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Cashmere producing smallholder nomads of himalaya: Survival challenges of a system

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A B S T R A C T

Cold arid region of Himalaya is famous for Changthangi Cashmere (Pashmina) producing breed of goats reared under transhumance production system. Breeding tract of Changhthang spans from the Chinese province of Quinghai in the East across central and North Tibet to Ladakh (India) in the West with an altitude of 3700–4500 m amsl and wide seasonal/diurnal fluctuating temperature (35 °C to − 40 °C). Two field studies were conducted with objectives to assess performance, livelihood security, pastoral nomadism, value chain and survival challenges of Cashmere goat based smallholder production system. Multistage stratified random, probability proportional to size sampling, project evaluation, growth models, and constraint analysis techniques were used to synthesise the results based on data collected from 350 nomadic households rearing 25,659 goats in three zones of Changthang with variable altitudes. Results reveal altitude, demographic trend, flock structure and size, sex, age and grade of Cashmere exhibited statistically significant high correlation ($r > 0.80$) between altitudes and flock size vis-a-vis fibre quality. Important contributing factor for quality fibre diameter (≤14 μ) turned to be cold aridity, altitude ≥4000 m asl and availability of quality pastures. Cashmere yield was recorded highest in castrated bucks (585 g) and lowest in does (385 g) with body weight highest in castrated (30 kg) and lower in breeding bucks (27 kg). Overall, Cashmere production and breed population showed growth (CAGR) of 3.7% and 4.94%, respectively with BCR (2.72:1), IRR (1843.17%), NPV (INR 72.14) and payback period of one year, indicating the viability of the production system. In the value chain, brilliantly coloured feather weight Cashmere shawls, rumal and stoles handcrafted from the fibre with 20 times value addition annually realised around INR 1679 million (USD 24.70 million) revenue besides generating employment of 3.56 million mandays. Constraint analysis indicate survival challenges of the production system and the study flags policy options to arrest diseases, high inbreeding, winter malnutrition, kid mortality, trans-boundary hostility, onslaught of fake products besides infrastructure deficits in Changthang.

1. Introduction

Wool in Shina language (*Dardu dialect*) is called 'Pash' while in Persian it is called 'Pashm' and pashmina means woolen (Cunningham, 1853). With the exception of South Asia, the pashmina fibre is globally known as "*Cashmere*" (The old spelling of Kashmir). Pashmina fibre occupies a prime position among animal fibres, because of firmness, warmth, durability, lightness, softness and ability to absorb dyes and moisture, as compared to mohair and other types of wool, for being free from modulation and crimps. Pashmina is a highly valued fibre for manufacturing quality apparels. It has recorded its name in the Guinness Book of World Records for being costliest cloth in the world after a trade ban was imposed on the most precious natural fibre *Shahtoosh* (King of fibre) of small Tibetan Antelope known as Chiru.

World pashmina production increased from 4500 metric tonnes (mt) in year 1991 to 15,000–20,000 mt in year 2012, i.e. by about 3–4 times. However, during corresponding period, global production of mohair declined from 20,000 mt to 5000 mt. China is the major contributor with nearly 70% of world's Cashmere production followed by Mongolia which contributes more than 20% i.e. 3000 mt (FA0, 2012). Smaller quantities of pashmina are produced in Iran, Afghanistan, former Republics of U.S.S.R, India, Turkey and Pakistan. India has almost static pashmina production of 50 t per year for the last decade and it is less than one per cent of the total global production of pashmina (Wani et al., 2007). During 2013–14, pashmina production in India was 50 t of which Changthangi breed of goats contributed 90% (LAHDC, 2014; Gupta et al., 2006). Goat fibre with less than 19 μ is usually classified as Cashmere but the fibre from Changthangi breed is even finer with average diameter of 10–14 μ. For that reason it is considered the best quality, warmest cashmere/pashmina in the world. As a matter

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Table 1
Classification and geographical distribution of Cashmere/pashmina goats.

Group	Breeds	Geographical distribution
Kirgis goat	Altai mountain, Charihissar, Down, Don, Kirgis, Orenburg, Anatolian Black, Kazakh, Morkhor, Uzbekh, Asmari, Vatani	USSR (former) & Afghanistan
	Kurdi, Morghose, Rani	Iran & Iraq
Mangolian goat	Chegutu, Chungei, Jinning, Lianoning, Wun, Xingjing and Mangolian	China & Mangolia
Kashmir goat	Changthangi, Chegu, Kaghani, Kel	India, Pakistan
	Hill goat, Bhotia, Sinhal Tibetan	Nepal & Tibet
European & Oceania goat	Ferel goats,	Australia, New Zealand, Scotland & USA

of fact, fibre diameter is the single most important feature of pashmina wool. Smaller the diameter, finer the fibre (Ryder, 1987). The next important features of pashmina wool are fibre length, colour and yield. The quality of fine pashmina wool is directly related to the altitude at which nomads graze and maintain these goat herds. However, fibre diameter of individual goats/sexes may be more or less than the range for a village. Generally, altitude, cold aridity and availability of quality pasture land have been found important determinants of high quality low fibre diameter.

2. Classification and geographical distribution

All important breeds of goats yielding Cashmere are from a single group called Central Asiatic “Pashmina goats” (Masoni, 1981). However, this main group has been further divided into various sub groups. The goat breeds which produce pashmina fibre in different countries are listed in Table 1.

In India, two recognized pashmina goat breeds are Changthangi and Chegu. Average pashmina production of Changthangi breed is superior to Chegu with fibre fineness at par (Mishra, 1985). Changthangi breed with normal population is native to high altitude areas (3700–4500 m amsl) in Ladakh region of Jammu and Kashmir, reared by pastoralist nomads “*Changpas*”. The population of this breed is 1,70,000. In addition to this, 35,000 non-descript goats in other parts of Ladakh also produce pashmina fibre. Altitude of pashmina belt ranges from 3000 m to 5000 m above sea level. Topography and climate of these areas are suited for pashmina production (Bhatt, 1992; Wani et al., 1995, Thakur et al., 2005). Changthangi breed owes its name to a Tibetan word ‘Changthang’, which means “northern plains” (Chang = Northern, Thang = Plains).

3. Pashmina goat production economics

Production parameters of pashmina goats are usually the economic indicators that reflect their overall production performance and characteristics. Many factors; biological, climatological and physiological affect the production traits. Data collection under field conditions compared to organized government/private farms has obvious difficulties. Nomads do not maintain records on production traits, as such the researcher have to rely on the information collected through extensive surveys by interviewing the nomads and field functionaries of Sheep Husbandry Department. Breeding tract of Changthangi goats (Changthang sub-division of Ladakh) comprised of three zones, viz., Kurzok, Nyoma and Durbuk with 17 villages and 3033 households of which 2282 households reared pashmina goats. A sample of 250 households (11%) were randomly selected from the zones and villages through probability proportional to size.

Milk, though a prime trait in most of the goat breeds is less significant in Changthangi goats because they are reared mainly for Pashmina and Chevon. Does in the flock are milked for human consumption according to the requirements of the newborn children/family/market demand. Generally, does are not milked in February and March in view of scarcity of fodder and grazing. The overall average milk yield per doe per day in Changthang was 300.05 g with 355.79 g, 295.23 g, 250.04 g during a particular lactation in Kurzok, Nyoma and Durbuk zones, respectively. Average lactation length per doe was 126.07 days with lactation yield of 38.30 kg. Lactation period ranged from 113.71 days to 134.85 days and yield from 30.14 Kgs to 44.04 Kgs in different age groups. Average age at first kidding was 729 days and ranged from 699 to 754 days across the age groups. Age at first mating ranged from 13 to 17 months when animals attained body weight of more than 18 Kgs. Kidding interval i.e., the time period between two consecutive kiddings, was 340, 349, 346 days in Kurzok, Nyoma and Durbuk zones, respectively and ranged from 326 to 390 days across the age groups. The does bearing male kids have a slightly higher kidding interval length. Maximum concentration of kidding in Changthangi goats was during the month of April (59%), followed by that in March (15%) and May (13%) buttressing the fact that temperate and cold arid goats are seasonally polyoestrus (Davendra and Burns, 1970). Much difference was not observed in seasonality in kidding among different zones. The overall average sex ratio observed in the born kids was 48:52 (48 males to 52 females). Prolificacy or multiple births was a rare phenomenon in Changthangi goats. The twinning percentage was only 4–5%. The overall kidding percentage was observed to be 95% and ranged from 93 to 98% in different zones (Wani and Wani, 2007). Calendar of various events of pashmina goats is summarized in Table 2.

Pashmina quality and quantity are influenced by various factors such as sex, age, body weight, and availability of nutrients/pastures, altitude, temperature, degree of atmospheric dryness and ratio of secondary hair follicles and colour of pashmina. However, the most important traits are sex, age, body weight and location of the villages. Pashmina yield across all sexes, zones and villages was the lowest in 0–1 age group, maximum in 3–4 and 4–5 age groups and decreased thereafter with the advancement in age. The results further revealed that the average pashmina yield of all age groups was highest in castrated bucks and lowest in does. Body weight was also highest in castrated bucks and lowest in breeding bucks. Animals in Kurzok zone yielded rawer pashmina (432.76 g) as

compared to Nyoma zone (357.77 g) and Durbuk zone (338.11 g). The same trend was observed in body weight. This fact is also established by government officials, traders of Ladakh and proudly affirmed by *Changpa's* (pastoral nomads) of Kurzok zone. Important parameters besides other factors are better quality grazing lands and more caring of animals.

Total input cost of *Changthangi goat* rearing was estimated to be INR 594, INR 537 and INR 514 per animal and INR 68787, INR 36511 and INR 29307 per flock in Kurzok, Nyoma and Durbuk blocks, respectively. Imputed value of family labour was found to be the major component of the total expenditure because animals are reared as migratory flocks and accounted for 38.90, 44.13 and 47.06% of total cost in three blocks, respectively. The most important benefits from *Changthangi goat* rearing were in the form of pashmina, animal sales, changes in flock inventory, milk and manure. The *Changthangi goat* rearer's earned a net profit of INR 971, INR 741 and INR 725 per animal and INR 112732, INR 50404 and INR 41307 per family in zone Kurzok, Nyoma and Durbuk blocks, respectively and was the highest compared to any other goat species in India. The magnitude of net annual income generated from goat in zone Kurzok was 30.99 and 33.98% higher compared to zone Nyoma and