

Chapter One

Introduction

Bhutan is located in the eastern part of the Hindu Kush-Himalayan region (HKH). Precipitation in many parts of the country is considerably higher than in most other parts of the HKH. Nevertheless, Bhutan shares many of the vegetation, climatic, and socioeconomic characteristics of its immediate Eastern Himalayan neighbours, especially the south-eastern Tibetan region of China and the Sikkim and Arunachal region of India. As in many parts of the HKH, Bhutan's livestock production systems are largely based on natural grassland resources. However, sentiments against culling animals have limited the scope for the meat industry and for selective breeding, as in much of the Buddhist region of the Tibetan Plateau.

Bhutan also has many unique features.

- It is the only country in the HKH region that is exclusively mountainous.
- As a result of its low population density, the landholdings in Bhutan's temperate belt are generally larger than in other HKH countries.
- It has a much higher proportion of forest cover and a remarkable biodiversity.
- It possesses a great diversity of agricultural production systems.
- Its domesticated bovine species are diverse: they include yak (*Poephagus grunniens*), cattle (*Bos taurus* and *Bos indicus*), mithun (*B. frontalis*), and buffalo (*Bubalus bubalus*), which are raised under a diverse array of animal husbandry systems.
- Bhutan initiated development activities relatively late compared to other countries in the region.
- Unlike in most other HKH countries, the population living in the mountains is in the majority. This has led to a strong commitment on the part of the government to work with mountain farmers and herders to improve their livestock production systems.

Bhutan is a small country and has only limited resources to invest in research and the development of fodder resources. In spite of this, the well-focused research activities on temperate production systems carried out during the 1970s and 1980s have had a substantial impact on livestock production systems in the country. These achievements have been recognised by forage and livestock specialists from neighbouring countries, and some of the experiences and technologies will be of interest to forage and livestock specialists and others interested in fodder resources development in other parts of the HKH. This book focuses on the experiences and achievements related to fodder production, rather than those concerned directly with livestock. Those in temperate regions may be interested to learn from Bhutan's experience with seed production systems and methods for establishing temperate fodder species, with forage systems using willow in combination with white clover, or with using turnip and

pumpkin for fodder in mixed livestock farming systems; those in sub-tropical regions will find useful experience with plantation systems such as citrus and mango combined with fodder peanut (*Arachis pintoi*). Last but not least, many will be interested in the way in which livestock, crops, horticulture, and forestry are integrated in a single research and extension system across the country – an approach that could be usefully replicated elsewhere at mountain research stations and lower level administrative units such as at the district level, even if not on a country-wide scale.

Fodder resource development in Bhutan

This publication is the result of a review carried out from 1996 to 1998 by the Renewable Natural Resources Research Centre (RNR-RC) in Jakar, Bumthang to evaluate and document 30 years of research and development activities in Bhutan's fodder resource sector.

The early 1960s saw rapid changes in Bhutan with the building of roads, the introduction of a modern school system and a policy limiting land ownership. At the same time, government sponsored programmes were initiated to provide support for farmers in livestock development (Tenzing 1978). These programmes gathered momentum with the creation of a separate Animal Husbandry Department (AHD) in 1963.

Early on it was recognised that any improvement in livestock production depended on improving the quantity and quality of fodder resources. Yet it was only in 1974 that the first methodical feed and fodder research and development activities were initiated (Roder 1996a) by the Dairy and Forestry Project in Bumthang (later Rural Development Project). Thus the bulk of the information used in this review originates from documents written from 1975 onwards (Figure 1).

The commitment and support for fodder development grew steadily throughout the Fifth and Sixth plan periods (1981-1992) with strong inputs from various donor agencies. During the second part of the 1980s the number of research activities decreased whilst support for extension increased.

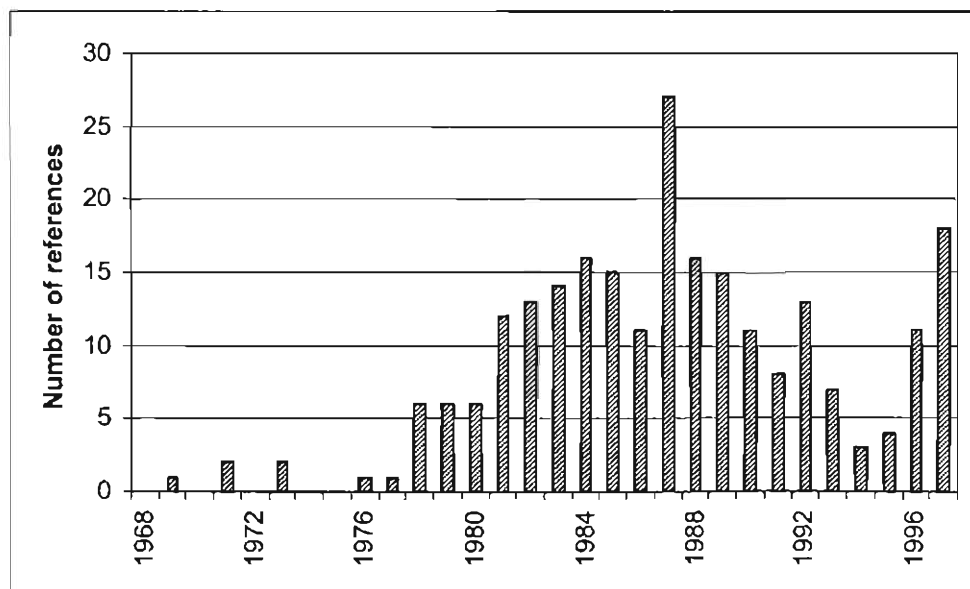


Figure 1: Publications on livestock development in Bhutan with an emphasis on fodder

The number of research activities only started to increase again after the 1994 reorganisation of the Ministry of Agriculture. At this time a new research network was put in place, with a strong commitment to the decentralisation of responsibilities and the integration of all disciplines into regional institutions. Considering these changes and the fact that the Government sponsored research and development activities in livestock production and fodder resources had been running for over 20 years, a need was recognised to review activities, experiences and achievements. To respond to this need the RNR-RC Jakar carried out this review with the following objectives.

- To list and summarise all references relating to fodder resources in Bhutan
- To describe existing fodder resources and their management
- To summarise and analyse past research and extension activities in fodder resources and their management
- To assess the impact of these activities at the farmer level
- To build up a reference base for the planning of future research and extension activities

The information obtained from the many references was supplemented with information collected from surveys carried out between 1996 and 1998 on:

- winter feeding practices of farmers with milking cows (in Bumthang dzongkhag [district]);
- rice paddy straw treatment (farmers assessments were collected and the impact of extension activities were measured in selected dzongkhags);
- fodder trees (the importance of tree fodder, the species used, and the impact of extension activities were measured in selected dzongkhags); and
- fodder resources and fodder development (farmers assessments were collected and the impact of extension activities were measured in selected dzongkhags).

This document provides substantial information on the management of grassland and fodder resources by summarising the available documentation. Some comments and opinions have been included by the authors of this review, but these do not necessarily reflect the views of the original authors of the documents that are reviewed.

Socioeconomic background information

Bhutan's economy is strongly influenced by its historical and geographical isolation and remains largely agrarian. Over 80% of its population are involved in agriculture-related activities, and contribute about 41% towards the GDP (PPD 1996). The traditional farming system was strongly influenced by Bhutan's isolation, which required almost complete self sufficiency in food. This was achieved by extensive investments in terracing and irrigation systems and by using labour intensive cultivation practices.

Land use is influenced by climate and topography. Due to Bhutan's mountainous character only a small percentage of its area is suitable for agriculture (Table 1). The main crops that are cultivated are, in order of importance, maize, rice, millet, wheat, buckwheat, potato, mustard and barley.

In 1996 it was estimated that there were 65,000 farming households in Bhutan with an average household size of seven persons (PPD 1996). At that time the country reported a total population of approximately 600,000 (rural and urban). The average landholding size was 1.5 ha with 10% of households having more than 5 ha. Rice is cultivated on small terraces on slopes with gradients of up to 80%. The steep topography and market inaccessibility favour livestock production, especially in regions lying above 2,000m.

Table 1: Land use and livestock statistics

Land use ¹	Area ('000 ha)	% of country
Forest	2,904.5	72.5
Lowland rice	38.8	1.0
Upland agriculture (maize, wheat, barley, buckwheat)	181.7	4.5
Shifting cultivation ('tsheri' & 'pangshing')	88.3	2.2
Horticulture (apples, oranges, cardamom)	5.8	0.1
Natural grassland	155.3	3.9
Improved pasture	1.1	<0.1
Total land area	4,007.7	100
Livestock (1995 data)^{2,3}	Numbers ('000s)	
Cattle	305.0	.
Buffaloes	1.0	.
Yaks	30.2	.
Equine (horse, mules, donkeys)	25.8	.
Goats	16.0	.
Sheep	31.3	.

Source: ¹MOA 1997a; ²MOA 1997b

³ not including pigs and poultry



Figure 2: Traditional livestock products: cheese and butter wrapped in rhododendron leaves

resources are specified in the Land Act (RGOB 1991). This legislation specifies that permanent grazing lands (tsadrog) are registered as a specific land-use class and cannot be diverted to other uses. Over the past decades, several amendments to the legislation have been formulated to facilitate livestock production (the animal by-laws) and the development and use of the fodder resources (draft pasture policy). Following the Land Act, all registered grazing lands belong to the state and herders only have the grazing rights.

¹ The first spiritual and political leader who unified Bhutan.

Livestock production is very important in all Bhutanese farming systems. The large variations in environmental conditions across the country result in a wide range of livestock production systems, ranging from the high altitude transhumance yak system, to systems in which animals are only used for draught and manure purposes. The present livestock production is estimated to contribute about 8% of Bhutan's GDP (Figures 2 and 3). In 1996 milk production was estimated at 10,600t per year (PPD 1996). Since the beginning of the 1980s, programmes to crossbreed local cattle with Jersey and Brown Swiss cattle have had a substantial influence on the structure of the cattle population, the management systems, and milk production.

A number of authors have referred to the socioeconomic factors that affect livestock production and the management of fodder resources (Marakham 1876, Fischer 1971; Wangmo 1984; Roder et al. 1987; Guenat 1989; Caron 1994; Dorjee 1995; Gyamtsho 1996). Information is available on transhumance yak production systems (Wangmo 1984; Gyamtsho 1996), cattle production systems (Fischer 1971; Guenat 1989; Ura 1996), and sheep farming systems (Gyamtsho 1996).

Bhutan's legal code is based on an ecclesiastical system initially established by the first Shabdrung¹ in the 17th century. Rules and regulations guiding the use of land



Figure 3: A herder milking a yak

Early records (before 1975)

Isolated by geographic and self-imposed barriers, Bhutan experienced little or no outside influence until the second half of the twentieth century. Bhutan's rugged topography, its low population density, and its geographic isolation favoured livestock production. Bhutanese farmers and herders have followed traditional practices in well-adapted subsistence farming systems. In the absence of any systematic government-sponsored research and extension programmes, farmers and herders depended on their own curiosity and ingenuity to assess and adopt new technologies from neighbouring regions or develop technologies themselves (Roder et al. 1987). Changes generally took place slowly. A strong impact on the livestock population came about through crossbreeding programmes with mithun cattle (*Bos frontalis*), which probably began about a hundred years ago. Until 1960, government interventions were largely

restricted to tax collection and regulating land ownership (Roder et al. 1987; Ura 1996). For most families livestock and property were the only investment opportunities.

The earliest accounts of Bhutan's vegetation are those given by Griffith (1839) and Schweinfurth (1957). Griffith's travelogue of his 1838 journey gives an interesting glimpse of Bhutan's vegetation along a route leading from Eastern Bhutan through Bumthang to Thimphu (1839). Griffith made a few remarks about cattle management. He was surprised by the poor condition of the animals and the poor feed provided to them. Records from other early travellers give us some insights into agricultural and herding practices (Kuloey 1865; Marakham 1876). However, they rarely discussed the vegetation cover or other aspects that relate to livestock fodder. White (1909) made some interesting observations about forests and suggested that the Bhutanese had acquired the secret of combining the regeneration of forests with unlimited grazing.

Prior to 1960, most grazing lands and a large percentage of the cattle and yaks were owned by a few prominent families and by the monasteries (Roder et al. 1987). Grassland use and livestock management were largely influenced by these owners of the large, migrating cattle herds. Data from 1837 show livestock commodities such as ponies, yak tails, and musk as among Bhutan's most important export items (Table 2).

Table 2: Bhutanese products exported to India through Rungpore in 1837

Product	Unit	Quantity	Value ² (Rs)
Hill ponies	no.	100	3,500
Yak tails	maunds ¹	4	160
Musk	no.	50	100
Wax (bee)	maunds	30	1,000
Walnuts	no.	50,000	125
Lac	maunds	10	100
Madder – a plant product used as dye	maunds	500	1,500
Blankets	nos.	300	600

¹ Approximately 40kg, ² Indian currency as valued in 1837

Source: Kuloey 1865

Following visits to Bhutan in 1969 and 1971, Fischer (1971) recommended the following measures to improve livestock production:

- clear pasture areas of brush and other weedy vegetation;
- divide grazing lands into smaller units and fence them with hedges (he recommended using evergreen oak, *Quercus semecarpifolia*, and said that some of the hedge plants could be left to grow into trees);
- cultivate grasses and other suitable herbs as cattle fodder;
- avoid using imported fertiliser;
- keep cattle in stables and use the dung as fertiliser; and
- introduce silage making (the author suggested that hay making may not be possible because of the wet monsoon climate).

Despite the clear historical record of the importance of livestock in the local economy, the Royal Government of Bhutan (RGOB) did not begin concerted efforts in livestock or fodder development until the 1970s. This was because the government had no advisory or research establishment for agriculture or livestock prior to the establishment of the modern government system in 1961.

Product	Unit	Price (Nu.)	Quantity (kg)	Total Value (Nu.)
Wheat	kg	100	100	10000
Maize	kg	80	100	8000
Barley	kg	60	100	6000
Oats	kg	50	100	5000
Hay	kg	40	100	4000
Silage	kg	30	100	3000
Other	kg	20	100	2000
Total				38000