

# TRANSHUMANT PASTORALISM IN YAK PRODUCTION IN THE LOWER MUSTANG DISTRICT OF NEPAL

*A. Allan Degen, Michael Kam, Shambhu B. Pandey, Chet R. Upreti, Sanjeev Pandey and Prajwal Regmi*

## Abstract

There are thirty yak herd owners, all men and mainly Thakalis, between Jomsom and Lete in Lower Mustang. Transhumance is used in herding yaks, which migrate seasonally between winter pastures at about 3,000–4,000 metres and summer pastures at about 4,000–5,000 metres above sea level. Absentee herd ownership, in which shepherds (usually members of a non-Thakali ethnic group) herd only yaks and do not own any animals themselves, is common. Yaks are raised primarily for meat and milk, though substantial income is realized from selling blood during two blood-drinking ceremonies and from selling yaks as pack animals. Milk is used for products such as butter/ghee and a dry, hard curd cheese (*chhurpi*), which are mainly sold but also used for home consumption and for making 'salty butter tea'.

Yak wool has little commercial value today but is used to make rope and tents. Yak owner estimations of how much of their income is derived from their herds range widely between 10 percent and 90 percent, but average about 50 percent. Additional income is made from the sale of seasonal crops, in particular apples, potatoes, maize, millet and barley that are produced on the owners' land. Owners also raise chickens, cows, buffalo, oxen, horses and goats. Two of the herd owners owned hotels that were run by their families. In this study, annual earnings from yaks totalled approximately Nepalese Rupees (N.Rs) 72,780 and total income for the herd owner was about N.Rs 145,560 (U.S. \$2,079).

We concluded that for these herd owners, yak raising is not a subsistence economic activity but rather part of a market economy based on speculative investments and accumulation. Moreover, yak production is a very high-risk enterprise as disasters can decimate large proportions of a herd quickly.

**Keywords:** Nepal, yaks, transhumant pastoralism, Lower Mustang, absentee herd ownership

## Introduction

Economies in mountain societies are often based on livestock production which, in general, entails covering large distances to suitable pastures. In the Himalayas, in particular in remote areas, yaks are often the livestock of choice and can be a

symbol of wealth (Wu 2006). Yaks are generally raised by transhumant pastoralism, which Kreutzmann (2004) defined as ‘seasonal migrations of herds between summer pastures in the mountains and winter pastures in the lowlands’.

The value of yaks in high mountains is well illustrated in the Langtang Valley in Nepal and on the Tibetan Plateau in western China. In the Langtang Valley, yaks and hybrids account for 79 percent of all domestic livestock, sheep for 15.5 percent, horses for 3.5 percent and goats for 2 percent (McVeigh 2004). McVeigh (2004: 109) states that ‘yaks and yak-cow hybrids dominate Langtang’s pastoral landscape. They are by far the most important domesticated animal in terms of absolute numbers owned, the number of households who own them, the economic contribution they make to the household and village economy, and the social arrangements necessary to maintain them’.

On the Tibetan Plateau, Tibetan nomads raise yaks and their hybrids, sheep, goats and horses (Miller 2000). According to Miller:

[A]lthough Tibetan Nomads also raise other animals, they place so much value on the yak that the Tibetan word for yaks, *nor*, is also translated as wealth. The yak makes life possible for man in one of the world’s harshest environments. There is little doubt that the presence of wild yaks, and their later domestication, was the single most important factor in the adaptation of civilization on the Tibetan Plateau. (2000: 89)

## **The Yak**

The yak (*Poephagus grunniens*) belongs to the family *Bovidae*, together with bison (*Bison*), buffalo (*Bubalus*) and cattle (*Bos*), and is the only species of its genus. Initially, the yak (the female is called ‘nak’) was named *Bos grunniens* due to its relationship to cattle, but was then placed into its own genus, *Poephagus*, because of its distinctness from other bovines (Zhao 2000a). However, there is still some confusion concerning its nomenclature. Many authors still refer to the yak as *Bos grunniens* (Zi 2003) while some simply use both genus names interchangeably (Han et al. 2002).

Yaks originated in high mountainous regions bordering the Himalayas, such as in Nepal and the Tibetan Autonomous Republic. They were first domesticated most likely in the Stone Age by the ancient Qiang people on the Qinghai-Tibetan Plateau about 10,000 years ago; archaeological proof of domestication dates back approximately 5,000 years (Cai 1996; Luo, Gu and Aireti 1997; Weiner, Han and Long 2006). Today, yaks are found in the mountainous highlands of central Asia at 2,500–6,000 metres above sea level, between 70° and 115° of east longitude and between 27° and 55° of north latitude. Wild yaks still exist in remote areas of the Tibetan plateau and adjacent highlands, and a few exist in the Chang Chenmo Valley of Ladakh in Eastern Kashmir, India. However, in 2002, there were likely fewer than 10,000 in total (IUCN 2002). It is estimated that there are about 14.7

million domesticated yaks spread across areas of Nepal, China, Bhutan, Mongolia, Southern Russia, Tajikistan, Kyrgyzstan, Myanmar, Pakistan and Afghanistan, with about 95 percent (fourteen million) of these in China alone (Hong et al. 2004).

According to Wiener, Han and Long (2006), there were 38,000 yaks in Nepal in 2000. However, Joshi (2006) reported that there were only about 20,000 yaks and 40,000 yak hybrids in the eighteen alpine districts of Nepal. The high rate of interbreeding most likely creates some of the confusion in identifying the number of pure yaks. Joshi (2006: 316) states that in 1961 there were 200,000 yaks and hybrids, but the number of yaks has been decreasing due to 'government restrictions on livestock numbers and movement in Nepal's national parks'. In addition, grasslands have become less productive and the Tibetan border has been closed, which has had a deleterious impact upon the number of yaks in Nepal (Bauer 2004).

#### *Uses and Adaptability of Yaks*

The yak is a multi-purpose animal and is indispensable for people living in mountainous regions, as it produces valuable products such as milk, meat, hide, hair and dung and is also used as a pack animal and for draught purposes. In addition, its blood is drunk by some people as it is believed to possess medicinal value (Vinding 1999). The importance of yaks in the high mountains was well expressed by Dong, Long and Kang (2003: 86), who suggested that 'without yaks, it is doubtful whether man could survive on the harsh, high-altitude grazing lands of the Plateau (Qinghai-Tibetan Plateau of China)'.

The yak is adapted excellently to both high altitude and extremely cold environments. High altitude does not affect energy requirements and low air temperatures actually decrease energy requirements of yaks (Han et al. 2002). Its ability to survive under extremely cold temperatures is aided by its thick hide, subcutaneous fat and long, thick hair. Furthermore, because of its relatively large heart and lungs and high erythrocyte count, the yak can tolerate the low oxygen levels at high altitudes.

#### *Yak Reproduction*

A low reproductive rate is the primary limiting factor in yak production, as only 40–60 percent of mature yaks reproduce annually (Zi 2003). Yaks are seasonal breeders with mating taking place in the relatively warmer months of the year from mid-July to early November, which coincides with the period of peak forage growth. Puberty usually occurs in the second to fourth warm season after birth, that is, between thirteen and thirty-six months of age. The estrous cycle is approximately twenty days and estrus usually lasts less than two days, although a wide range of values has been reported for both the cycle length and duration of estrus (Yu, Huang and Chen 1993; Zhao 2000b; Zhang 2000). Females are usually mated for the first time when they are three to four years of age. They

produce four to five calves in a lifetime, usually calving once every alternate year. Occasionally, they calve once every three years when nutrition is poor but can calve twice in three years. Length of gestation is approximately 258 days.

The onset of breeding is affected mainly by the body condition of the naks, prevailing ecological factors such as climate and forage availability and geographical location, specifically altitude. Naks with relatively good body condition come into estrus quicker than naks in poorer body condition and naks at lower elevation start breeding earlier than naks at higher elevation. Breeding reaches a peak when air temperature is highest and forage availability peaks. Thereafter, estrous activities decrease in frequency and eventually ceases.

The number of chromosomes of both yaks and cattle is sixty and cross-breeding between the two is common. However, nomenclature of the hybrids differs among areas and can be confusing. According to Sherchand and Karki (1997), yak bulls are crossed with hump (low altitude; locally called *aule* – *Bos indicus*) and humpless (high altitude; locally called *kirko* – *Bos taurus*) cows to produce *urang jhopkyos* (sterile males) and *urang chauris* (fertile females) while naks are mated to humpless bulls (*Bos taurus*) to produce *dhimjo jhopkyos* (sterile males) and *dhimjo chauris* (fertile females). *Jhopkyos* are relatively gentle and are used as pack animals (Figure 1), while *chauris* produce considerably more milk



**Figure 1:** *Jhopkyos*, near the Kali Gandaki River between Kagbeni and Jomsom, Bringing Wood to Jomsom in Lower Mustang (photograph by A. Allan Degen)

than naks. In general, the performances of *urang* and *dhimjo* hybrids are similar within each sex (Sherchand and Karki 1997). However, in some areas, *dhimjo chauris* are preferred to *urang chauris* as they are said to produce more milk and *dhomjo jhopkyos* are preferred to *urang jhopkyos* as they are said to be gentler (Devkota 2002). Furthermore, *chauris* from yak bull and *kirko* cow matings are usually preferred to yak bull and *aule* cow matings as they are said to produce more milk (Kharel, Neopane and Shresthra 2005; Pande 2007). Both *jhopkyos* and *chauris* are maintained at a lower altitude than yaks and, at about 2,500 metres, herding these hybrids is the primary source of earning a livelihood (Joshi et al. 1994) in many areas of the Himalayas. However, it should be noted that neither *jhopkyos* nor *chauris* can be slaughtered for meat in Nepal as they are considered cattle. Slaughtering of cattle is not legal in Nepal, given its strong Hindu tradition.

According to Joshi (2006), average body mass of male yaks in Nepal is 245 kg and of naks is 215 kg. Body length, heart girth and wither height of males are 110 cm, 140 cm and 105 cm, respectively, while these values for females are 105 cm, 130 cm and 102 cm, respectively. When compared to yaks in China, yaks raised in Nepal are considerably smaller. The body mass of these smaller male and female yaks barely falls within the range of yaks in China, but body length, heart girth and wither height are all below the range (Table 1). There are twelve recognized yak breeds in China, while in Nepal yaks are not separated into breeds. Much more selection has been done for certain traits in yaks in China, which has also resulted in the development of some larger breeds.

## Methods

To gather data on yak production in the lower Mustang, we travelled to the region in four consecutive years: 2005, 2006, 2007 and 2008 (2061, 2062, 2063 and 2064 according to the Nepalese calendar). We spent two weeks in the region

**Table 1:** *Body Mass, Length and Height of Adult Male and Female Yaks in Nepal and China*

Measurement	Nepal		China	
	Males	Females	Males	Females
Body mass (kg)	245	215	357 (235–594)	223 (188–314)
Body length (cm)	110	105	144 (123–173)	125 (114–140)
Heart girth (cm)	140	130	197 (176–236)	161 (152–182)
Wither height (cm)	105	102	124 (114–138)	108 (103–117)

*Source:* For Nepal – Joshi (2006); for China – Wiener, Han and Long (2006). Values are the mean of ten locations and nine breeds; ranges are in brackets.

during each visit, which took place between January and March. We interviewed yak owners and shepherds using a structured questionnaire as well as open-ended questions and we observed yaks grazing. We also collected data on yaks and on the Mustang region from the District Livestock Service Office in Jomsom, and interviewed the livestock officer in Tukuche, who was a year-round resident at his post. The officer in Tukuche collected data on livestock numbers and herd composition, which were then logged at the District Office. He spoke both Nepali and Thakali and accompanied us on our visits to the yak owners and shepherds.

## Study Area

Mustang, a remote northern district of Nepal, borders the Tibetan region of China. This high-altitude trans-Himalayan region is approximately 3,640 square kilometres in area, and almost the entire region lies 2,500 metres above sea level. Mustang is situated in the rain shadow areas of the Dhaulagiri Mountains to the west and the Annapurna massif to the east. Annual rainfall averages less than 260 mm at Jomsom in the Lower Mustang (Table 2). Spring and autumn are generally dry, but some precipitation is brought by summer monsoons, which averaged 133 mm at Jomsom between 1973 and 2000. The mean minimum monthly air temperature falls to  $-2.7^{\circ}\text{C}$  in winter while the maximum monthly air temperature reaches  $23.1^{\circ}\text{C}$  in summer. Both diurnal and annual variations in

**Table 2:** *Average Monthly Minimum and Maximum Air Temperatures and Monthly Precipitation at Jomsom, Lower Mustang. Minimum and Maximum Air Temperatures are Averages from 1981 to 2000 and Monthly Rainfall is the Average from 1973 to 2000*

Month	Ave Min Temp ( $^{\circ}\text{C}$ )	Ave Max Temp ( $^{\circ}\text{C}$ )	Rainfall (mm)
January	-2.7	10.4	7.9
February	-2.1	10.6	10.2
March	1.5	15.1	23.8
April	4.2	18.7	18.1
May	7.3	21.5	16.9
June	11.7	23.1	23.9
July	13.5	23.0	40.0
August	13.4	22.8	34.6
September	11.2	21.3	36.9
October	5.8	18.2	30.2
November	1.2	14.3	8.9
December	-2.1	11.8	6.3
Annual	5.3	17.6	253.1

*Source:* Meteorological Forecasting Department, Nepal (2008)

temperature are large. Only about 40.3 square kilometres, about 1 percent of the total land area, is cultivated and 1,477 square kilometres, about 40 percent, is pasture land (Table 3).

The Nepali government divides its territories into districts, village development committees (VDCs) and wards. However, for the purpose of this paper, we found it more convenient to divide Mustang into its four territorial units. From north to south, these are: (1) Lo (proper Mustang to Upper Mustang) from the Tibetan border to Ghemi; (2) Barahgaon (twelve villages) from Ghiling to Lubra; (3) Panchgaon (five villages) from Thini to Chimang; and (4) Thak Satsaya (Thak seven hundred) from Tukuche to Ghasa (Figure 2). As one moves southward, the Tibetan culture becomes less evident. Inhabitants of Lo in Upper Mustang are basically Tibetan in language and culture, whereas inhabitants from Panchgaon and Thak Satsaya in Lower Mustang speak Thakali, a Tibeto-Burman language. Inhabitants of mid-Mustang of Barahgaon speak both Tibetan and a language similar to Thakali (Salter and Gurung 2003). According to Aita Bahadur Thakali (District Livestock Service Office, Jomsom) 75 percent of the population is Buddhist and 25 percent is Hindu.

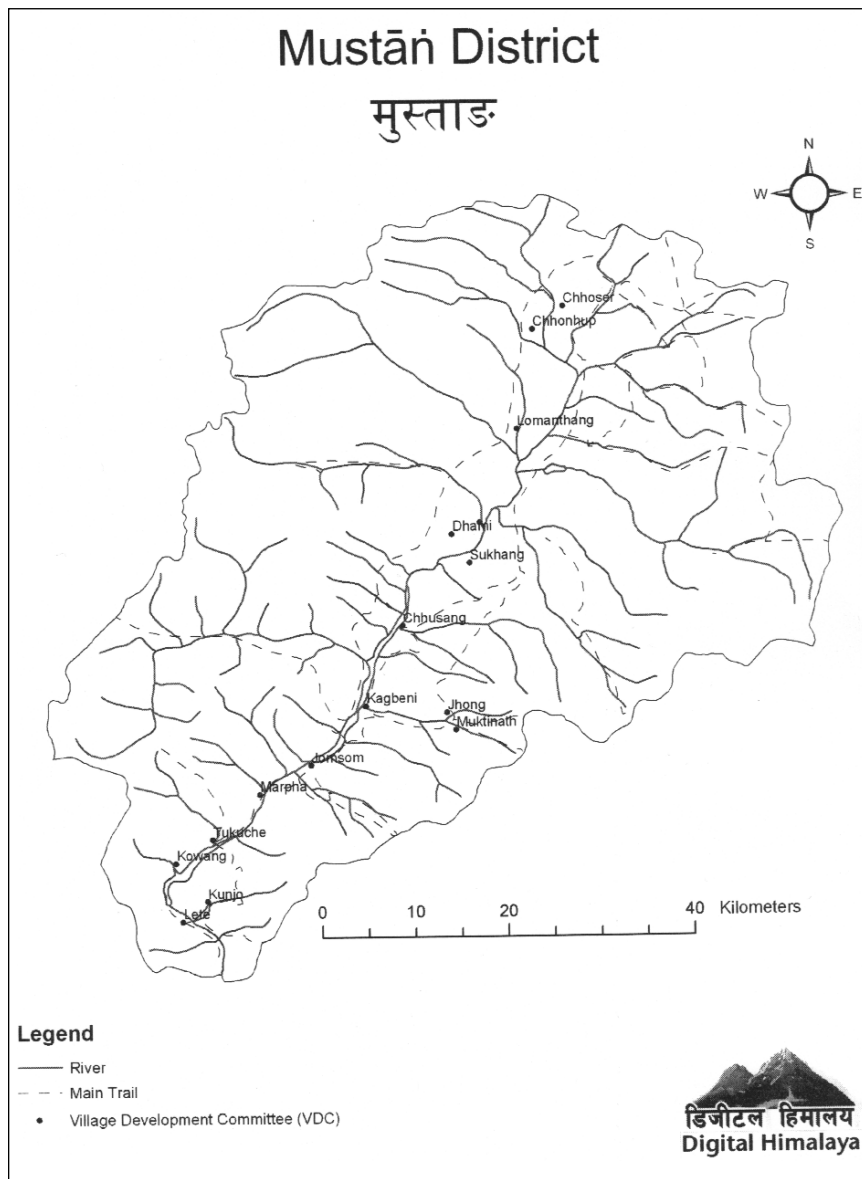
Vegetation in the Mustang District is of the steppe type and consists of grasslands interspersed with scrub. Cold desiccating winds, a short growing season, low precipitation and cold air temperatures limit the standing biomass produced from the steppe vegetation. Scrub is dominated by *Juniperus squamata* on gentle slopes, whereas steeper slopes are dominated by *Caragana gerardiana*, *C. brevispina*, *Rosa sericea*, *Ephedra spp.* and *Lonicera spp.* Vegetation above 5,000 metres consists mainly of *Rhododendrom anthopogon*, *Potentilla biflora* and *Saxifraga spp.* Little or no vegetation is found above 5,800 metres.

The land between Tukuche and Ghasa is divided among thirteen villages. Owners in each village can herd their yaks only in an area allotted to their village.

**Table 3: Land Use Pattern in Mustang District**

Subject number	Description	Area covered (km <sup>2</sup> )
1	Total area of the district	3639.6
2	Total forest area	123.2
3	Total cultivable land	40.3
a	Irrigated cultivable land	32.5
b	Rain-fed cultivable land	7.83
4	Pasture land	1476.8
5	Area covered by river, stream, cliff, sloppy mountain, stone etc.	1505.7
6	Area covered by residence and buildings	3.20
7	Area covered by snow	305.9
8	Area covered by lake	0.92
	Others	183.5

Source: District Development Committee, Mustang.



**Figure 2:** A Map of Mustang District, Nepal. The Villages of Nakum and Naurikot are within five kilometres of Kobang, to the Northwest (Kowang in the Map) and Sowru is within two kilometres of Kobang, to the Southeast. These Villages Lie along the Kali Gandaki River  
(source: Digital Himalaya, <http://www.digitalhimalaya.com>)



There is a Yak Farmers Association led by a chairman who determines the size and allocation of the land to the yak owners. Yak owners from the villages are permitted to use the land above their homes for grazing with no charge. Owners from other villages are allowed to use the land only with permission from the Association, but they are charged for the use of the land. Ganesh Lal Thakali, chairman of the Yak Farmers Association, told us that this system has been in use in Lower Mustang since he can recall, and according to him, has always been in use.

## Findings and Discussion

### *Yak Owners*

There were thirty yak owners, all men, in the Lower Mustang District from Jomsom to Lete in 2007: four in Panchgaon (all in Marpha) and twenty-six in Thak Satsaya (four in Tukuche, five in Kobang, one in Dumbo, seven in Naurikot, four in Sowro, two in Nakum and three in Lete). The owners live in the villages, which are approximately 2,500 to 3,000 metres above sea level (a.s.l.). The number of owners changed over the past three years, as did some of the owners – some owners sold all their yaks and some new ones entered into yak ownership. For example, during 2006, a yak owner from Kobang sold all his animals (forty-two in total) to his brother in Naurikot. Most of the thirty owners are Thakali (sixteen are Tamang Thakali; six are Marphali Thakali; four are Yhulkasompaimhi Thakali – see below for distinction). However, there are two Tamang owners (#1 and #26), a Gurung (#22) and a Khatri Chetri (K.C., #3). The K.C. was married to a Thakali woman and was a yak shepherd before he became an owner.

Tamang Thakalis possess Mongolian features, which include ‘circular faces, slightly prominent maler bones, oblique eyes with the characteristic epicanthic fold (a feature which is only found among Mongoloid people), low and even depressed nasal roots, wheatish brown complexions, scarce facial and body hairs, sturdy bodies and medium statures’ (Gautam and Thapa-Magar 1994: 3). They originated in the Thak Khola region of the Dhaulagiri zone, which lies in the southern part of the Mustang district between Annapurna Himal on one side and Dhalagiri Himal on the other. Thak Sat Sae, which lies in the salt trading zone on the south of the Tukuche mountain, is the traditional home of the Tamang Thakalis. Tukuche is the cultural centre.

They are an endogamous group, divided into four exogamous clans: Gauchan, Tulachan, Sherchan and Bhattachan. These clans are considered equal in status socially and ritually and it is expected that Tamang Thakali marry other Tamang Thakali, but outside their clan. Marriages between cousins are permitted. Tamang Thakali speak a Tibeto-Burman language, which is similar to that of the Tamang, Gurung and Chhantyal (NEFIN n.d.). They are considered an educated group, with a literacy rate of about 63 percent. By comparison, the literacy rate for all of

Nepal is approximately 37 percent (World Bank 1996). Tamang Thakalis were originally shamanists, and incorporated Bonpo and Buddhism from the Tibetan north. They are known for their involvement in trade and business, and for being an organized people who maintain clean, neatly tended kitchens and houses. They are considered to be economically well-to-do. They own and run many of the lodges and tea houses along the Annapurna trail. They trade Tibetan salt and wool for Nepalese rice, operating mule and *jhopkyo* caravans (Figure 1). Today, many attempt to hide their Tibetan Buddhist past and to adopt a more Hindu way of life. There are approximately 13,000 Tamang Thakalis in Nepal according to the census of 2001. About one-fifth of the population still resides in Mustang while four-fifths have left the region. About 50 percent of Tamang Thakalis speak Thakali as their mother tongue, and about 80 percent of the Tamang Thakalis within the Mustang district still do so, but only about 20 percent do so outside the district.

Marphali Thakalis are recognized as an official nationality by the Government of Nepal. They are known locally as Mawatan Thakali and resemble Tamang Thakalis in appearance. Moreover, their religious practices, rituals, language and clothing are similar to those of the Tamang Thakalis. The Marphali Thakalis also have four clans: Hirachan, Joharchan, Pannachan and Lalchan. There are approximately 2,000 Marphali Thakalis (estimated in 2000) with about 118 households in Marpha. Like the Tamang Thakalis, many are engaged in trade and business, in addition to agriculture and animal husbandry, and many have left the Mustang district (Thakali n.d.). Yhulkasompaimhi (meaning ‘people from three villages’) Thakali originated from Thini, Syang and Cimang and are similar to Tamang and Marphali Thakalis. They follow ten patrilineal clans and use Thakali as their surname (Vinding 1999). According to Krishna Gauchen and his wife Sushila (Sherchan), hotel owners in Jomsom, Thakalis with the surname Thakali can be divided into two groups: (1) those who originated sixty years ago and inhabited Thini, Chimang, Syang, Dumba and Chairu; and (2) those who are primarily Gurungs, who came from Tibet, changed their names and live mainly in Upper Mustang and Tibet.

The general management of yaks is similar among the three Thakali groups and thus data from all owners is combined and presented as means ( $\pm$  standard deviation). In general, the Thakalis consider yak production as one of their enterprises, which also includes others such as crop production and maintaining hotels. If the right financial opportunity arises, an enterprise such as yak production can be bought or sold, offering an explanation and rationale, at least in part, for turnover in yak ownership during the research period. In addition, many Thakalis from the three groups have left the Lower Mustang to other parts of Nepal and even to countries outside Nepal. The migration from the mountains to mainly urban centres in search of employment and business opportunities has become increasingly common in Nepal.

On average, yak owners were 53 ( $\pm 13$ ) years old and had 23 ( $\pm 17$ ) years of experience in raising yaks, with 5.2 ( $\pm 2.6$ ) people residing in a household. Some

of the owners inherited the herd from their fathers and some were from a long line of yak owners, while some bought their herds only recently (Table 4). Yak owners from these various groups usually hire shepherds to attend the herds or, in some cases, do the shepherding themselves.

**Table 4:** *Distribution of Yak Farmers in Lower Mustang in 2007, Their Work Experience (Exp.) and Family Status. Village Location is Denoted in Figure 1*

Village	Farmer	Surname	Ethnic Group	Age (yrs)	Exp. (yrs)	Family members
Dumbo	1	Tamang	Tamang	45	20	4
Kobang	#2	Sherchan	T	49	40	8
Kobang	#3	K.C.*	*	43	9	y 6
Kobang	4***	Sherchan	T			
Kobang	#5	Bhattachan	T	70	41	15
Kobang	#6	Gauchan	T	60	5	5
Kobang	7	Thakali	Y	25	5	5
Lete	8	Gauchan	T			6
Lete	9	Gauchan	T			5
Lete	22	Gurung	Gurung			
Marpha	10	Juharchan	M			
Marpha	#11	Hirachan	M	58	31	4
Marpha	#12	Juharchan	M			
Marpha	#13	Hirachan	M			
Nakum	14	Thakali	Y			
Nakum	15	Tulachan	T			1
Naurikot	#16	Gauchan	T	63	7	y 6
Naurikot	#17	Gauchan	T	59	50	4
Naurikot	#18	Gauchan	T	64	50	3
Naurikot	#19	Gauchan	T		49	5
Naurikot	#20	Gauchan	T		8	y 5
Naurikot	#21	Gauchan	T	34	13	y 5
Naurikot	#31	Sherchan	T	43	1	y 6
Sowro	#23	Tulachan	T		17	4
Sowro	#24	Tulachan	T	41	3	5
Sowro	#25	Hirachan	M	49	10	5
Sowro	#26	Tamang	Tamang	48	34	3
Tukuche	#27	Thakali	Y		14	
Tukuche	#28	Tulachan	T	70	45	4
Tukuche	#29	Juharchan	M	68	21	8
Tukuche	#30	Thakali	Y	62	22	2

\* K.C. = *Khatri Chetri*; defined as a cast

y The shepherd is from the farmer's family

# Interviewed

Y = Yhulkasompaimhi Thakali; T = Tamang Thakali; M = Marpha Thakali

\*\*\*An owner from Kobang (#4) sold his yak herd to his brother (#31) in Naurikot

## Herd Management

In total, there are approximately 1,522 yaks and naks in Lower Mustang. A typical yak herd has 51 ( $\pm 16$ ) animals composed of 4 ( $\pm 3$ ) adult males, 27 ( $\pm 12$ ) adult females, 9 ( $\pm 5$ ) subadult males, 9 ( $\pm 3$ ) subadult females, 8 ( $\pm 4$ ) male calves and 6 ( $\pm 3$ ) female calves (Table 5). Tukuche, with seventy animals per owner, has the highest average and Naurikot, with forty animals per owner, has the lowest average.

In total, 83 percent of the yak herds of the Mustang region are herded by shepherds, mainly Gurungs, but also by a Magar (#26), Sunwar (#24) and a Yhulkasompaimhi Thakali (#17). Four Tamang Thakalis (#16, #20, #21, #31) and the K.C. (#3) do their own shepherding. The 83 percent would be higher but one owner in Tukuche (#28) was herding his yaks because his shepherd left without warning in 2005. This owner explained that the shepherd was from the 'untouchable' caste (*Sudra: Bishwakarma [B.Ka.]* group-blacksmith) and it was a mistake that he had hired him. Now he was looking for a Gurung as a shepherd, but had not found a suitable candidate in nearly two years.

Transhumant pastoralism is practised in yak production. The yaks migrate to the high pastures in summer, at 4,000–5,000 metres a.s.l. in *asad* (June–July) and to the low pastures in winter (Figures 3a, 3b), at 3,000–4,000 metres a.s.l. in *kartik* (October–November). Walking time from the village to the yaks is about one and a half to two hours in the winter and two to two and a half hours in the summer. For shelter, the shepherd usually has a tent made of yak wool. When ascending to summer pastures, the shepherd generally makes two stops, each for about one month, before the highest elevation is reached just below the snow line, where he stays for about four to five months. Other than natural pasture, yaks receive very little supplementary feed. Some owners do not provide any supplementary feed while others provide some to weak yaks once or twice a year. This consists of a mixture that can include a combination, but not necessarily all components, of mustard oil, eggs, barley, millet, honey, nutmeg, molasses, ghee, mineral mix (the local name being *silajeet*), yeast mix (*cheng*) and herbal plants.

Laxmi Prasad Hirachen in Marpha prepares a mixture of fifty eggs, four kilograms molasses, five kilograms mustard oil and fifteen to twenty litres of *cheng*, which provides thirty-five litres of supplementary feed. All adult yaks/naks receive 0.33 *mana* (Nepalese measure milk in *mana*; 1 *mana* = 0.57 litres) 'for a few days' in July. Dan Prasad Gauchen in Naurikot makes a mixture of one litre molasses, fifty eggs, five *mana* ghee, yeast, five nuts and 0.5 *mana* black pepper and each animal receives 0.5 to 1.0 *mana* twice a year. One of the owners (#25) provides a supplement during *chaitra* (March–April) and *baisakh* (April–May). In addition, some owners supplement lactating naks with salt, honey, eggs, oil, millet, corn and ghee once a year.

None of the yaks are vaccinated against diseases. One owner in Tukuche (#29) drenches and dips his herd twice a year, and one owner in Naurikot (#16) drenches only his calves twice a year, once at high pasture in September and once

**Table 5:** *Size and Composition of Yak Herds in Lower Mustang; 'No.' Refers to Herd Owner in Table 3*

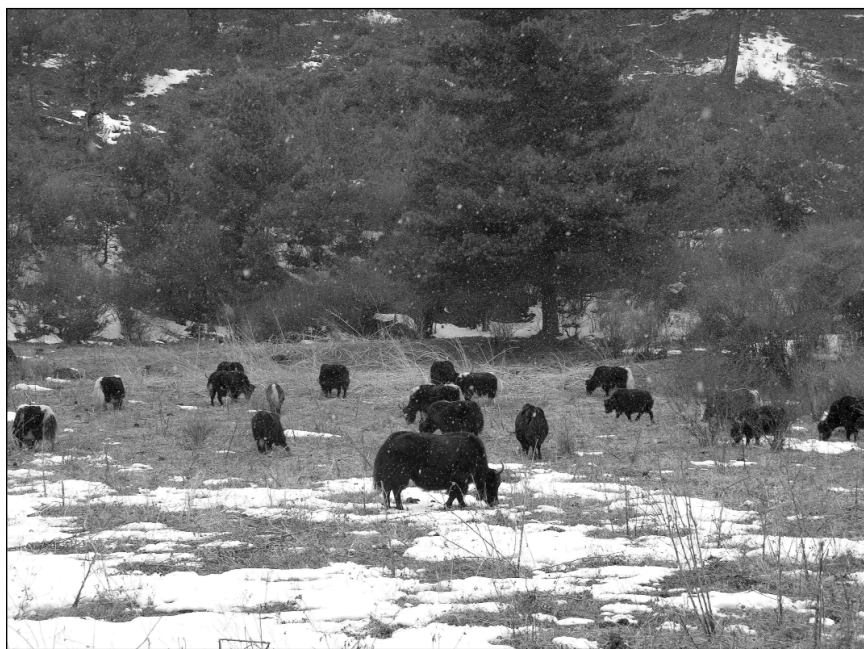
Village	No.	Total	Adults		Subadults		Calves	
			♂	♀	♂	♀	♂	♀
Dumbo	1	84	3	31	18	12	9	11
Kobang	2	54	9	30	0	0	7	8
Kobang	3	55	3	21	0	11	12	8
Kobang	4*	—	—	—	—	—	—	—
Kobang	5	45	4	15	8	2	9	7
Kobang	6	56	4	24	0	12	10	6
Kobang	7	35	1	9	2	12	6	5
Lete	8	55	7	31	0	0	8	9
Lete	9	59	9	35	0	0	9	6
Marpha	10	50	1	35	0	0	4	10
Marpha	11	40	1	29	0	0	5	5
Marpha	12	50	1	—	—	—	—	—
Marpha	13	50	1	45	0	0	4	0
Nakum	14*	—	—	—	—	—	—	—
Nakum	15	42	3	26	0	10	2	1
Naurikot	16	42	3	14	0	8	12	5
Naurikot	17	35	2	17	0	8	5	3
Naurikot	18	23	5	16	0	0	1	1
Naurikot	19	55	3	28	0	7	11	6
Naurikot	20	36	2	12	0	8	8	6
Naurikot	21	45	2	15	0	10	11	7
Naurikot	31	80	4	56	0	10	6	4
Sirkung	22	54	1	27	7	6	9	4
Sowro	23	26	9	17	0	0	0	0
Sowro	24	49	3	22	12	12	0	0
Sowro	25	69	4	30	0	12	15	8
Sowro	26	35	—	—	—	—	—	—
Tukuche	27	68	4	40	0	0	12	12
Tukuche	28	55	6	20	6	5	12	6
Tukuche	29	36	3	33	0	0	0	0
Tukuche	30	87	8	50	8	4	8	9

\*Data was not obtained for these two owners.

*Note:* Some of the adult males were not used for breeding purposes and could be considered as subadults. Many of these were sold for meat (as subadults) by the owners.

at low pasture in June. Winter is a difficult time as snow can be high and forage insufficient, causing the yaks to lose body condition and some 25 percent of their body mass. Generally, snow does not stay on the ground for more than a week; however, if it does, yaks can survive for several days without eating by using their body reserves (Vinding 1999).

Yaks are all herded together and during the mating season the males stay with the females. Matings are natural and usually one male (*byathey*, i.e., a breeding



**Figure 3:** *A Breeding Yak (3a) and Adult Naks and Their Calves (3b) Grazing in a Winter Pasture above Tukuche (~ 4,000 m above sea level) (photograph of 3a by Michael Kam and 3b by A. Allan Degen)*

male), but sometimes two, at least nine years of age, mates with all the females. Breeding males are usually selected from within the owner's herd although some owners borrow a male from other herds to reduce inbreeding. In addition, some owners mentioned that a breeding male is sometimes purchased from (or acquired by trade from) another owner in Lower Mustang, or another area such as Dolpo district or from Tibet, although this was becoming more difficult. Yaks are becoming increasingly valuable in Dolpo district and good breeding males are not easily available from Tibet. Outside the breeding season, males separate naturally out from the main group of yaks and graze on their own.

During the milking season, the shepherd stays with the herd constantly as he has to manage and milk the naks daily. He descends to the village once or twice a month to obtain provisions and, occasionally, someone from the village ascends with produce for the shepherd. However, during the winter season, the shepherd is free to leave the herd as there is much less handling of the herd required and the herd can graze on its own. For example, one shepherd (#29) stays with the herd for four to five days and then descends to the village for two to three days. Occasionally, an owner replaces the shepherd for a short period, which also provides him with an opportunity to observe the herd. Male yaks are allowed to graze freely and the shepherd checks on them occasionally, perhaps once or twice a month. During the milking season, females and calves are corralled separately overnight and females are milked prior to grazing. A typical schedule would be as follows: milking is done by the shepherd alone between 5:30 and 9:00 A.M., the animals are released to graze until 7:00 P.M. and are then corralled till milking the next day.

Yak owners in this study reported that naks give birth approximately once every two years, that is, about 50 percent of the adult naks give birth each year. This is similar to that reported for yaks in other countries (Wiener, Han and Long 2006). Mortality of calves is high, averaging about 50 percent. Most of the deaths occur in the first three months after birth, some predated by Himalayan snow leopards. Predation of yaks, in particular of calves, by snow leopards has been reported in other yak-raising areas as well (Bagchi and Mishra 2006). Therefore, the number of live calves each year is approximately one quarter the number of mature naks, that is, six to seven live calves yearly were produced on average by the twenty-five mature naks in our study.

Most yaks are sold just before winter when they are in their best condition and maximum body mass. They are sold as subadults at three to five years of age as pack animals for about N.Rs 14,000, often to residents in the Dolpo district or in Tibet. In addition, yaks of about ten to fifteen years of age are sold for meat for about N.Rs 25,000. According to Rajendra Bahadur Basnet and Aita Bahadur Thakali (Livestock Development Officers, Jomsom), yaks are raised mainly for meat and 150–200 are slaughtered yearly in Lower Mustang, where the people prefer yak meat to sheep meat. Often a household will buy half a yak, dry the meat, and eat it over a period of six to seven months.

Naks are kept till about fourteen years of age, at which time they cannot keep up with the herd. They are then sold for meat for N.Rs 11,500. In addition, one owner (#11) sells naks with calves of up to six months in age, each set for N.Rs 25,000. In general, about three subadults and one mature yak are sold yearly, but this is a very rough estimate and can vary greatly depending mainly on mortality and the number of calves raised.

When asked about problems faced in raising yaks owners mentioned landslides, snowslides, predation by Himalayan snow leopards, falls from cliffs, a skin disease (*dundage*) that can be fatal to yaks and lack of forage in winter. These challenges are most prevalent in winter from *mangshir* (locally known as 'marg'; November–December) to *baisakh* (April–May) and can cause the death of large proportions of the herd, making yak raising a risky enterprise. For example, an owner from Tukuche (#28) lost sixty-two of sixty-five yaks in a snowslide in 1987. He managed to buy nineteen animals the following year and continue yak raising. An owner from Marpha (#11) lost twenty-five of sixty yaks in a snowslide in 1998 and an owner from Naurikot (#18) lost forty yaks to a skin disease in 2003. Also in 2003, an owner from Marpha (#13) lost seventy of seventy-five yaks when a severe snowstorm struck, which was then followed by an avalanche. This owner then bought thirty-five yak/naks in 2005 with some financial help from the District Development Committee and an International Non-Governmental Organization.

Similar disasters have been reported by yak owners in other countries as well and most have been in winter. For example, the winter of 1997–1998 was extremely severe in the Tibetan Autonomous Region, during which an estimated three million head of livestock perished. Unusually early and heavy snowfall was followed by extremely low air temperatures which prevented the snow from melting. Livestock were unable to reach the forage under the snow and, consequently, many perished. Sheep and goats suffered most but mature yaks were also affected. In some townships, 70 percent of the livestock was lost. Nearly 25 percent of the million nomads were affected and hundreds of nomad families lost all their livestock (Miller 2000).

## **Milk and its Products**

Naks are milked for 180 days between *jestha* (May–June) and *mansir* (November–December), beginning three to four weeks after calving. They are milked once a day in the morning, yielding approximately 1.36 ( $\pm 0.34$ ) litres of milk per nak per day (each nak produces 2.4 *mana* of milk per day). Milk yield for different yak breeds in China vary greatly, averaging between 0.8 kg and 3.0 kg per day or between 104 kg and 464 kg per lactation (Dong, Long and Kang 2003; Wiener, Han and Long 2006).



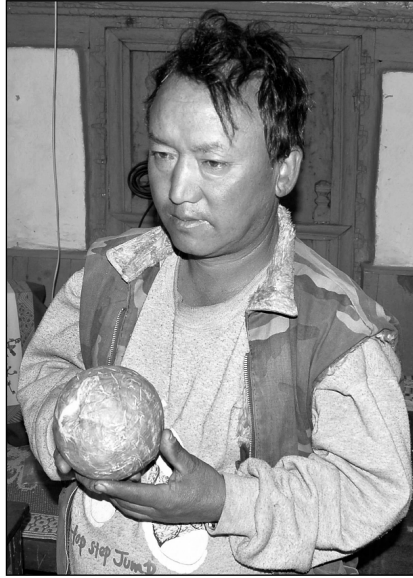
None of the nak herds in Lower Mustang was milked more than once a day, although this is practised with some naks in other regions. Milking yaks twice a day can increase milk yield by 30–50 percent, but there is a concomitant decrease in fat percentage, total dry matter content and amino acid content of the milk. Thus, the growth rate of calves of naks which are milked twice a day can be half the rate of calves of naks that are milked once a day. There is also a significant reduction in the reproductive rates of naks milked more than once a day (Dong, Long and Kang 2003).

Naks that calved in the previous year, known as *yamas*, are also milked. (Naks that have not calved for at least two years are known as *ganbas*.) According to Wiener, Han and Long (2006), *yamas* produce about 50 percent of the milk yield of naks that calved in the season, but this can be up to 67 percent of the yield; however, fat and dry matter contents of milk from *yamas* are higher than from naks that calved. When asked if there was a difference in milk production between yaks that calved and *yamas* in our study, most owners were not able to reply as this was not checked. One owner (#11) thought there was no difference while another (# 6) said that milk yield of *yamas* was about 50 percent of the amount of naks that had calved.

For milking, which takes two to four hours, the front legs or the head of the nak are secured. The milking and handling of the milk is only done by the shepherd at the summer grazing site of the herd. He uses some milk for himself and, occasionally, some milk is brought to the village. Some of the milk is drunk fresh, but most is processed into butter/ghee and a hard, dry white curd cheese (*chhurpi*). Butter is made by churning the milk in a long, cylindrical, wooden churn using up-and-down, piston-like strokes. The butter rises to the top and is scooped out. This butter is then heated and clarified to make ghee, which is shaped into a round ball (*dhalla*, Figure 4) and covered with the bark of a local tree. Each *dhalla* weighs 800 grams and sells for about N.Rs 325. The whey that remains is discarded and the curds are removed and dried. Eventually, they are shaped into thin strips and dried into a hard cheese (*chhurpi*, Figure 5) which sells for about N.Rs 700 per *pati* (1 *pati* = 8 *mana* = 4,546 ml). On average fifty-one *dhallas* of ghee and thirteen *patis* of *chhurpi* are produced from twenty-seven adult naks per herd per season.

A favourite drink of the Thakalis is ‘salty butter tea’. This is made by placing brick tea, yak butter and salt (and sometimes also yak milk) in a tea churn and churning it vigorously. It is served hot and is ‘very warming and provides much energy’ for high altitude people (Ganesh Lal Thakali, chairman of the Yak Farmers Association). This drink is generally kept in a thermos and drunk steadily throughout the day (Figure 6).

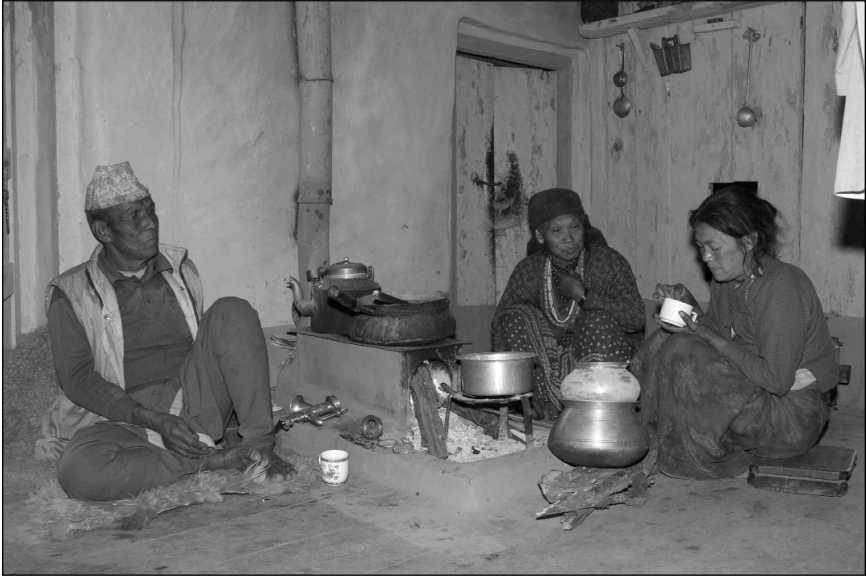
According to the Department of Livestock Services, naks in the Mustang area produce approximately 1.1 kg milk per day, which is about 40 percent less than local cows. Total milk solids and fat and protein contents are higher than the contents in the local cow milk (Table 6). The Dairy Development Corporation



**Figure 4:** *A Yak Owner (# 25) from Sowru Village Holding a Dhalla (800 g) of Ghee Produced from Yak Milk (photograph by Michael Kam)*



**Figure 5:** *Chhurpi – Dried, Hard Curd Cheese Produced from Yak Milk and Served on a Local Plate (photograph by Michael Kam)*



**Figure 6:** *A Thakali Family (# 23) in Sowru Sitting Around a Stove in a Typical Home Drinking ‘Salty Butter Tea’ (photograph by A. Allan Degen)*

started cheese production from yak milk in 1964. The corporation operates nine cheese factories in five districts and, in addition, private sectors have emerged to produce cheese. Producing yak cheese is much more profitable than producing butter/ghee and *chhurpi*, earning approximately 50 percent more money. However, none of the owners that we interviewed in the Lower Mustang brought their milk to a factory. There is no cheese factory in Lower Mustang and transportation of the milk to a factory would be difficult and expensive because of the long distance and poor roads.

**Table 6:** *Milk Production and Composition in Nak and the Local Mustang Cow*

Measurement	Nak	Cow
Milk production (kg/day)	1.1	1.9
Fat (%) 7.0	4.2	
Solid not fat (%)	11.0	9.1
Protein (%)	5.5	3.0
Lactose (%)	5.5	4.8
Total Solid %	18.0	13.2

*Source:* Directorate of Animal Production, Department of Livestock Services, Jomsom

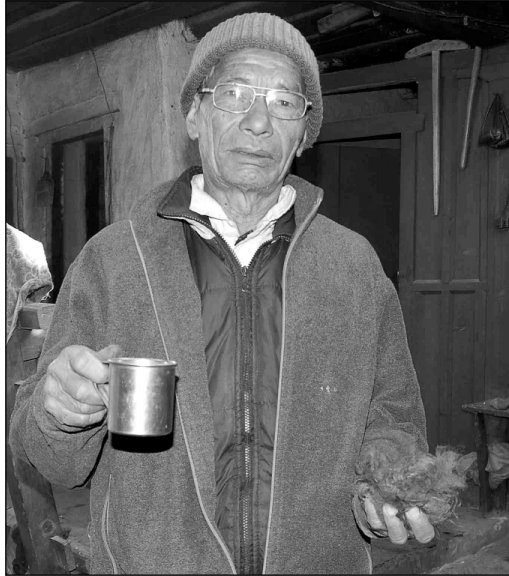
## **Blood Drinking Ceremony**

Traditionally, fresh yak blood is drunk by Thakalis, but it is also drunk by other ethnic groups such as Tamangs. We were told that the blood cures primarily digestive problems. 'The blood is mainly for people who have chronic diseases; it is helpful for gastritis but bad for people who suffer from high blood pressure' (Aita Bahadur Thakali, District Livestock Service Office, Jomsom). Shah (2001) reported that 'wild yak's blood is used to treat fever, dysentery and schizophrenia, while its bone marrow and tail is used to treat arthritis and snow burn'. In addition, 'wild yak's tail is used to scare away ill spirits'.

The traditional blood drinking ceremony (*khoon khaney parwa* in Nepalese language; *kateo kathunbo* in Thakali language) is practised twice a year, during *baisakh* (April–May) and *shrawan* (July–August). The ceremony takes place at the yak pastures and usually lasts five days each season, but can extend up to fifteen days. In *shrawan*, *Marche* (near Tukuiche) and *Mulee* (near Kobang) and in *baisakh*, *Sekum* (near Kobang) are particularly well known for this blood drinking ceremony. Vinding (1999) reported that Thakalis believe the blood in *baisakh* is mainly for 'gastric problems and malaria'. whereas the blood in *shrawan* is for 'making people fat and healthy'. Often, the ceremony is shorter in *baisakh* than at *shrawan* and less blood is taken from each animal, as the yaks are weaker and 'there is less blood' at this time. People wishing to drink blood must climb up the mountain to the yaks, except at Naurikot where some owners bring the yaks close to the village.

One or two cups of blood are drunk each day of the ceremony, in particular by the older and chronically ill, but can also be drunk by healthy people. Some people do not drink every day, but every second day. Yaks can be bled by 'professional bleeders' (*aamji*) who receive N.Rs 700 to 1,000 per season from the herd owner at a herd in Naurikot (#16), where two bleeders work per herd, and N.Rs 500 per day plus food in Marpha (#11), where one bleeder works per herd. At four sites, bleeding was done by the herd owner (#24 in Sowru, #2 and #3 in Kobang, and #21 in Naurikot).

Blood can be collected from all yaks/naks over one and a half years of age, except from lactating naks. Pressure is placed around the jugular vein with a rope, the vein is pierced with a sharp object such as a knife, and blood is collected into a stainless steel cup (Figure 7). The cup has a handle and holds about 236 ml of blood (base diameter = 67 mm, height = 67 mm). For this ceremony, each participant brings his own blood drinking cup. After bleeding, the pressure is lessened on the vein slowly and yak dung or mud is placed on the wound to stop the bleeding. A typical scenario would be the collection of about twenty-two cups of blood from a five-year-old yak in *baisakh*, which sells for N.Rs 60 per cup, and thirty-five to forty cups of blood in *shrawan*, which sells for N.Rs 50 per cup. The number of visitors varies greatly among yak herds. The average is fifty to sixty visitors per day, but can range from ten to twenty per day at a herd in Naurikot



**Figure 7:** *A Yak Owner in Tukuche (#29) Holding a Blood Drinking Cup and Soft 'Pashmina- Like' Yak Calf Wool (photograph by Michael Kam)*

(#18) to 300 per day at a herd in Sowru (#25). One owner in Marpha (#11) bleeds his yaks only once a year for nine days in mid-June, while others do not bleed their animals at all.

Yak blood consumption is not limited to the Lower Mustang. In the Solukhumbu district, many Sherpas drink fresh yak and nak blood at Lhosar, the Buddhist New Year (Ram Chandra Devkota, Senior Livestock Development Officer, personal communication). The Sherpas collect the blood themselves and believe that drinking the blood will make the animals stronger. Devkota, who was the Senior Livestock Development Officer at the Yak Development Farm, Solukhumbu, from 2002 to 2005 told us:

In 1975, the farm manager at the time, Dr Prabesh Man Singh, hired a Tibetan, Mr Nurbu Sherpa, as a labourer. Norbu Sherpa was a skilful bleeder of yaks. Later, he married a Nepalese Sherpini woman and he settled permanently at the Yak Farm. He is still working at the farm today but does not possess Nepalese citizenship. He taught many of the local youths how to bleed yaks and now many people can do this. Today, Nurbu Sherpa is old but he has many followers to bleed yaks in the Solukhumbu area.

In the Rasuwa District, Tamangs also consume the blood of yaks, naks and both male and female hybrids. Here, an experienced bleeder (*Ragat Jhikane Manish*)

collects the blood, which is not drunk fresh, but is cooked and then eaten. A chauri owner in the village of Gatlung, Rasuwa District, told us that he had consumed the cooked blood of yaks and their hybrids regularly, but had not done so for about three years because there was no one available who could collect blood.

## **Wool**

Animals are shorn once a year in June/July, although one owner (#30) shears in March/April and another (#12) does not shear at all. It takes three people about seven to ten minutes to shear an adult yak. The front legs are tied and one person holds the horns while another shears, mainly the ventral side. In the past a knife in the shape of a semi-sickle was used, but today hand shears are used.

One of the owners in Tukuche brings his herd to the village for one day, shears the animals with help from the shepherd, family and friends and then returns the herd. Approximately 0.8–1.0 kg of wool is collected from mature yaks/naks and about 0.5 from calves and subadults. The wool has little market value today and is used mainly to make ropes, carpets and tents for the shepherds. The wool of calves (Figure 7) is very soft, ‘like pasmina wool’, and in the past was used to make clothing items, mainly sweaters. This wool is removed easily by simply pulling it gently off the animal.

## **Yak Herding**

Yaks are herded as a single species in Lower Mustang, which is in contrast to most pastoralist systems (see Blench 2001). More than one species of livestock allows the rangelands to be better exploited as some species are mainly grazers and some are mainly browsers. In this way the livestock density can be increased considerably compared to a system of only one livestock species. In addition, risks of livestock losses are buffered, whether losses are due to disease or extreme environmental conditions (Degen 2007).

In other regions, yaks are often raised in conjunction with other livestock. In Bhutan, where seasonal migration is commonly practised in the pastoral mountain systems, as in Nepal, yaks are herded together with sheep and/or cattle while grazing forest, rangeland and other open grazing areas. In this system, the yak herders often attend the sheep rather than the sheep owners seeing to them (Dorji et al. n.d.). Mongolian pastoralists generally raise three to five types of livestock – including yaks, sheep, horses, cattle, goats and Bactrian camels – in a system termed ‘mobile livestock keeping’ (Janzen 2005).

Each species of livestock is herded separately and, therefore, a single household is not an optimal unit for herding. Consequently, the basic unit in Mongolian pastoralism consists of two to six households, managing the flocks as

a single integrated economic unit (Anon, undated-b). In Mongolia, winters are severe and a difficult time for the pastoralists; livestock losses can be high. Livestock usually spend the winter at a sheltered campsite, foraging on dry grasses on the range (Bedunah and Schmidt 2000).

## Absentee Herd Owners

As noted, absentee ownership was practised by 83 percent of the yak owners in Lower Mustang, which is substantially higher than that reported for yak owners in Bhutan, where it ranges from 34 percent in western Bhutan to less than 10 percent in eastern Bhutan (Dorji, Roder and Tshering 2006). Three systems are used in Bhutan in which absentee owners 'lease' yaks to herders, the most common being the *nakzi*. In this system, the herder has to supply the owner with forty *saangs* (three *saangs* is about one kg) of butter for each leased yak with a calf less than one year of age and twenty *saangs* of butter for each yak with a calf above one year of age. These amounts have to be paid, even if the herder has to purchase the butter.

All the dried curd cheese (*chugo*, known as *chhurpi* in Nepal) that is produced is kept by the herder, although he often voluntarily contributes some to the owner. Should an animal die, the carcass is given to the owner. If the meat cannot be eaten, the herder must replace the animal. For his part, the owner provides the herder with basic supplies such as rice, buckwheat and salt and, in addition, the herders are given either a *gho* or *kira* (traditional Bhutanese men's or women's clothes; Wangdi 2002).

In Mongolia, absentee herd ownership is widespread, having increased sharply following the privatisation of livestock in 1992 (Fernández-Giménez 1999). Here, characteristically: (1) the absentee owner and herder are usually kin or friends; (2) herders own and tend private herds in addition to the absentee-owner's livestock; (3) little difference exists between absentee owners and herders in caste or ethnic group; and (4) herders are from all economic strata.

These patterns are different from absentee owner-herder relationship in Lower Mustang as: (1) the absentee owner and herder are usually not kin or friends; (2) herders do not own livestock; (3) absentee owners and herders are from different ethnic groups – owners are usually Thakali and herders Gurung; and (4) herders are usually not from a wealthy strata but, rather, tend to be poorer than the Thakalis. However, there are some similarities between the absentee herd owners in Mongolia and the absentee herd owners in Lower Mustang. Following privatisation of the herds in Mongolia, pastoralist societies have undergone a transition from a subsistence economy in a collectivized livestock production system to a market economy based on speculative investments and accumulation. Many of the herd owners in Mongolia are urban-dwellers who have income from other enterprises (Potkanski 1993, Fernández-Giménez 1999).

In Lower Mustang, all yak owners live in villages. None of the owners depend solely on yaks for their livelihood; they all have other sources of income. In essence, the owners in Lower Mustang 'direct' their enterprises, including yak production; yaks are sold and bought when opportunities for profit arise. In addition, the situation in Lower Mustang is similar to that described in pastoral societies in Africa where wealthy investors live in settlements and hire poor herders, who have few or no animals, to tend their livestock (Little 1985, White 1990).

## **Income and Expenses**

Yak owners estimate that total earnings from yak herding is about 50 percent of their income, but estimations range widely between 10 percent and 90 percent. One owner in Sowru estimated that he earned N.Rs 60,000–70,000 yearly from his yaks, which was about 25 percent of his total earnings. Yet another owner in Tukuche (#29) stated that he 'does not see any profit in keeping yaks because they keep dying due to Himalayan leopards, landslides, snowslides and disease, particularly skin disease'.

Most yak owners had about eight rupani (1 rupani ~ 500 square metres) of land, although one owned twenty-eight rupani and another owned fifty rupani. They grew seasonal crops, in particular apples, potatoes, maize, millet and barley, which were sold in the cities such as Pokhara and to the hotels in the area. One yak owner from Tukuche (#27) had an apple orchard on one hall of land (one hall = the amount of land that two oxen can plough in one day ~ 7–8 rupani). He sells the apples in Pokhara for a profit of N.Rs 30,000–40,000 per season. Two of the owners (#27 and #28) owned hotels, which were managed by family members. One owner in Sowru (#25) was also a grade school teacher and another, also in Sowru (#26), worked in fields as an agricultural labourer.

From the data we collected from owners, we envisioned the following scenario on annual income and expenses based on fifty-one total yaks, including twenty-seven adult naks (Table 7): sales from dairy products, that is, ghee and *chhurpi*, totalled N.Rs 15,230 and from blood and wool totalled N.Rs 15,620. (Many owners were not able to sell their wool, as it had little market value, but used it instead to make rope and tents. Therefore, we assume here that income from wool is only N.Rs 520, as it contributes little to the household's overall budget). On the basis of the sale of two subadult yaks for pack animals, two mature yaks and one mature nak for meat, an income of N.Rs 89,500 could be realized. Thus, total income acquired through yak production is N.Rs 120,838 (U.S. \$1,726).

Expenses are mainly for the shepherd, with relatively small sums paid for the yak bleeder (*amji*) and supplementary food, for a total of N.Rs 48,100. Therefore, a profit of N.Rs 72,780 (U.S. \$1,040) can be made from yak production. If this is 50 percent of the total income, then each owner earns approximately N.Rs 145,560 (U.S. \$2,079) per year.



**Table 7: Annual Products of Naks and Yaks and Annual Expenses of Yak Farming in Lower Mustang, Nepal Based on an Average Herd of 51 Animals. The Various Products are in Addition to Home Use by the Shepherd and the Owner and the Milk Sucked by the Calves. Mean Values are Based on Information from 25 Yak Owners from the Villages, Marpha, Tukuche, Sowru, Kobang, Nakum and Naurikot (see text for explanation)**

Item	Amount	Unit	Price (N.R.) per unit	Total price (N.R.)
<i>Income</i>				
Ghee	51.1	<i>dhalla</i>	323.6	10,350
<i>Chhurpi</i>	12.8	<i>pati</i>	694.4	8,762
Total dairy products				15,230
Wool*	7.1	kg	80	520
Blood**	295	cup**	50	15,630
Subadult yak sale	2	yak	14,000	28,000
Adult yak sale	2	yak	25,000	50,000
Adult nak sale	1	nak	11,500	11,500
Total Income	120,880			
<i>Expenses</i>				
Shepherd	1			43,200
<i>Amji</i> ***	4***		850	3,400
Food supplementation	1		1,500	1,500
Total Expenses	48,100			
Balance	72,780			

\* Other yak owners reported prices of N.R.125, N.R. 200 and even N.R. 400 per kg of yak wool, but they did not sell it.

\*\* Blood is for drinking during the *Khoon Khaney* ceremony, twice a year; a 236 ml cup is used. Exceptionally high value (3,000 cups; N.R. 150,000) reported by one farmer was not included in the average.

\*\*\* *Amji* is a local professional hired for drawing yak blood during the *Khoon Khaney* ceremony; two people during each of two seasons.

According to the World Bank Development Indicators (2006), the average annual income in Nepal is about N.Rs 18,900 (U.S. \$270), while that of Nepalese residents in rural areas is considerably lower (USAID 2005). Why then do more Nepalese not raise yaks, where the potential income can be much greater than the national average? Foremost, yaks are expensive, making it impossible for most Nepalese to start this enterprise. In comparison to most Nepalese, Thakalis are considered quite well-to-do and some can purchase yaks. Also, income is quite unstable in yak production.

This emerged from the large variation in total income contributed by yaks, 10 percent to 90 percent of the total income of the herd owner, and from the large standard deviations in most parameters that were measured in yak production.

Thus, although profits can be high, losses are occasionally expected and the owners should have some financial reserves as well as other sources of income to overcome these periods. Most Nepalese do not have these assets, but the Thakalis herd owners do. In addition, it is a very high-risk enterprise as disasters can decimate the whole herd, or large proportions of a herd, quickly.

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A. Allan Degen is a professor in environmental animal ecophysiology at the Desert Animal Husbandry and Adaptations Unit, Wyler Department of Dryland Agriculture, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev Beer Sheva 84105, Israel. He is presently doing research on livestock production in pastoral societies, including the Negev Bedouin in Israel and hill people in Nepal.

Email: [degen@bgu.ac.il](mailto:degen@bgu.ac.il)

Michael Kam is a researcher in environmental animal ecophysiology at the Desert Animal Husbandry Adaptations Unit, Wyler Department of Dryland Agriculture, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev Beer Sheva 84105, Israel. He is presently studying energy and water balances in free-ranging livestock.

Email: [mkam@bgu.ac.il](mailto:mkam@bgu.ac.il)

Shambhu B. Pandey is the Director of Nepal Animal Science Research Institute (NASRI), Nepal Agricultural Research Council (NARC), Khumaltar, Lalitpur, Kathmandu, Nepal. He is presently doing research on livestock and fodder production in Nepal.

Email: [pandeyshambhu@hotmail.com](mailto:pandeyshambhu@hotmail.com)

Chet R. Upreti is Chief of Animal Nutrition Division, Nepal Animal Science Research Institute (NASRI), Nepal Agricultural Research Council (NARC), Khumaltar, Lalitpur, Kathmandu, Nepal. He is presently doing research on livestock and fodder production in Nepal.

Email: [crupreti@yahoo.com](mailto:crupreti@yahoo.com)

Sanjeev Pandey is an M.A. student studying livestock and fodder production at Tribhubhan University, Nepal.

Email: [sanpanday@gmail.com](mailto:sanpanday@gmail.com)

Prajwal Regmi is an M.Sc. student studying livestock and fodder production at Agricultural, Food and Nutritional Science, University of Alberta, Canada.

Email: [prajwal.regmi@ualberta.ca](mailto:prajwal.regmi@ualberta.ca)