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Pashmina Goat Farming in Cold Arid Desert of Changthang and Its Impact on Economy of Changpa Nomads of This Region

Akeel Bashir Beigh and Samina Bashir

Abstract

In Changthang, there is a trend towards increasing the livestock population, especially a breed of goat (*Capra sibirica*) that produces one of the finest natural fibres: pashmina, which is the mainstay of economy of Changpa nomads. The environmental condition of this region suits for the development of pashmina, therefore, these animals are reared in large numbers. Changthangi goats are reared under harsh climatic conditions (-40 to $+40^{\circ}\text{C}$). Best quality pashmina is produced in this region and is economic mainstay of nomadic people of Changthang. Pashmina fibre is very expensive as it is being used for production of world's finest shawls. The Changthang region alone produces around 35,000 kg of raw pashmina fibre every year from about 0.15 million of Changthangi goats, which form 80% of the total pashmina production of the country. 90% of the population in Changthang area survives on the income from goat and sheep, which is nearly \$8.4 million, annually.

Keywords: pashmina goats, Changthangi, Changpa, cold arid desert

1. Introduction

Goats, essentially an Asian animal are distributed in all ecologies and their fibres classified as mohair, pashmina and hair, but mohair and pashmina have the commercial importance. India's indomitable heritage is possession of goats in high altitude Himalayan cold arid region that produce pashmina (cashmere), which is fine, tough, warm and soft. Pashmina can also be defined as the down (undercoat) fibre derived from cashmere goats with a diameter of 30 microns or less. Pashmina has derived its name from the Persian word 'Pashm' meaning, soft gold, the king of fibres [1]. India produces the best pashmina of the world with an annual production of about 40 tons but this is merely $<1\%$ of the total world production [2, 3]. In India two pashmina breeds viz., Chegu and Changthangi are recognized. Changthangi goat is reared in Changthang and adjoining areas of Leh in an area of 20,000 sq. km at 3000–6000 m above MSL (-40 to $+40^{\circ}\text{C}$) under extensive system. Pashmina is the economic mainstay of the people of Changthang, as almost 55% of the income is generated by this fibre [4]. With the increase in demand of raw pashmina the cost of this fibre is highest in the international market (90–180 Eu/kg in 2004) [5]. The present per annum production of pashmina from Ladakh is about 35,000 kg which is harvested from about 0.15 million Changthangi goats [6, 7].

Pashmina is a precious animal fibre for its warmth, firmness, lightness and softness apart from to dye absorbing property in comparison to mohair or wool. Pashmina is a valuable fibre for quality designer apparels. Guinness Book of World Records has accredited it with the reputation of being costliest cloth in the world after ban imposed on natural fibre Shahtoosh (called as King of fibre) produced from small Tibetan Antelope known as *Chiru*. Fifty tonnes of pashmina was produced in India during 2005–2006, 80% of which was obtained from *Changthangi* breed. Fibre obtained from goats with $<19\ \mu\text{m}$ of diameter is termed as cashmere however, the Changthangi fibre has average diameter of $10\text{--}14\ \mu\text{m}$, making it the best. Pashmina shawls which are brilliantly dyed are prepared from *Changthangi* goats are a fashion sensation with essential elements of style and comfort throughout the world [8].

Besides *Changthangi* goats, *Changluk* sheep (used for meat purpose) is an essential part of pashmina goat based trans-humance delivery system. It serves as alternative source of income for sustenance of *Changpa* when the production system fails. The Changpas rearing the pashmina goats in the Changthang region have a significant contribution to the economy of Ladakh (cold arid region, which accounts for $107,545\ \text{km}^2$ of the total $387,390\ \text{km}^2$ zone in the country). Rest of the region is a hot arid Indo-Gangetic plain and peninsular India [9]. Nomads encounter a myriad of problems, like, poor living standards, fodder shortage, no market accessibility and involvement of huge investments. These hindrances render nomads to generate very much lesser returns than its potential.

2. Breed characteristics

This goat (*Capra hircus*), a mammal belonging to subfamily Caprinae and family Bovidae produces fine, soft and much straighter double fleece of hair called guard hair. These goats are of medium type, their height ranges from 60 to 80 cm. The average weight of male and female pashmina goats is about 45 and 35 kg respectively. They possess wide horns; have blocky builds, and refined features. Pashmina goats occur in different colours. White tends to be dominant but black, brown, red, cream, grey and badger faced are very common. These goats tend to be alert and cautious, rather than docile and placid. These traits are largely due to their feral ancestry, relatively only a few generations back (**Figure 1**).



Figure 1. Pashmina goats leaving for grazing. Source: Beigh (author of this chapter).

3. Morphological characters

Colour of Changthangi goats generally vary from white to light brown (88% of the goats are white in colour and only 12% have a light brown colour). The colour of the head of Changthangi goats ranges from white to black with a few animals spotting grey head. Birth parameters are: the length is about 26.0 ± 0.2 cm, the height at wither and girths at chest is 27.7 ± 2.0 and 29.9 ± 1.6 cm, respectively. The whole body of the animal is covered with undercoat of pashmina as well as long hair. The face and muzzle are without hair. The ears of Changthangi goats are small in size and erect while the horns possess a typical character. The horns are curved first upward and then backwards, downwards and onwards. The body is observed to be straight and heavy.

Goat size (avg.)	Changthangi male (adult)	Changthangi female (adult)
Body weight (kg)	30	28
Body length (cm)	52	53
Body height (cm)	53	52
Chest girth (cm)	66	65

3.1 Classification of pashmina goats

Based on the various physical parameters, the world pashmina goats can be classified into four main groups: (1) western, (2) eastern, (3) feral and northern, and (4) Pashmina-Mohair crossbred goats [3].

3.1.1 *The western (Kirgiz) type*

The principal characteristics are a higher production of undercoat and coarser undercoat fibres than Mongolian and feral goats and undercoat is often longer than the outer coat. Undercoat weight as a percentage of fleece weight is 75–80%, but there is some content of intermediate fibres. Undercoat fibre length is 9–11 cm, fibre diameter 18–20 μm , body weight of adult does 34–36 kg and body weight of adult bucks 55–60 kg.

3.1.2 *The eastern (Mongolian) type*

The principal characteristics are long outer coat fibres protecting a fine undercoat, and shorter undercoat fibres (5–6 cm) than in the Kirgiz type. Undercoat production is up to 350 g for does and 600 g for bucks, but more for the best animals. The principal aims of selection are a higher undercoat weight and longer undercoat fibres, but no change in undercoat diameter.

3.1.3 *Feral and northern goats*

Re-domesticated feral goats are relative newcomers in cashmere production, and the population is very heterogeneous and unimproved. Undercoat percentage and production are often smaller than the economics of single-purpose production would require, and the role of these goats in the economy should be viewed, at present at least, from the point of multipurpose production.

3.1.4 Pashmina-Mohair crossbred goats

Crossbreeding of cashmere goats with mohair goats leads to increases in fibre length, fleece weight and fibre diameter. Over-long undercoat, resulting from crossbreeding with mohair goats, is prone to weathering.

4. Management practices

The hardy and agile Changthangi animals are well adapted to the migratory life practiced under difficult conditions by Changpa. The Changpas reside in traditional circular tents called as 'Rebo' with a local heater arranged in the centre (**Figure 2**). The herds are moved out in open each day for grazing throughout the day and later returned to the villages by night. The grazing spots for summer and winter are properly earmarked although the herds remain migratory. The harsh climatic conditions induce the production of undercoat for insulation against the extreme weather. The animals have adapted well enough to survive on sparse diet where they prefer scrubs to richer grasses. The goats moult at the beginning of summer, by the end of winter combing is done using a combing device to obtain maximum yield of pashmina. The sexual cycle photoperiodism regulated, triggered by decreasing day length and the animals become sexually active from June. Breeding takes place during November and December and the kidding takes place during months of April and May. The kid mortality has been observed to be low, approximately 3%. For mating purpose one buck is sufficient enough to breed 40 does. Weaning of the young one is normally done at 4 months of age. Daily milk production averages 700 ml/animal with lactation length of about 5 months. The goats are kept in open air within stone fencing (**Figure 3**). Highland grazing is generally carried out during the month of July to September, while as the pasture grazing is done during months of May to June and October to December. Goats are restricted to stall feeding from January to April to avoid exposure to the very cold weather. In stall feeding, the average concentrate given to individual animals amounts to 400 g for does, 500 g for bucks and 300 g for young animals daily, while fodder given has been estimated to 1.5 kg to bucks and 1 kg to does as well as young animals daily.

4.1 Production parameters

Of total 15,000 metric tons pashmina wool produced in the world, China's share is 70% followed by Mongolia at 20%. India's yield constitutes a mere 1% of the world's pashmina production. Of this, 40 tones are derived from the around 1.6 lakh



Figure 2.
Outer view of Rebo. Source: Beigh (author of this chapter).



Figure 3.
Pashmina goat paddock fenced with stones. Source: Beigh (author of this chapter).

pashmina goats found in the Ladakh region of Jammu and Kashmir. Pashmina yield by bucks is lower and a relatively higher yield by does. These goats are very poor in milk production. On an average a female goat can produce 200–500 ml daily. Pashmina yield per annum in Changthangi goats is about 80 g at first clip, 150 g at second clip, 230 g at third clip, 200 g at fourth clip and 210 g at fifth clip. The length of fibre is observed as higher in males than females [10].

4.2 Reproductive parameters

The reproductive traits of the goats make up an essential part of the farmer's ability to maintain the farm population systematically making the farming enterprise profitable. The age of first tuppung, age of first kidding, the gestation period, kidding interval and the litter size of Changthangi goats is 668 ± 18 , 830 ± 13 , 152, 397 ± 7 days and 1, respectively. Single kidding is more common in 99% cases and twinning is very rare in Changthangi goats. Gestation period of Changthangi goats is 150 days.

4.3 Properties of pashmina fibre

Fibre fineness is the most important quality parameter and it differentiates pashmina fibre from the sheep wool. The average fibre fineness of pashmina fibre is 12–13 μ . The average fibre length is 55–60 mm. The fibre length depends on its origin/genotypes, grade and source. The mean fibre length of guard hair varies from 25 to 93 mm [2]. The microscopic structure of the fibre is given in (Figure 4).

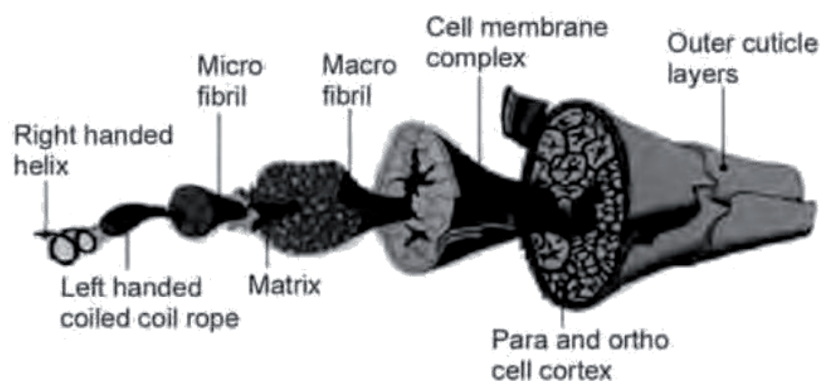


Figure 4.
Morphological structure of wool. Source: Shakyawar et al. [2].

5. Disease prevalence

Occurrence of diseases is quite rarely observed in Changthangi goats. Most common problems are related to stunted and retarded growth. Sometimes, animals suffer from diarrhoea which due to parasitic and poisonous grasses. In goat kids, tapeworms, roundworms and coccidian infestation has also been observed sometimes. In big farms, vaccination is followed for FMD, pox and clostridial infection. Gid is a common incidence in Changthangi goats. Tick infestation is commonly found. Deworming with anthelmintics and dipping with some antiparasitic drugs two times a year is being followed in some of the organized farms. However, these medical activities are not so common among the poor small village farmers, which has resulted in comparatively higher mortality in the animals. Sometimes, genetic defects like cryptorchidism, stumpy ear, short legs, prognathism and mixture of body colour is found in some animals.

6. Economics of Changthangi goat rearing

Changthangi goat rearers usually build up the flocks from their own animals over the period of productive life of animal and cull old/unproductive and dispose surplus animals. The most important benefits from *Changthangi goat* rearing is in the form of pashmina, animal sales, changes in flock inventory, milk and manure. The returns obtained from pashmina forms the major chunk of gross returns in *Changthangi goats* (>40%) which is followed by the sale and value addition in kids. Goat rearing not only generates income for the people living under harsh cold climatic extremes, but also provides a livelihood as well as food security to the nomads (*Changpa*) in the form of milk and meat. Pashmina enterprise being profitable also possesses self-employment potential and if proper attention and care is taken, it will prove helpful in increasing the family welfare of down trodden nomads rearing the breed under miserable conditions [8].

7. Material and method

Changthangi goats are mostly concentrated in Changthang sub-division (Nyoma and Durbuk blocks) of Ladakh which is also known as pashmina belt of Jammu and Kashmir. In addition non-descript goats and Changluk sheep are reared mainly for meat and milk in other parts of Leh. In this chapter information regarding birth weight, lactation period, calving period, age, kidding, yield of pashmina, disease occurrence, marketing values, etc. is provided.

8. Discussion

In India, pashmina is obtained from Ladakh region of Jammu and Kashmir, Lahul and Spiti valley of Himachal Pradesh, Uttar Kashi, Chamoli and Pithargarh districts of Uttaranchal. The pashmina obtained from Jammu and Kashmir is known as Changthangi pashmina whereas that obtained from HP and Uttaranchal is known as Chegu pashmina. Best quality pashmina is produced in Changthang region of Ladakh and is economic mainstay of nomadic people of Changthang.

9. Conclusion

Pashmina, as a valuable fibre being produced by Changthangi goat, should be marketed properly in order to help the farmers derive greater economic benefit. The

rearing of pashmina goats is economically viable in terms of gross, net, family labour income and employment generation. Fodder banks may be established to supply fodder to the farmers during lean periods. A proper management, health monitoring and well planned breeding programme should be adopted to enhance the performance of Changthangi goat.

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