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Shift from Transhumance and Subtle Livelihood Patterns of the Bhotia Community and its Impact on Tibetan Sheep Population in Sikkim (India)

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Abstract: Tibetan sheep are carpet and apparel wool producing ovine breed of the Indian subcontinent. The Bhotia community of North Eastern India traditionally rears the sheep of this breed. The Tibetan sheep are adapted to the temperate climate and have been providing livelihood for majority of the people in the region. Livestock herding was the primary occupation of the people of the higher altitude regions of the area but it has been observed that the younger generations are shifting, towards alternative sources of livelihoods. This is leading to reduction in the sheep population in the region. The need for conservation efforts of the Tibetan sheep in India has long been recommended. Les moutons tibétains sont le tapis et la laine de confection produisant la race ovine du sous-continent Indien. La communauté Bhotia de l'Inde Nord de L'est élève traditionnellement les moutons de cette race. Les moutons Tibétains sont adaptés au climat tempéré et ont fourni des moyens d'existence à la majorité des gens dans la région. Le bétail s'assemblant était l'occupation primaire des gens des plus hautes régions en altitude de la région; il a été remarqué que les générations plus jeunes se déplacent, vers les sources alternatives de moyens d'existence. Cela cause la réduction de la population de moutons dans la région. Le besoin pour les efforts de conservation des moutons Tibétains en Inde était longtemps recommandé.

Key words: Tibetan sheep · Wool quality · Sikkim

INTRODUCTION

Sikkim is a small mountainous state in the Eastern Himalayas with an area of 7,299 square kilometers. It lies between 27° 04' to 28° 07' 48" N latitude and 88° 00' 58" to 88° 55' 25" E longitude. To its north, lies the Tibetan plateau, to the west the kingdom of Nepal, to the east the kingdom of Bhutan and the Chumbi valley of Tibet and to the south, the Darjeeling district of West Bengal, Figure 1. The shape of Sikkim is almost rectangular, 113 kilometers long and 64 kilometers wide. The elevation of hills ranges varies from 300 to 8400 meters above mean sea level. The state of Sikkim is situated in route between Tibetan Autonomous Region of China and Kolkata (the largest city of eastern India). The state is divided into four districts, namely East, West, North and South. The Tibetan sheep are reared at the higher reaches of the North district of Sikkim beside Kameng district of Arunachal Pradesh (another state of north east India), Acharya [1].

The Bhotia community of Sikkim has been strongly influenced by Tibet in its religious and cultural development. The Lachenpa (residents of "Lachen', a hamlet) and Lachungpa (the residents of "Lachung", a hamlet) are the residents of North district of the state of Sikkim.

The families residing at Thangu (a small hamlet) own yaks (ranging from 20-150 heads per family), sheep (some families had exclusively sheep, flock size ranged from 400 to 500 heads), goats (flock size ranged between 5 and 20 heads per family) and horses or mules (numbers ranged between 4and12 heads per family), Avasthe [2]. Their traditional occupation was trading of wool and pastoralism. In the recent decades, their occupational character has changed to agro-pastoralism.

The transhumance families live between Samthong (a pastoral village) and Thangu from April to November, every year. They migrate to lower altitudes, during the winter months (from second fortnight of November till the onset of summer months when the snow melts).

The residents have no land ownership rights and pay a nominal royalty of Rs. 1.50 per yak and Re. 0.50 (1 USD= Rs 47.0) per sheep to the State Forest Department, Avasthe [2].

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Fig. 1: Location of Sikkim

The region is quite inaccessible and almost all the essential items for their daily usage is brought from Gangtok (the capital), which is also the market for the pastoral products viz. finished woolen products which include dried meat, wool and "churpi" (a type of smoke dried hard cheese), Avasthe [3].

The Tibetan sheep are allowed to graze in the open pastures during the day and enclosed into stone-fenced barns during nights. Without any proper shelter, this leads to a number of deaths amongst the lambs and convalescent sheep; the fodder is also scarce during the winter months.

The wool from Tibetan sheep was an important item of trade till the first half of the last century. The trading between India and Tibet ceased thereafter leading to scarcity of apparel and carpet grade wool in India. The

demand for wool (in India) was thereafter met by importing the product from Australia and New Zealand.

The sheep migrated to India with the Tibetan traders and who earlier used them as beast of burden for transporting various merchandise besides wool, Government of Bengal [4].

The present project was carried out to study the fleece character of Tibetan sheep and the impact of livelihoods changes in the Tibetan sheep population of North district of Sikkim.

MATERIALS AND METHODS

The wool from the Tibetan sheep was collected from the sheep breeding area of North Sikkim. The wool fiber from the Tibetan sheep was analyzed using optical fiber diameter analysis techniques and standard methodology as recommended by Baxter *et al*. [5]. The mean fiber diameter was analyzed according to the guidelines suggested by AFD; IWTO [6] and average fiber curvature was drawn as per the methods suggested by AFC; IWTO [7].

The information on Tibetan sheep pertaining to their habitat, distribution, management, reproduction and production parameters was obtained from their raisers using preset questionnaires.

The data on various biometric traits were recorded on twenty-four rams and seventy ewes from the Thangu area of North Sikkim. This was carried out using self-devised instruments and as per the methodologies suggested by Macjowski and Zieba [8].

RESULTS AND DISCUSSIONS

The coat colors of the Tibetan sheep are mostly white with black neck, forequarters and face; the ewes are polled while the rams are horned. The average length of their ears at maturity is 5.5±1.2 cm the ears are drooping. The Tibetan sheep have Roman nose, their face, neck, belly and feet are devoid of fleece, Figure 2. The wool of Tibetan sheep is dense and lustrous.

Some of the biometrical traits of Tibetan rams and ewes are presented in Table 1. The values for the biometrical traits studied find consonance with the results obtained by Acharya [1]. The average age at first lambing of the ewes of the Tibetan sheep is around 14±1.5 months. Lambing takes place once a year usually between the months of July and September when the fodder is plenty and the weather relatively warm. The lambs born in the late autumn have poor survivability due to the onset of winter prior to their weaning. Twinning percentage amongst the ewes is around 2-3 percent. The ewes of Tibetan breed of sheep have good mothering ability.

Grazers during transit carry young lambs in specially made pouches, which are carried by horses or mules. They allow the lambs suckle the dam at certain times of the day, to facilitate easy movement and also to save the lambs from predators.

The Tibetan sheep loose about 15-17 percent of their weight (in comparison to their weight in the summer months) in the winter months which can be attributed to lack of fodder during these months and also due to improper housing facilities for the sheep. Tibetan sheep

Fig. 2: Last of the Tibetan sheep at Bichu village (Lachung), North Sikkim

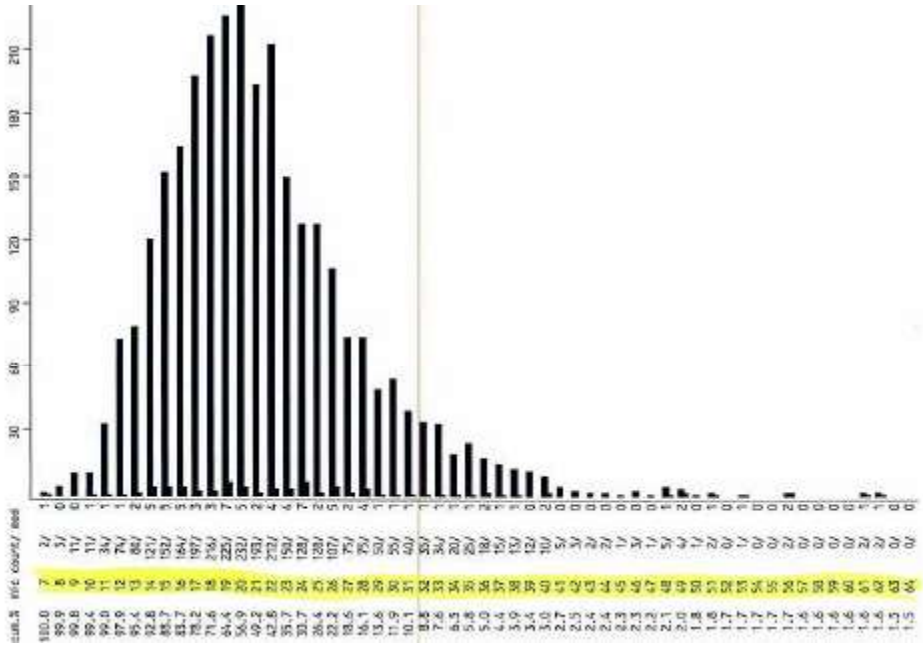

Fig. 3: Optical fiber diameter analyzer (OFDA) curve of Wool from Tibetan sheep, from Lachen, North Sikkim
The third row from the top indicate the average diameter (in microns) of the wool, the row above it indicates the fiber count and the top row indicates the medullated fibers under each category of fibers

Table 1: Means ± standard error (numbers) of some biometrical traits of Tibetan sheep

Parameters	Rams	Ewes
Height at withers (cm)	65.5±2.8 (24)	62.7±1.5(70)
Body length (cm)	71.5±3.4(24)	66.2±2.9(70)
Chest girth (cm)	82.5±2.9(24)	77.2±3.2(70)
Body weight (Kg)	29.5±2.8(24)	25.7±1.5(70)

Table 2: Optical fiber diameter analyzer results of the wool obtained from a Tibetan sheep

Trait	Values
Mean fiber diameter (ìm)	22.5
Fiber diameter standard deviation (ìm)	11.9
Coefficient of variation (%)	52.8
Percentage fiber (%> 30ìm)	11.9
Curvature (degree/mm)	83.5
Opacity (%)	61.5
Medullation (#/3000)	132
Medullation%	4.4

are reared in the open and while grazing in the meadows they are there guarded by the Tibetan Mastiffs, (a breed of dog).

The average age at weaning of the lambs is around 110 days. The average carcass yield of the Tibetan sheep is around 48% and the meat is succulent and tender, some of the carcasses are smoke dried which assists longer shelf life.

The average greasy wool yield varies between sexes; age and type of management the yield of which varies between 300-900 grams per clip, clipping of the wool is done twice a year. The average staple length of the wool fiber as obtained in this study is 7.5±0.18 cm (N=50) finding consonance with the results obtained by Acharya [1], higher values for the trait have been reported by, Nyima [9] from sheep reared in Tibetan region of China.

The quality parameters and the optical fiber diameter analyzer (OFDA) results of Tibetan sheep wool (collected from sales lot) are presented in Table 2. The presented results (Table 2), indicates that the mean fiber diameter (MFD) of the wool obtained from the Tibetan sheep reared in North district of Sikkim is lower than values obtained reported by Nyima [9].

The pricing of the wool is decided on its MFD values, the trait that is highly heritable and therefore has been included globally as a parameter for wool quality and clip preparation improvement. The MFD results obtained in the present study indicate that the fleece quality of Tibetan sheep falls under the ½ category of wool fiber, Mathis and Faris [10].

The high values of standard deviation (SD) of the Tibetan sheep wool obtained in the present study may be attributed to variations in fleece quality.The lower values of (SD) within a given MFD value indicates fleece with

better spinning quality. The wool from the sheep with low SD values also tend to be less prone to fleece rot and also have a higher staple strength.

The coefficient of variation of fiber diameter percentage (CVD%) results obtained in the present study is on the higher side, indicating the wool of Tibetan sheep is uneven in character and style, IWG [11]. Both SD and CVD% values are influenced by non-genetic factors and therefore the values vary between years, IWG [11].

Under ovine breeding programs, CVD% values are considered for indirect selection criteria for staple strength. The SD and CVD% results vary within sheep of the same breed and therefore the values for sales lot of wool (as analyzed in the present study) would tend to be higher, than results obtained from a single sheep, IWG [11].

The study indicates that the potential of the wool obtained from Tibetan sheep are in the manufacture of apparel (finer wool), carpets and rugs. The kemp fibers can be used for the manufacture of felted products. The result of the OFDA curve, of the wool obtained from Tibetan sheep is presented in Figure-3, the result of the wool is curved is skewed to the left hand side of the histogram, generally referred to as a fine edge, IWG [11].

The wool analysis results obtained in the present study pertaining to the fleece of Tibetan sheep indicate that there is scope for improving the softness of the wool by selecting sheep with lower MFD values.

The apparels manufactured from the wool of Tibetan sheep is soft and has a high comfort index, the results can be collated with the low MFD values as obtained in the study even if the SD and CVD% results are higher. IWG [11].

It can also be concluded from the present results that the fleece obtained from the Tibetan sheep is amongst the best obtained from native ovine breeds of the Indian subcontinent. The findings are in consonance with the observations of Roy [12].

The census reports on ovine population (numbers of heads) reared in the state of Sikkim presented in Table 3 (a) show that the domestic sheep population in the state has decreased by 36% (with respect to the 1977 census), Government of Sikkim [13]. The figures in Table 3 (b) indicate that the quantity of wool obtained from the Tibetan sheep (reared in the North District of the state) is 43 8.percent of the total wool production of the Sikkim state, Government of Sikkim [13]. The gradual decline in the native ovine breeds in the Himalayan region of India can be attributed to attempting breed crossing of the native ovine breeds with the Merino sheep. The breed crossing was aimed to improve the fleece quality of the native ovine population.

Table 3a: Number of heads of Tibetan sheep in Sikkim

1977	1997	2003
16104	5023	5796 (36% of 77)

Table 3b: Wool production from Tibetan sheep for the year 2005-06 (in Kg)[1]

North (Mangan)	653.00 (43.06% of total production)
Total State (Sikkim)	1516.45.

The ovine population in the other Himalayan states of India too is dwindling. Sheep population in the Uttaranchal state of North India has decreased by 73.2 percent over the last twenty years; Garbyal *et al*. [14]. Diminution in sheep population in Western Himalayan states of India has been attributed to the shift from pastoral to agro pastoral livelihood amongst the various tribes in the region, Ahmed [15] and Joshi [16]. The raisers of the Tibetan sheep in the North district of Sikkim are culling/castrating the rams so that the ewes do not breed in the following season.

Lack of access to grazing land is leading to curtail in ovine flock size by the livestock raisers in the area, Fig. 4. The large herds of yak and sheep that were earlier maintained on the high altitude meadows exercised immense pressure on the limited rangeland often resulting in avalanches and land slides in the region, Government of Sikkim [17].

The study (pertaining to shift in livelihood patterns of the Lachngpas and Lachenpas) indicated that the pastoralists are willingly reducing their livestock population, which in most of the cases can be attributed to dearth of professional herders besides limited access to the meadows.

Lack of fodder especially during the winter months results in mortality among the ovine population especially amongst the convalescents, newly weaned and yet to be weaned lambs. This results in financial distress amongst the livestock raisers who are amongst the economically challenged members of the society.

The woolen carpets, Figure-5, produced by the traditional crafts person are finding fewer buyers. The synthetic carpets of similar motifs are replacing the woolen carpets. The synthetic carpets are gaining popularity, as they are easy to maintain and are cheaper. This is desisting the weavers to invest further in the profession. The symbiotic relationships between the various production channels (raisers, dyers, spinners, weavers) need to be rejuvenated by establishment of marketing channels.

Fig. 4: Tibetan sheep grazing near Thangu, North Sikkim

The Department of Handicrafts, Government of Sikkim is promoting carpet weaving by establishing centers in different parts of the state. The Khadi and Village Industries Commission, of the state, have recently started providing soft loans to the members of self-help groups in Lachung, to establish new looms. The National Bank for Agriculture and Rural Development has established farmers club in the region to assist the pastoralists by providing them with need based capacity building programs.

The Tibetan sheep can be promoted for the production of organic wool and mutton. The proposed activity along with proper marketing of the value added produce could assist in the conservation of the Tibetan sheep and can also be a step towards the sustainability of the pastoral lifestyle of the community.

Some Recommendations Towards the Conservation of the Tibetan Sheep in North Sikkim:

- It is recommended that a large gene pool of the Tibetan sheep be maintained at the region keeping into account the numbers that can be sustained in the fragile ecosystem of the region by establishing a nucleus flock and studying the production and reproduction parameters of the same in-situ. This can be done by encouraging the existing herders to rear sheep and also to provide better husbandry practices.
- Formulation of self-employment opportunities, training facilities that use local/natural resources for the promotion of handloom and handicrafts and incentives towards sustainable harnessing of natural resources and proper marketing opportunities thereof.
- Integration of commercial production of medicinal plants and conservation, protection of the natural habitat and pastoralism to ensure sustainable utilization of natural resource base.
- The breeding of the Tibetan sheep has to be organized utilizing the scientific sheep breeding and animal husbandry methods, integrating with indigenous traditional knowledge thereby suiting the needs of the high altitude region.
- Wise adaptation/ application of, if any crossbreeding as an improvement strategy without disturbing the nucleus flock of the breed.
- Multidisciplinary approaches from various organizations are needed to safeguard the cultural heritage of the Bhotia community.
- Establishment of community level fodder depots, to cope up with the forage shortage during the winter months.

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