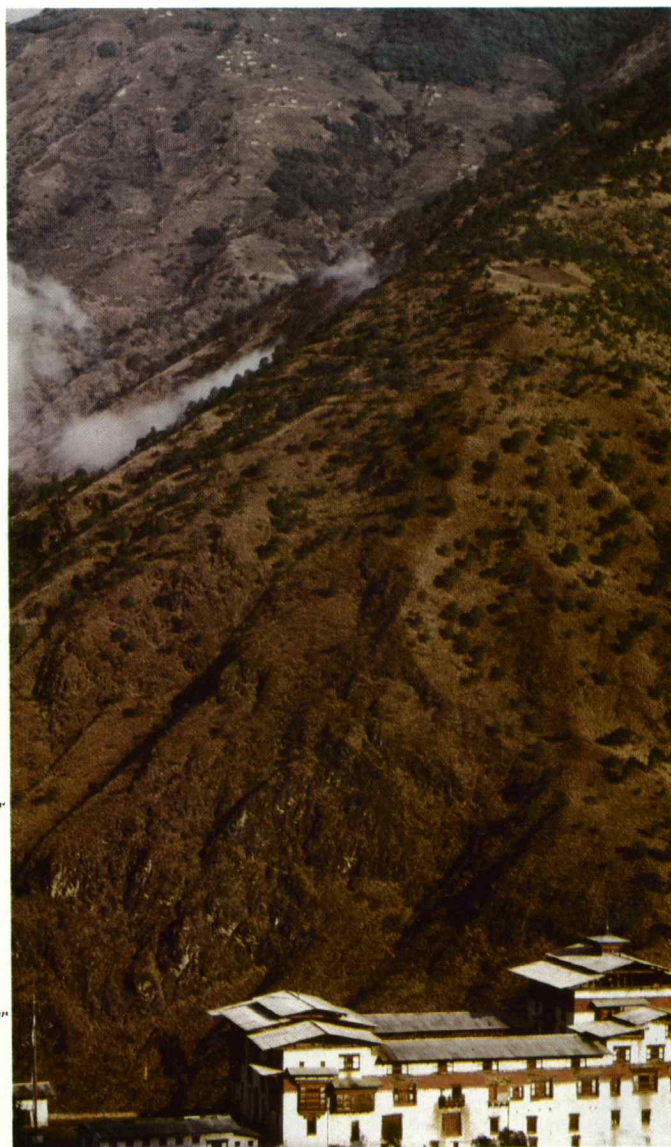


Rangelands of the Himalayan Kingdom of Bhutan

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Bhutan, known as the "Thunder Dragon Country," is a tiny, independent kingdom tucked into the Himalayan mountains just east of Nepal. Situated between India and the Tibetan Autonomous Region of China, the country of Bhutan is almost entirely mountainous. Hills rise steadily from subtropical plains at an elevation of 700 feet along the Indian border in the south to snow peaks over 25,000 feet on the Tibetan frontier. Over half of the land area of Bhutan is forested and it is estimated that grazing land comprises ten percent of the total land area. This paper is an attempt to acquaint readers with the livestock production systems and rangeland ecosystems of the Himalayan Kingdom of Bhutan.

Bhutan's rugged topography has kept the country relatively isolated from the rest of the world for centuries. It is only recently that this Himalayan kingdom has opened its gates to foreigners and I was fortunate to be able to visit the country while on an assignment as a range management specialist with the Asian Development Bank. For five months



The fortress of Tashigang, Bhutan, built in 1642. Subtropical grasslands on the hillside in the distance.

in 1985 and 1986 I travelled throughout much of the country evaluating the rangeland resources and their potential for development. The travels took me from steamy, tropical jungles, through the heavily forested mid hill regions where a type of slash and burn or swidden agriculture is practised to alpine rangelands at over 15,000 feet grazed by herds of yaks.

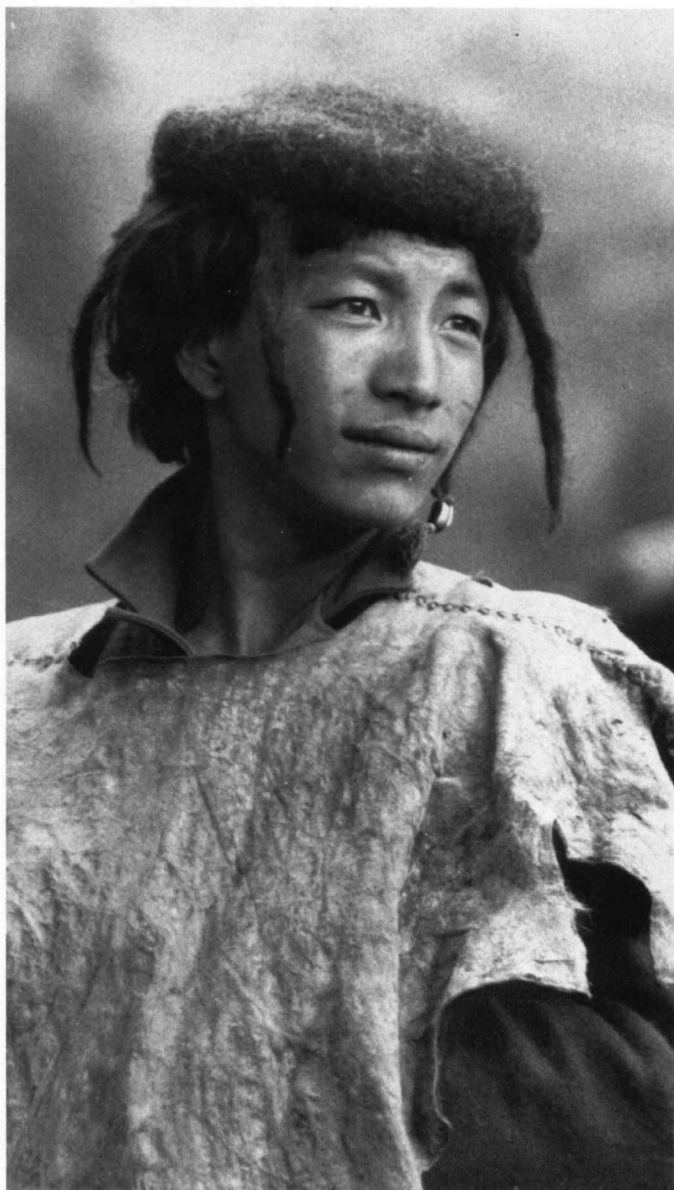
Bhutan is a land-locked country with an area of about 16,000 square miles and a population of 1.2 million people. Per capita income in Bhutan, at about \$116, is among the lowest in the world. The economy is heavily dependent on agriculture and animal husbandry, which provide the main livelihood for about 95 percent of the population.

Livestock are an indispensable part of the agricultural production system in Bhutan. They provide almost all the power for cultivation and their dung is extensively used for composting. In addition, livestock provide essential items of subsistence food such as milk, butter, cheese, and meat for

the farming communities. Yaks, horses, and mules are also used as pack animals to transport goods through a mountainous country where very few roads exist.

Livestock production in Bhutan is centered to a large extent around milk production. Milk products have traditionally been an important part of the diet and they are consumed at most meals. A tea made with yak butter is consumed in large quantities and a cottage cheese like product prepared with a lot of chile peppers is eaten almost daily.

Yaks are an important component of the pastoral system in Bhutan, especially in the highland regions. Yaks and yak-cattle crosses provide milk, butter, cheese, and meat for home consumption and are also exchanged or sold in order to obtain food grains and other necessities. In many regions of the country large herds of yaks are raised by nomadic herders who have no permanent habitations or cultivated land. These herders, however, do follow well defined tradi-



Yak herder from Sakten.

tional transhumant routes on their movements from one grazing area to another. These nomad yak herders live most of the year in large black tents woven from yak hair.

Most farmers in Bhutan keep cattle to provide milk products for home consumption, draft power for cultivation, and in order to obtain manure for use as fertilizer in crop production. The predominate breed is Siri cattle, a slow maturing *Bos indicus* animal of small size. Mithun cattle, *Bos frontalis*, are used for cross breeding with Siri cattle to produce hybrid animals that are in demand because they can reportedly forage better than local cattle in forested areas.

In recent years the government of Bhutan has introduced exotic breeds of milking cattle, mainly Jersey and Brown Swiss for cross breeding in order to increase milk production. These improved animals require better management and higher quality forage that is generally not available yet on the average Bhutanese farm.

The most important infectious disease reported in livestock in Bhutan are foot and mouth disease, haemorrhagic

septicaemia, black quarter, and anthrax. Rinderpest outbreaks occur occasionally along the border with India. Internal parasites are a major problem in most livestock, with liverfluke and nematodes being particularly common in cattle and sheep. Ticks are prevalent throughout the country and leeches often create problems for livestock during the summer monsoon season.

There is an estimated one million acres of grazing land in Bhutan. Rangeland resources vary from subtropical grasslands along the Indian border and low elevation mid hills to temperate grasslands and alpine rangelands above 13,000 feet. In addition, forested areas provide a major part of the grazing for livestock and valuable forage from fodder trees.

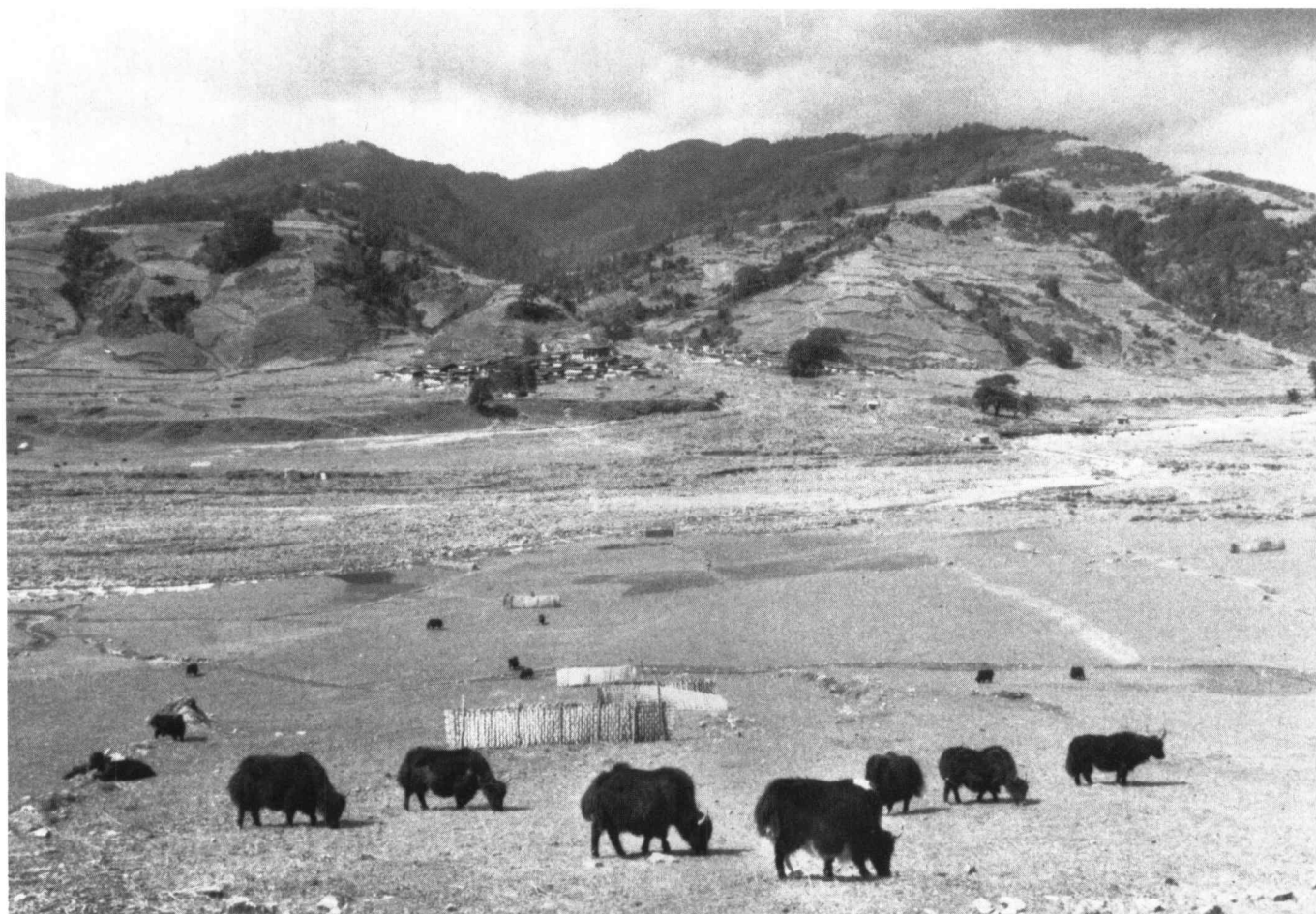
In the subtropical regions of the country farmers maintain cattle and mithun-cattle crosses on native grasslands and in forests around villages. Crop by-products are also an important source of livestock feed. There is little improved pasture and in general the subtropical grasslands are poor in forage quality. During the winter large migratory herds of cattle are brought down out of temperate areas where they have spent the summer to subtropical grazing lands at lower elevations.

On drier sites at elevations of 3,000 to 5,000 feet large areas of Bhutan are dominated by lemon grass-tanglehead grass, *Cymbopogon* sp.—*Heteropogon contortus* grasslands. These subtropical grasslands are often savannas associated with chir pine forests. Many of these grasslands are regularly burned. These grasslands are very extensive in the Punakha and Wangdiphodrang region in central Bhutan and around Lhuntshi and Tashigang in eastern Bhutan, especially on south facing slopes. Other commonly encountered genera in the subtropical zone are: *Apluda*, *Arundinella*, *Bothriochloa*, *Chrysopogon*, *Digitaria*, *Eulalia*, *Oplismenus*, *Panicum*, *Paspalum*, *Pennisetum*, *Saccharum*, *Sporobolus* and *Themeda*.

In the temperate zone at elevations of approximately 7,500 to 9,500 feet there are extensive grasslands dominated by an Old World Bluestem, *Schizachyrium delavayi*. These grass-



Wild gaurx, captured by villagers near Sakten and used by villagers for cross breeding with local cattle.



Yaks and grazing land at 11,000 ft in Sakten, eastern Bhutan.

lands are often associated with Himalayan blue pine forests and there are good examples of these bluestem grasslands around Bhutang (8,600 ft.) in central Bhutan and between Paro and Thimphu (7,800 ft.) in western Bhutan. Grass genera often found in these grasslands in the temperate zone include: *Agrostis*, *Arundinella*, *Brachypodium*, *Bromus*, *Eragrostis*, *Elymus*, *Festuca*, *Helictotrichon*, *Pennisetum* and *Themeda*.

Timberline is encountered at about 13,000 feet in Bhutan. In the subalpine and alpine zones there are extensive rangelands throughout the country that are grazed by domestic yaks. These high elevation grasslands also provide habitat for wildlife such as blue sheep, takin, and musk deer. Subalpine and alpine grasslands in many areas of Bhutan are dominated by oatgrasses, *Danthonia*. Needlegrasses, *Stipa*, are also very common as are species of wild ryegrass, *Elymus*. Other commonly found genera of grasses in these high elevation rangelands include: *Agrostis*, *Anthoxanthum*, *Bromus*, *Calamagrostis*, *Festuca*, *Helictotrichon*, *Oryzopsis*, *Poa* and *Trisetum*.

In some parts of Bhutan fire is used to control rhododendron shrubs in subalpine rangelands. Fire has also been used to expand grazing land by burning subalpine Himalayan fir forests. Many of the rangelands in Bhutan have been subjected to years of heavy grazing and production has been reduced in recent years in some areas.

The Department of Animal Husbandry in Bhutan has initiated work with introducing improved pasture forages for hay production and intensive grazing throughout the country. However, the proper management of rangelands has largely been ignored so far. This is compounded by the fact that there is a shortage of personnel trained in the science and art of range management in Bhutan.

Throughout my stay in Bhutan I found the government officials in the Department of Animal Husbandry and the Forestry Department to be intelligent, energetic persons concerned about resource conservation and the proper development of their country. Bhutanese need to receive training in the principles of range management and there is an urgent need to begin investigations on rangeland ecosystems in Bhutan so that these resources can continue to support the livestock industry which is so important to the country.