now often happens both at the initial stage of distribution and at the later stage of consumption. The marked difference in milk production levels also indicates a variation in each family's daily income depending on the ratio of cows to buffaloes that they own. The average daily household income from milk sales is NRs.23.

The quantity of milk produced by each household and each milch animal has been classified into three main groups. Elsewhere, in general the more animals owned, the higher the milk productivity. That is not the case in Mahespur. The 73 percent of households with 89 percent of the total milch stock lie within the lowest production group, 1-4 kg, whereas the eight percent that own only two percent lie in the highest production group (Table 5).

There is variation both in milk production and use among the different castes. The Yadavs are the most significant in terms of production and they also sell the most. They contribute two-thirds of the total production and the other third is shared evenly between the other castes. Yadav milk makes up 51 percent of the total sold; the Muslims sell 20 percent and the rest is sold by the other castes.

Table 5. Daily Milk Production by Household and Number of Milch Animals

Milk Quantity (Kg)	Households	Percentage	Animals	Percentage
1-4	54	73	128	89
5-9	14	19	13	9
Over 9	6	8	3	2
Total	74	100	144	100

Source: Field Survey

Milk is sold every day except Sunday. Table 6 provides information on the various uses of the milk produced. Eighty-five percent is sold; the remaining 15 percent is consumed, particularly by the richer, larger Yadav families. In this panchayat, Sisuwa village contributes 60 percent of the total milk for sale, Mahespur 24 percent, and 21 percent comes from the other villages. Most of it is sold in Kalaiya town.

In addition to selling milk, animal owners earn an irregular income from selling the animals themselves. In most cases the animals sold are goats, sold for meat. Seventy-two households kept goats for this reason. The goats are sold at periodic markets called "Hat Bazaars".

Goat meat is fatty and has less protein than some others, but it is the main meat consumed in the Tarai. Pork is gradually being adopted but buffalo meat is not common despite the comparatively lower price and appreciably higher nutritional content. Muslims eat beef but cannot do so openly in the areas where Hindus live. Only members of the Dum caste keep and sell pigs.

Animals are kept either in open sheds or closed sheds. Over 90 percent of the stock is kept in open sheds in front of, or underneath, the family house; this facilitates taking care of them. Different types of stock are kept separate. Goats are usually kept inside the owners' room at night, and if pigs are kept, they live in khors (pig houses) close to the house.

Milking Practices

Milking is usually done twice a day. Commonly, the calf takes first, which encourages the milk to come down. The calf is then withdrawn and tied to a stand in front of its mother, who is milked. The calf is allowed to remain with its mother for a short period after each milking but where the cow is milked infrequently, it may remain with its mother for a few hours after. This is so especially after the evening milking and the calf is then penned until the next milking. The cow is fed just before being milked.

Milking is often performed in open sheds despite the muddy floors during the wet season and dust in the dry season. Normally, they are cleaned by hand and, very occasionally, water drawn from a well is used. The sheds are cleaned once a day and the dung is collected. Most of the time, the shed and the surrounding area are littered with dirt, dung, straw and muddy ooze.

The leading cause of calf mortality is malnutrition. The milch animals in this area do not produce very much milk, and the owners take as much milk as possible for themselves or to sell. The mouth of a male buffalo calf will be wrapped in small pieces of gunny bags to prevent them suckling. Consequently, they often die.

Health Provisions

There is one Government-operated dispensary at Kalaiya. Its function is not only to treat sick animals and dispense medicines for them, but also to monitor livestock and grazing development. At present, there is no program to breed improved stock, although certain breeds have been tentatively chosen, and to increase the yield of pasture crops. The most common diseases in the Tarai are foot and mouth, liver fluke, mastitis, rinderpest, and numerous worms. Diseases occur more often in the summer. A number of local remedies are used and treatment by the government dispensary veterinarians is free. However, the farmers take their animals for treatment only when the diseases are beyond their capacity to cure. Despite various regulations to do so, no veterinary officer ever visits the sheds to examine the stock.

PASTURE

The Grazing System

Pasture is an integral component of livestock development. Its quality and quantity depend on careful utilization. Better pasture management means maintaining the production of good quality fodder for the longest time possible. Farmers in the Tarai have been using the natural grassland and indigenous fodder trees to feed their livestock, but have grazed them to excess, without allowing regeneration

(Panday, 1982). Tree fodder is hardly available anymore. Some suitable tree types for the area are Badahar (artocarpus lakoocha), Khanyu (figus cunia), Harro (terminalia chebula) and Banjh (quercus incana). In a more commercial age, the local people are asking the Forestry Division at Kalaiya to plant Sal and Sissoo, because of their high commercial value as timber.

The area of grassland is not constant. As a consequence of population growth, much of it has been brought under cultivation. There have been gradual changes in the traditional cropping patterns; the farmers are attracted to cash crops such as bhang and hashish. This not only reduces the extent to which forage crops are grown, but also the total production of basic subsistence crops.

Farmers collect fodder from two distinct sources: naturally growing fodder and cultivated fodder.

Natural Source. Since there has been no effort to cultivate or regenerate pasture crops in the grazing fields farmers depend on the fodder provided by nature. The area receives variable amounts of rain, therefore fodder availability is also variable, particularly from summer to winter. There is sufficient growth of green forage in the fields, road sides, and river banks, during the short rainy season; this provides good grazing from July to September. Two naturally growing fodder grasses are Dubo (cynodon dactylon) and Khar. They are collected primarily from the banks of the terraces. Public pasture lands are open for grazing to all animals. Terrace fodder is the most important private fodder source. Grass growing there is cut and fed to the animals in their stalls.

During the dry season, from October to June, green fodder is not available and the animals suffer. The fodder grasses on grazing land dry up. However, some species grow in small quantities on the road sides, river banks and terrace banks. They are Akti (vicia hersuta), Pipura (lathyrus sativus), Thariya (amaranthus spinosus), and others.

Some of the farmers own their own trees and collect some fodder from them. These include bamboo, simal, sissoo, banjh, pakad, and amala, but they are often considered more valuable for other purposes. However, the fodder they produce is negligible. The leaves of the most productive trees, such as bahar and pipal, are not taken because of religious beliefs. The leaves of the others go mostly to feed goats.

Cultivated Fodder. Farmers also collect fodder from cultivated fields. Just before the start of the rainy season, forage crops such as sawa (Euchlaena mexicana) and janera (Sorghum bicolor) are planted. They are sown at the end of May or beginning of June, and are harvested in August. Most of the fields surrounding the homesteads are used so that the farmers may collect fodder as they need it over the busy summer. There is usually enough fodder for three months. The sawa is also dried to make hay. Maize, cultivated mainly for human consumption, supplies green leaves and straw which is given to the animals.

The farmers practice ley cultivation (using arable temporarily for hay making or grazing), growing grain legumes such as gram, musuro, khesari, tori, and kerau, in alternation with the winter rice crop. The

grain legumes provide very nutritious, high quality feed for the animals, particularly bran. However, only about 20 percent of the farmers grow these crops; most buy oats or sugarcane leaves. The poorer farmers collect weeds from the legume fields.

Besides green fodder, the farmers traditionally feed their animals dried food. Conserving the fodder by drying it is cheaper than buying it and all the by-products of their crops are used. Of these, the straw from rice or wheat is the most important. It is stored in stacks on nearby fields after threshing. The straw is cut into small pieces and stored in the houses for the winter. Part is reserved for other purposes, such as reroofing the house after the monsoon rains. The availability of this fodder depends on the productivity of the crops.

Grazing land is indispensable, despite the other sources of fodder. The animals graze selectively, seeking out the grasses that have a higher nutritional value. As they graze, the dung they produce fertilizes the pasture land, increasing yields. Grazing is also the cheapest way to feed the animals. The animals are allowed to graze on public or government lands called parti zagga, river banks, road sides and uncultivable waste. In this area, they obtain a considerable percentage of their daily nutritional requirement in this way.

Parti zagga occupies only two percent of the total panchayat land; the animal population is 325 per hectare. It is difficult to assess the contribution of natural grazing to livestock rearing. Such land is severely overgrazed leaving little or nothing for the animals for most of the year especially since little effort is made to cultivate fodder grass. Also, while grazing, the animals may expend more energy than they extract from the pasture. Nevertheless, the stock owners are satisfied with the limited output because it requires little input from them. The pressure of livestock on village cultivated land is very heavy since no land can be devoted solely to the cultivation of fodder crops.

Pasture land is generally located near the farm; the distance ranges from two to four kilometers. The animals are put out during the day and taken home again at night. Very occasionally, they continue to graze at night, particularly during the summer. Male cattle, called Bayel, and very young calves are not grazed with the cows; the former are busy all day either ploughing or pulling carts, and very young calves stay sheltered from the heat. All the animal species are grazed together.

In winter, although there is little pasture available, the animals are always put out to graze. Grazing times differ among the livestock. Every day, early in the morning, cattle and goats are led from the corral to graze the range; they remain during the hottest part of the day. All the animals of the village are gathered at one place and are tended by three or four young village members. Stock owners are not involved in driving their own animals to graze. Cattle are grazed for longer than buffaloes. Buffaloes, especially the milch ones, are herded by young boys who ride on them. They usually go out at about 2 pm from their sheds after heavy morning feeds. Cattle spend eight hours a day, on average, grazing and buffaloes only four. Just before they are grazed, the buffaloes are taken to a pond to be scrubbed and left to wallow for an hour. Ordinarily, the herds are supervised by children.

During the rainy summer, most family members are needed to work in the fields. The animals are herded out to grass by at least one family member who is required to look after them and make sure they do not stray onto the cropfield.

In summer, there is much less control over the hours of grazing. Often, the animals graze continuously from morning till evening without any system. However, they get neither sufficient fodder nor nutrients of high quality. The grasslands can be improved with the introduction of fodder grass or legumes and controlled grazing, with a fixed grazing area per animal.

Stock owners also practice the zero-grazing system. This is a very good system for the utilization of natural pasture. The advantage of this system is that the coarse, unpalatable grasses are removed allowing the better ones to thrive. Fodder crops from the nearby fields, and natural grasses from the terrace walls, are cut, carried, and fed to the stock, particularly in the summer. This system provides high yields of nutritious feed to the animals and also reduces over-grazing of the pastures to some extent. Fodder is cut by hand early in the morning or late in the afternoon when it is cool.

Feeds and Concentrates

The yields of milk and meat also depend on the quantity and quality of feed given to the stock. Good feeding is essential to raise the productivity of the stock. Straw and green fodder are used to give bulky roughage. Cereal grains and oilseeds and their byproducts have less crude fiber but are good sources of concentrated roughage. Green maize, sorghum and oats are used to provide maintenance roughage, and different legumes provide productive roughage.

Normally, the animals are stall-fed twice a day. The first feed is given early in the morning and is a mixture of dried fodder (straw) and green fodder in the ration 3:1, and sufficient water. This mixture is called ledi and it is put in a big cement vessel called a nad. The vessel can take up to five kilos of the mixture, depending on its size. This same feed is used for all the stock. The same is given again between 7 and 8 p.m.

The feed for milch stock is of a higher quality. In addition to ledi, they are fed oil cake, pulse bran, crude sugar called mitha, and cereals. All have a positive effect on milk yields. Ledi and small quantities of mitha are also fed to lactating and gestating animals. However, the outlay on feed for cattle is much lower than for buffaloes.

Male cattle are fed by-products of pulses and cereals, and husks, together with ledi. The quantities are necessarily larger than for the other stock. Farmers pay close attention to the productive stock, such as milch animals and males; combined they make up 60 percent of the total stock. The male cattle represent 47 percent, milch buffalo 22 percent, milch cattle 18 and male buffaloes 13 percent. Green forage is never fed to the stock alone. Farmers believe that putting only green forage or a greater quantity of it in the feed may cause diarrhea.

Provision of Watering Points

Watering points are essential. The stock is bathed in ponds and rivers and drink at the same time. This panchayat has four ponds and one small river. The distance to these water points ranges from 250 to 500 meters and they are situated between the villages and grazing land.

Ponds are more useful than rivers for bathing the stock. In the summer, the water level of the river rises and the current is strong, and in the winter it is too low for the animals, particularly the buffaloes, to wallow. However, the lives of the existing ponds become shorter each year. They may all dry up because of the continuous deposition of soil from the rim of the ponds. Maintenance of the ponds is virtually non-existent, and no vegetation is grown on the slopes of the ponds to discourage mud slides. Continuous grazing is allowed there.

Problems and Prospects in Livestock Development

All the stock are local breeds. The general pattern of livestock rearing is very haphazard and no well-defined plans for nutrition, breeding and general management are observed. Growth rates, reproductive rates and milk production are comparatively lower than those for animals in temperate areas. There is very little traditional use of cattle other than for draught purposes. It is hard to convince farmers to change from traditional practices to improved ones even when it can be shown that this is worthwhile. One of the major obstacles to successful livestock development are the religious objections to animal use and slaughter.

Development is essential to improve the quality of life of the local people. Equally important is to realize the geo-economic situation of the area. The veterinary office distributed five Jersey breeds for trial in this district but all died within a year. It plans to distribute some more although the climate of the Tarai is not suitable for them and the local people do not like them because they do not have a well developed hump on their back like the local male cattle, that enables them to pull a plough and cart.

Some of the local farmers are not interested in adopting any new and improved breeds of cattle and buffalo, for example, Haryana cattle and Murrah buffalo. These breeds are suited to the local climate, but the office could not persuade the farmers to try them out. The staff of the veterinary office reported that only five to ten percent of the total stock in the district is Murrah. Most people want to have local breeds because they cannot afford the improved breeds; they are comparatively more expensive and need more time devoted to them. They are interested in keeping goats because of the low cost and time involved.

The farmers who have land that cannot be cultivated successfully are more interested in introducing improved pasture fodder crops. They want to improve the pasture or fodder species so that they are more resilient to the climate and soil of this area and which would provide not only more feed per unit area compared with natural grass but also feed of a higher quality. Such varieties include lablab beans, berseem, leucaena and lucerne.

Many years ago, the veterinary office distributed an improved variety of oats (taken from Khumaltar, Kathmandu) but now it has stopped. It is more concerned to provide breeds and improved fodder suitable for the local area, and also to the needs and desires of the local people. The Agricultural Development Bank is equally concerned with these problems but there is little provision for loans for livestock development in this area. Currently the Bank has provided loans to farmers who have at least ten buffaloes, and live in northern parts such as Nijgarh, Bharatganj, Mahendranagar and Dumargarh. They are all associated with the Dairy Development Corporation.

In spite of many shortcomings, the Tarai's rural livestock farming will probably expand and improve. The increasing population, urbanization and milk consumption across the country should provide a sufficiently large market to generate rapid development of livestock farming.

SUMMARY AND RECOMMENDATIONS

Summary

Livestock farming is indispensable in the agriculture dominated economy of rural areas. The local people keep ruminants for manure, draught power, milk and meat. Male cattle are kept for ploughing and traction and the females produce calves and milk. The slaughter of cows is prohibited. Buffaloes are kept mainly for milk production and goats for meat. Forty-three percent of the animals are bulls, 37 percent are milch buffaloes, with only 16 percent milch cattle. The cattle population is more than three times the buffalo population. Goats were kept by 72 out of 100 households. Most farmers earn extra income from selling milk and milk products, with the Yadav caste dominating the market.

The production of livestock is dependent on the quantity and quality of the pasture available for grazing. There is no tradition of growing pasture and the animals depend on naturally growing pastures for all their grazing needs. Over-grazing is inevitable.

Agricultural land is used mostly for crop cultivation. Pasture production on cultivated fields is insignificant. Commercialization of land use is a major factor in the misuse and wastage of land. The system of drying and storing fodder is good but dried fodder straw mixed with only a small quantity of green fodder, given all year round, does not provide sufficient nutrients. Most farmers graze their animals naturally and practice zero grazing but often the least important stock is left grazing everyday from morning to evening in the grazing field. These animals get neither sufficient feed, nor nutrients of high quality. Ruminants require both grazing and balanced stall-feeding to increase production.

Livestock density is high in the mixed farming economy of the Tarai and some farmers are interested in extending their livestock farming to breeding the productive Murrah and Haryana ruminants, and improving and conserving the pastures.

Recommendations

The local breeds are low producers mainly because weak traits have been inbred, and because they are given poor quality feed. The first prob-

Jem can be solved by introducing improved breeds. The livestock department should take into consideration the desires and needs of the local people, but at the same time encourage them to use new, improved breeds. Jersey cattle are not suited to the tropical climate of the region, but if it is crossed with the local breed it may be possible to produce an animal that enjoys the climate, has high productivity given the limited resources available, and still retains a well developed hump on its back. Murrah buffaloes, which produce large quantities of milk and have a high reproductive capacity are now in demand, and male Murrahs are good for cross-breeding. The demand for Haryana cattle is also increasing in this area.

The quality of the feed must be improved and increased. This can be done by encouraging the farmers to grow pasture fodder crops such as berseem, leucaena and lucerne on their own land. Cultivated pasture is more reliable nutritionally and constantly replaced. Moreover, the existing grazing pasture can also be improved by controlling the number of animals allowed on a certain piece of land and the number of hours they graze. The number of animals is based on the estimated carrying capacity of the land, but should also take into account the needs of the animals, that are essential to the local economy.

The present study has explored the existing condition of livestock farming and grazing, but the work has only been partly completed. It demands more research work into the carrying capacity of the land, pasture cultivation and the habits and traditions of the local people. This will provide a more reliable basis for livestock planning.

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