

## Indigenous rearing practices of Yak and its multipurpose uses in the Sikkim Himalayas

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**Abstract:** Sikkim is a small part in Indian Himalayas that infuses great diversity with a rich ecological hotspot zone. Sikkim has four districts, the climatic condition of which ranges from subtropical in the South to tundra in the North. Amongst the mammals of Sikkim are the rare Himalayan Black Bear, Blue Sheep, Red panda, Snow Leopard, Musk Deer and Yaks. The Yak is an important multipurpose mammal of the alpine Northern and Eastern Sikkim region. The traditional knowledge of Bhutia community living in the high altitude has been passed on from generation to generation but has no written document. Qualitative data was obtained through self designed questionnaire, and face to face interviews and discussions in 35 households between June 2013 and October 2013 in East and North Sikkim. Study revealed the maintenance of Yaks, grazing pattern indigenous plants, health management practices, traditional breeding practices and processing technology of meat, milk and fiber. The milk and meat was processed into fermented products. Thara, Tema, Shuza/Shapjha or Phuicha (beverage) and value added products made from skin, hair and tail were documented for the first time from Sikkim. Besides yak acting as an ingredient for poverty alleviation and food insurance for the highlanders, it also projects an area of research on conservation and fermentation technology of traditional food items.

**Keywords:** Dzomo, Ethnic community, Fermented food, Multipurpose, Sikkim, Yak.

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### I. Introduction

The eastern part of the Indian Himalayas highlights great diversity. This part of India has chilling cold climate as well as hot humid atmosphere with affluent flora and fauna (1). Sikkim is a part of the Eastern Himalayas with the differentiation in the ecosystems it is also called a biodiversity hot spot region (1). Sikkim is one of the least populated states in India, it lies 27° 05' - 28° 09' north and 87° 59' - 88° 56' east covering an area of 7.096 km<sup>2</sup>. Sikkim is bounded by a stretch of three international borders viz. Tibetan plateau in the North, Nepal in the west, and Bhutan in the east and one national border, the Darjeeling district of West Bengal in the South. The temperate, alpine eastern Himalayan regions are home to about 90% of the yak population of Sikkim. The world population of domestic yaks is about 14.2 million, of which 71 000 yaks are present in India (2). According to the summary report on 18<sup>th</sup> livestock census 2007 of Sikkim state there are 6468 yak in Sikkim alone (3). The mountainous terrain hardly leaves any land for agriculture although these regions are rich in medicinal plants. There are four districts in the small state of Sikkim: North, South, West and East populated by a number of indigenous communities viz., Bhujels, Bhutias, Chettris, Dukpas, Gurungs, Kagateys (Yolmos and Sherpas), Kamis, Lepchas, Limbus, Lachenpas, Mangars, Mistris (Sarkis), Newars, Rais, Tamangs and Thamis residing in this landscape for at least the past several centuries (1).

The Bhutias and Tibetan Dukpas are the major communities involved in yak herding after the twentieth century with herding being transferred from Eastern Nepal to Khangchendzonga landscape (5). Yak rearing is the only alternative to provide sustainable source of income to the people of the alpine region. The local communities herd livestock like yak, *Dzomo* (cow-yak hybrid) and domestic cattle. In Sikkim, yak is found at Lachen, Gurudongmar Lake, Chopta valley, Lachung valley and Yumthang in North district, Tsomgu Lake, Kupup, Thegu, Nathang in East district, and Yuksom-Dzongri in West Sikkim region. The first part of the paper describes the rearing of Yak by the ethnic communities in North and East Sikkim. However, the rearing of Yak originally started from Nepal, which was inherited from Bhutan (5). The Second part consists of its multipurpose uses; being raised by the herders for providing milk, meat and manure. Using the traditional knowledge passed on from generations the herdsman has developed novel practices for yak husbandry and yak product technology.

The present study describes the interrelationship that exists between yak and human that include the small group of ethnic people of North and East Sikkim. The knowledge gap that exists between local people and future generations can be filled by the preservation of their true culture, social and ecological attributes. The paper would open new avenues for future research serving as a baseline for further research in Sikkim. Some new ethnic beverages, food and value added products have been studied and reported. It would also draw attention to the higher authority on keeping yak in high priority conservation.

## **II. Materials and Methods**

Study was based on the most common research method. It is probably the best method for collecting original information of large groups. Through the method of open question and face to face interviews it was easier for the interviewer to explore for additional information on qualitative data collection from the respondents to ensure the facts on traditional yak management practices and the processing technology of the traditional products from yak milk. A set of questionnaire was prepared for the study area. The Tsmogu lake region in the East District, Lachen and Lachung in North District of Sikkim were the study areas, as maximum yak populations are found in these regions. A random sample of 35 households were considered, those involved in yak rearing and using traditional practices in maintaining their livelihood as well as the neighboring households. The management practices adopted by the herder community, the production of milk products and milk processing methods were studied in these areas. During the inquisitiveness of seeking facts from the herdsman, there was explanation on the purpose of research, benefits, research methodology used for the aim to preserve and conserve the traditional knowledge.

## **III. Results and Discussions**

The word “Yak” is an English word derived from Bhutia language *gyag*. Yak word in English refers to both male and female but in Tibetan, male is called yak and female is called *De*. The hybrids of yak and cattle are called *dzomo* (female) and *dzo* (male). The ancestors of yak were from Tibet which then migrated to Bhutan and Nepal and have however developed characteristics due to evolution (4). The scientific name of yak is *Bos grunniens* belonging to Class Mamalia and Phylum Chordata, with a height of about 2 meters and long hair covered body to keep them insulated in the cold alpine regions of the Himalayas. The various characteristics of yak must be attributed as adaptations to many factors like extreme cold; high altitude with low oxygen content of the air and nutrition with short growing seasons for grazing in herbaceous plants (5). Yak survives in the annual mean temperature below 5°C and the average in the hottest month is less than 13°C (5). This bovine mammal can survive cold temperatures up to - 40 °C and altitude of 3000 – 5000 m above the mean sea level. As per traditional knowledge, yak survival in such extreme condition is only due to the presence of long thick hair on their bodies, and rich fat layer deposit which keep them to remain insulated in such low temperatures. In the winter season the yaks maintain their internal body temperature by the presence of long coarse outer hair and an undercoat of fine hair. It is believed that yak adapt to low oxygen content of the air as they possess a large chest, large lungs and a large heart relative to their overall body size. In the Northern region it was observed that yaks differ in the amount of hair in their body, the color of body hair, milk production and presence or absence of horns (Figure 1).

According to the herders, wild yak prefer to live in herds of tens or even hundreds of animals, they have a very acute sense of smell and try to escape immediately on sensing or seeing people or other animals. According to the herders wild yak is large in body and strong, they have thick and long hair covering the whole body. The color of the hair is usually jet brown or jet black. Wild yaks are highly tolerant of cold and starvation. Wild Yak is resistant to diseases as reported by herder community but diseases due to parasitic infections through ticks and lice are common.

Yak is also called “surefooted animal” and excellent pack animal (8) as its foot has major grip towards the bumpy and stony heights of the rocky mountain terrain and for this reason it is often used to carry ration and other goods from one part to another by the tribes and army men to their camps in the North Sikkim which cannot be reached by horse or sheep. The yak bull when crossed with local cow produces *Zo* which is mainly used to carry goods. Yak, if in danger of sinking in a marsh, will spread out their legs and use the inner side of their bodies to escape from sinking; it will show swimming-kind of motion rather than panic and thrash around as a horse might (8). The strong limbs and solid hooves of yak attributes help them to walk in dangerous places and over marshland and to climb over steep mountains.



**Figure 1** (a), (b), (c) and (d) Yaks observed in East Sikkim, (e), (f) Yaks observed in North Sikkim

## **1. Yak rearing**

### **1.1. Management and grazing pattern of Yak**

The herders generally follow traditional methods of yak management owing to the topography and cultural influences. The yak raisers or the herdsman maintain yak in a semi-migratory fashion. During the winter seasons the yaks survive in extreme cold conditions but due to decreased vegetation they are moved down to lower areas with better pasture. When summer arrives and the temperature starts to warm up the yaks are migrated to higher altitudes into the temporary houses. The local herders train yak to understand commands by throwing stones in sling or *whurto*, made from its coarse fiber to control yak herds and chase unwanted animals. Yak grazes in open areas that are not fenced, after grazing yaks are called by herders by whistling or singing. At night yaks are brought to the shed for protection from wild animals and for milking. In summer season yaks are

left free for grazing early and brought late to the shed but during the winter season yaks go out late and brought back early. The herders have indigenous traditional ecological knowledge for selection of diverse groups of native shrubs. Being a herbivore animal, yak feeds on wild flowers and various shrubs in the alpine Northern Sikkim State. Yak depends 90-95% on the grazing pattern. It was observed that yaks graze on long grasses like other cattle do but they can also graze on short grass, creeping stems, roots and tender branches or shrubs. The yak feeds on palatable shrubs like *Kobresia napalensis* ("sun buki"), *Kobresia capillifolia* ("kesari buki"), *Carex nivalis* ("dharkhare"), *Phleum alpinum* ("doodhe jharr"), *Festuca valesiaca* ("rani buki"), *Kobresia duthiei* ("bhalu buki"), *Juncus* sp. ("suire buki"), *Allium prattii* ("dandu"), *Heracleum* sp. ("ganer"), *Selinum tenuifolium* ("cheeru"), *Rheum acuminatum* ("khokim") and *Carex nigra* ("harkat"), during the summer season. The indigenous herbs besides having medicinal attributes are considered by the herders to be nutrient rich (5). It is believed that in some households the herds are kept together and moved from less grazing pastures to more grazing pastures. But in some households yaks are kept in fenced areas where they are grazed in a surrounding area and taken to the shed for feeding. Apart from grazing yaks are fed with supplementary feed like molasses, barley, maize flour and water. The lactating herd, non-lactating herd and the pack herd are kept separately in the shed. Yaks consume less feed than cattle, preferring fresh and high quality forages; their feed intake gets reduced at high temperature. Yaks are also fed with bamboo leaves cut from the local areas by the owners. The sheds are cleaned every morning after sending the yaks for grazing in pastures, the feces are collected in a bucket and the uneaten feed is removed. The feces are pressed with fingers and then dried for future use as fuel for cooking.

### **1.2. Indigenous practices for yak health management**

Many diseases in yak are thought to be caused by nutrient deficiency especially during winter and also by environmental stress. Yak and cattle are affected by similar kinds of diseases. The herders informed that yak feed on the dead remains of animals that harbor harmful bacteria often causing infection. Yak is also sometimes infected by polluted water. Blood and stool samples are collected by the officials of Department of Animal Husbandry and bacterial infections that result in symptoms of mineral drenching and food poisoning. Traditionally, affected animals are given a drink made from medicinal herbs. The Department of Animal Husbandry also supplies necessary antibiotics and vitamins for these kinds of infections. The herdsman said, under certain circumstances of infection symptoms of abortion also appear. Mastitis occurs in yak, but it is believed that the incidence is less than among dairy cattle, because of the relatively low milk yield of yak and the suckling of calves. Pal (1993) referred to a virus outbreak in Sikkim in 1973(6). It is also believed that yaks are affected by diseases caused by parasites like ticks, lice and mites. Sometimes yaks die after drinking marshy stagnant water especially during the onset of the winter season. Yaks are also affected by diarrhoea; the stools are of a thin, pasty to watery consistency and sometimes contain blood. The herders fed the yaks with drink made from traditional herbs to alleviate such symptoms.

Some herdsman feed them with wheat and salt adding to mineral content when they do not have balanced mineral supplement after every 15 days. It is said that, the milk quality depends on the medicinal property of the herbs and shrubs of the terrain. The herder narrated that milk yield is closely related to pasture growth and quality. The yaks are fed with the residue of Chhurpi and Shyow as they are highly nutritious. After giving birth to a young calf, yak is fed with residue of local alcoholic beverage made from rice, maize, barley and finger millets. They are also fed with jaggery for quick recovery from child birth. The herdsman use crush rhizome of a local medicinal herb locally called as "pakhanved" (*Bergenia ciliata*) to cure fractured bone, fresh cuts and wounds of yaks.

### **1.3. Breeding of Yak**

As said by the herder community the breeding season reaches at peak during July to August when temperature is at its highest and grass growth at its best thereafter stops around November. Yak breeds in the warmer months with a gestation period of nine months in general like cow and give birth to young calf during April to July with May being the peak month, however the gestation period may vary with respect to the type of yak. Most yaks give birth to young calf at 5 to 6 years of age. In three years there are 2 calves as informed by the herders. The body weight of young born calf is estimated by herders to be about 10 kg to 16 kg whereas the adult body weight is 150 kg to 175 kg. It is believed if the male has a thick and a short horn then the chances of producing male is high. The life span of wild yak is believed to be about 20 years. During the survey, the herder informed that in earlier days when Sikkim was an independent country, there used to be frequent trade between Tibet and Sikkim as the border was porous. The open movement across the border facilitated cross breeding of yaks. But when the borders were sealed, the herders faced problems of inbreeding which resulted in weak, unhealthy and unproductive stocks. As informed by a personnel from the Animal Husbandry Department, Government of Sikkim, crossbreeding practices was done to improve the quality of yak but it was not successful when elite yak bull from Bhutan was supplied to the farmers for improving the genetic traits and conservation of this threatened breed in the period of four years. However Yak breeding farms have been developed at Chopta

valley as a summer station and another breeding centre at Zeema in North Sikkim as winter station by the state Government.

#### 1.4. Milk Processing

It is believed that milk yield is higher in hybrids than in pure yak. *Pheno* refers to yak type in Bhutia language gives less milk compared to *Hazi* type which gives more milk. The consistency of yak milk is thick, fatty, cream in color and sweet in taste. Total yak milk yield is 147-487 kg during lactation period of 180 days has been reported (9). Yak milk and dairy products are popular foods in high-altitude regions. Yak milk contains 16.9- 17.7% solids, 4.9-5.3% protein, 5.5-7.2% fat, 4.5-5.0% lactose, and 0.8- 0.9% minerals (9). Yak milk is rich in fat, protein, essential minerals, and healthy polyunsaturated fatty acids such as conjugated linoleic acid and omega-3 fatty acids (10, 11). Yak milk and its milk products play a major role in providing essential nutrients and minerals to the herdsman and the native people of the region as a staple food. The milching is done by the women once during the early morning and in some cases twice also in the evening before the sun set when the cattle return from the pasture. For milking the hind legs of yak are tied and then milking is started in the shed. Sometimes women also go to the yak around the pasture with bucket in hand for milking. The amount of milk driven by hand ranges from ½ litre to 2½ litre with the peak milk yield during the months of August and September. Collected milk is then preserved before being molded into various value added products to earn their livelihood by the implementation of their indigenous knowledge. Milk is collected and kept without boiling in utensils made up of wood and sometimes plastic jars for several days. Only when the sufficient milk is collected then processing of milk is done. Although milk is taken at the expense of calf, yak milk is molded into varieties of indigenous milk products in various household.

## 2. Multipurpose uses

### 2.1. Milk products

The most common Yak milk products of Sikkim are *Shyow* (Dahi in Nepali) (7), *Marr* (Ghew in Nepali) (7), *Thara* (Mohi in Nepali), *Chhurpi* (7), Chilu (Yak Fat), *Philu* (7) and *Tema* (Yak cream) (as per survey) (Table 1).

Table 1. The various traditional products of yak milk.

Sl. no	Local names of yak milk products	Common names in English
i)	<i>Shyow</i>	Curd
ii)	<i>Khachu</i>	Whey
iii)	<i>Marr</i>	Butter
iv)	<i>Shuza/Shapjha or Phuicha</i>	Butter Tea
v)	<i>Chhurpi</i>	Cheese
vi)	<i>Philu</i>	Creamy cheese
vii)	<i>Tema</i>	Cream

#### 2.1.1. *Shyow*

*Shyow* is curd in Bhutia language, it is known as Dahi in Nepali or Hindi language. *Shyow* is either naturally fermented yak milk or is prepared from the addition of a starter culture used for fermentation (7).

#### 2.1.2. *Khachu*

Butter milk or whey is known as *Khachu* in the local Bhutia language and *Mohi* in Nepali. It is the fermented by-product of *Shyow* or Dahi. It is a popular refreshing beverage of the alpine region.

#### 2.1.3. *Marr*

Butter is known as *Marr* in the local Bhutia language and it is known as *Ghew* in Nepali (7). It is one of the principal yak milk products of the local community of North and Eastern alpine region of Sikkim and highly expensive being Rs 700- Rs 800/- per kg. The herder communities churn *Shyow* in wooden containers locally called as *zodong*. Some of the solid butter is kept for consumption and some for offering to the sacred Gumpa (Temple) in the form of butter lamps (Figure 2a). *Marr* is used for cooking and frying edible items, or it is consumed directly. It is used to prepare *Tsamba*, made from barley is the staple food of the Dokpas that looks like flour. *Marr* is melted and added to barley and baked potato by the local people and consumed as a snack.

#### 2.1.4. *Shuza/Shapjha or Phuicha*

The local people consume tea made up of yak milk with salt known as *Shuza/Shapjha or Phuicha* in the local language of the herders. It is believed to be one of the oldest traditional beverages of the indigenous community in the alpine region. They drink tea throughout the day providing the Dokpas the most possessed supplement in their diet. Salt tea has been most popular delicacy among the local people and consumed on a

regular basis although sugar is available to them. In Nepali language it is called *Ghew Chea*. It is a refreshing beverage served by the local community to their guests.



Figure 2 (a) *Marr* or Butter ready to be packed into leaf (b) *Dongmo*, vessel for making *Shuza/Shaviha* or *Phuicha*

It is made in wooden vessel known as *Dongmo* by herders (Figure 2b). Boiling tea is added in *Dongmo*, *Marr* (Butter), salt and yak milk is added for taste and spun with a wooden stick tied to rope by hand. The tea has a soup like consistency and is served hot.

#### 2.1.5. *Chhurpi*

*Chhurpi* is of three types: Soft *Chhurpi*, Hard *Chhurpi* and *Dudh Chhurpi* (7). Soft *Chhurpi* is one of the most common traditional fermented food products in the house hold of the Sikkimese community. To the local this delicacy item is highly palatable and also replaceable to even the non-vegetarian food. Hard *Chhurpi* is sweet in taste and chewy. It is the most famous ethnic food highly relished by the tribal community. These types of *Chhurpi* are very hard and have low moisture content; it can be stored for a number of years. The more aged the harder it is with more value. *Chhurpi* costs about Rs 600/- per kg in the surrounding area and even more if marketed (Figure 3a). *Dudh Chhurpi* (Figure 3b) is much expensive than other two *Chhurpi*.



Figure 3 (a) Hard *Chhurpi* (b) *Dudh Chhurpi*

#### 2.1.6. *Philu*

During milking of yak, fresh the milk is added directly into cylindrical bamboo vessels (called *dzydung* by the Bhutia) or in wooden vessels (called *yadung*). The soft creamy mass attached to the branches of *lawa*, a local plant is then scraped off and stored as local cheese which has great value in the market. This soft creamy mass is called *philu* (7).

### 3.1 Meat Products

Meat forms a major part if the diet of the local people in the North and Eastern part of Sikkim. The local people prepare and consume a variety of traditionally processed smoked, sun-dried, air-dried, or fermented meat products, including sausages since olden days. Male yak is slaughtered instead of female yak. Mostly yak killed in accidents is consumed by the herdsman. The herdsman consume yak meat on a daily basis and also

during festivals like *Losar* in month of February (Figure 4). The following are the yak meat products: *Satchu* (Dry meat), *Kargyong* or *Gyuma* (Sausages) and *Chilu* (Yak Fat) (11). Yak *Satchu* costs Rs 500 to 600 per kg. According to one of the herdsman, in olden days fat separated from fresh meat was collected in sheep stomach, pressed with stones and hung in their houses but nowadays they use wooden jars to store fat until further use. Food cooked in its fat is considered as being tastier than in normal oil. Fat stored in these manner are used by the local community for a year or more.



Figure 4(a) Yak meat in normal drying process, (b) Cooked meat served with “T momos”

#### 4.1. Value added products from Yak Fibre

Two types of wool are found in yak, coarse outer hair and the inner soft hair coat called *Khullu* in Bhutia language. During shearing Yak gives more coarse hair of about 2 kg and 1/2 kg of fine hair. The hair of Yak is highly water proof with great tensile strength (Figure 5 (a, b).



Figure 5 (a and b) Yak fibre, drying of detached the skin with hair from the yak body

The horns of Yak are also used for decorative purposes and considered holy. The horns are round and very thick about 15 - 20 cm in diameter. Fine wool or *Khullu* is used to make garments like muffler, sweaters and blankets. The fine wool woven to make garments resists rain and cold winter. Coarse hair is used to make tents, caps, blankets, hand bags, door mats and hand woven carpets. Carpets (Figure 6a) and door mats are woven in wooden frames traditionally and are used to cover the floor, chairs for making softer and warmer sitting in chairs. Good quality caps are also made by mixing the yak wool with the fine wool of Angora rabbit making them highly attractive, aesthetic and acceptable by the tourists. Ropes are prepared from long hairs that are twisted over to tie tents or domestic animals. The ropes are highly strong that can withstand sun, wind and rain. Slings locally known as *whurto*, made from coarse fibre is used to control yak herds and chase unwanted animals. Besides body hair yak tail also has religious value. The tail is washed properly and tied tightly with a rope in a wooded handle to make *Chamar* and used as a fly whisker in some areas in India. Besides a fly whisker it also has some aesthetic value. Its cost price in local markets ranges from Rs 5,000 to Rs 6,000 (Figure 6b). Yak skin is also used to make hide, tents to resist cold, *mura* or stool (Figure 6c) and for many decorative purposes.



Figure 6 (a) Carpet made from Yak hair, (b) Yak tail or *Chamar* and (c) Yak hair attached with skin to make *mura* or stool.

#### IV. Conclusion

The herder community follow traditional pattern of management and grazing pattern of yaks due to climatic conditions and socio- cultural conditions. The yak keeping varies from both primitive and advanced ways of semi- migration in winter seasons. Grazing pattern followed by the herders depend on their indigenous knowledge of pasture. The traditional health management practices rely on the knowledge of indigenous medicinal herbs passed from generation to generation. The indigenous knowledge all together plays a pivotal role in maintaining yak sustainability and also their livelihood sustainability. Thus the documentation of traditional knowledge would provide the preservation of culture and indigenous practices used by the Lachenpas, Lachungpas, Dokpas and Bhutia communities of North and East Sikkim and used as a key for poverty mitigation and food security. The livelihood sustainability of the herdsman of the alpine Sikkim is mainly around the Yak, a “surefooted” multipurpose animal. Yak is their major income generating source for poor herdsman from its milk, meat, hair, skin to tail serving them to help their survival in this world away from transformation making them to value traditional values, religion, community and ethnic beliefs. Without it, one cannot imagine how humans could survive in this beautiful but hostile environment.

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