



## Ectoparasite prevalence in Pashmina goats in Changthang: A pastoralnomadic area of Ladakh

MIR SHABIR<sup>1</sup>, MOHD IQBAL YATOO<sup>2</sup>, M S KANWAR<sup>3</sup>, SYED SHAFAT KUBREVI<sup>4</sup>,  
RUKSAR DAR<sup>5</sup> and KUNZES ANGMO<sup>6</sup>

*Krishi Vigyan Kendra, Nyoma, Changthang, Ladakh 194 404 India*  
and

*Sher-e-Kashmir University of Agriculture Science and Technology of Kashmir, Jammu and Kashmir 190 025 India*

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### ABSTRACT

The present study was a part of the survey which was carried out on Pashmina goats during November 2014 to October 2015 from in and around Nyoma block of Leh in 13 villages. There were around 38,412 Pashmina goats in 228 flocks which were less than 8 years recorded from these areas. Young goats constituted around 15–20% of whole goat population. The male and female goat constituted about 27–32% and 68–73% of total adult population respectively. During the study, an attempt was also made to find out ectoparasite prevalence, which showed that 21.12% male, 32.89% female goats and 35.31% young ones were infested by single or mixed ectoparasites. The infestation rate of ectoparasites was significantly higher in females against male goats. The analysis also showed that the prevalence of ectoparasites was significantly higher in younger (35.31%) than adult goats (27.01%). The most common ectoparasites encountered were lice. Tick was present in very less predominance. Flea and mite were rarely present. The seasons of highest infestation of ectoparasites were autumn and winter (>65%), the least being spring and summer. Therefore, to reduce high prevalence of ectoparasites and their impacts on the productivity and health status in Pashmina goats, appropriate and strategic control measures by creating awareness among farmers through extension services is needed.

**Key words:** Changthang, Ectoparasites, Goats, Ladakh, Pashmina, Prevalence

Production systems in Ladakh are adapted to the harsh environment in which they operate. Depending on the degree of access to high rangeland pasture like Changthang, the pastoralists, synonymous with nomads, raise mostly Pashmina bearing goats and Changluk sheep, but also maintain a more diverse herd structure composed of yak, horses, and donkeys. Goats and sheep make up the vast majority (95%) of the total herd, 55–68% Pashmina goats and 27–40% Changluk sheep. The net returns from Changthangi goat rearing which produce the finest cashmere wool or Pashmina in the world were obtained from Pashmina and formed the major component (>40%) followed by sale and value addition of kids (Wani and Wani 2007). Ectoparasite infestations have direct effect on animal production and productivity, reproduction, pruritis, exoriation and in some skin diseases cause serious economic

loss to farmers through down grading and rejection of skins, they are also efficient vectors of many diseases caused by protozoa, viruses, bacteria and rickettsia to man and domestic animals (Radostits *et al.* 2000). Lice are host specific ectoparasites that spread mainly by direct contact (Heath *et al.* 1995), if left uncontrolled, these lice could reduce wool quantity and quality, and cause defects in goat leather (Wilkinson *et al.* 1982, Heath *et al.* 1995). Identifying and characterizing the common ectoparasites involved in small ruminants is an important step towards developing and implementing strategic control and preventive measures (Kassa *et al.* 1998). Moreover, considering the place of goats in the socio-economic and livelihood of 90% farmers of Changthang, there is need for regular check on ectoparasites infestation in them to increase their economic values and productivity.

### MATERIALS AND METHODS

The study was conducted from November 2014 to October 2015 in cold arid region of Changthang of Leh district of Jammu and Kashmir, India. The Changthang region is the Indian Trans-Himalayan area of Ladakh represents the western extension of the Tibetan Plateau, an important highland grazing ecosystem. It lies 4250 m above

Present address: <sup>1</sup>Subject Matter Specialist (shbr.ahmad@gmail.com), KVK, Shopian. <sup>2</sup>Assistant Professor (iqbalyatoo@gmail.com), Division of Clinical Medicine, Shuhama. <sup>3</sup>Programme Coordinator (mskanwar2004@rediffmail.com). <sup>4</sup>Assistant Professor (shafatkubravi2015@gmail.com), Division of Agricultural Extension, Wadora. <sup>5</sup>Junior Scientist (drruksar@rediffmail.com), KVK, Malangpora. <sup>6</sup>Junior Scientist (Iodznuk@gmail.com).

sea level where the highest altitude Krishi Vigyan Kendra of India, Nyoma exists. The area lies approximately between 36° 10' to 36° 60' N and 77° 55' to 78° 20' E with maximum dry season. The temperature in Changthang during summer (from April to September) varies from 6.1 to 23.2°C with the highest average of 17°C in July-August. During winter months, temperature decreases far below the freezing point around -35°C. Flocks of goats (228) from 13 villages like Kharnak, Rupshu, Korzok, Chumur, Punguk, Buk, Rongo, Tsaga, Kuyul, Nyoma, Nidder, Mudh and Angkung were selected and studied for Pashmina goat population as well as for the prevalence of ectoparasites. From each flock, the animals were categorized into three groups, viz. adult male and female and young groups. The ages of animals were determined by the method described by Alello and Mays (1998). From each flock, six animals were randomly sampled and selected for ectoparasite examination from every three groups. A total of 1368 animals were sampled randomly from each group. A total of 4104 sampled Pashmina goats in all the three groups were examined to study the distribution of ectoparasites. The whole body parts of the animals were examined for the presence of ectoparasites. Examination of animals was done by close inspection after proper restraining and by taking samples to the laboratory for further processing. Ectoparasites including lice, and rare ticks were collected by hand from their attachment site, put in universal bottle containing 70% methanol (Soulsby 1982), for further identification of the parasites. Two methods of treatment were applied for control of ectoparasites. During summer season, dipping method in which Butox (Deltamethrin: Dosage: 4 ml/litre of water) was usually practised. During fall and winter seasons, Neomec (Ivermectin: Dosage: 1mg/5 kg BW S/C) was practised.

Microsoft excel spread sheet was employed for data storage. Arithmetic mean and standard error were calculated, tabulated and the statistical analysis of data was done as per Snedecor and Cochran (1994). In all the analysis, comparisons having  $P < 0.05$  were considered to be statistically significant. Prevalence was determined by the formula described by Thrusfield (2005) as the rate of number of infested animals and total number of animals in the population using simple percentiles.

## RESULTS AND DISCUSSION

This present study, extending into number of villages of Changthang having favourable Pashmina goat population, considered the levels of infestations of ectoparasites involved in male, female and young goats. A total of 38,412 Pashmina goats in 228 flocks constituted the total Pashmina goat population of 13 villages. The male, female and young goat population of the area is summarized in Fig. 1. Young goats constituted around 15–20% of whole goat population. The male and female goat constituted about 27–32% and 68–73% of total adult population respectively. The most frequent ectoparasites encountered were lice. Tick was present in very less predominance. Flea and mite were rarely

present. It was also observed that all the body regions having major or minor importance in ectoparasite prevalence. Cornall and Wall (2015) found that the goats with poor body condition were number of times at risk for lice and tick infestation than goats of good body condition. Sayyad *et al.* (2016) revealed widespread occurrence of ectoparasites in ruminants in Muzaffarabad District, Azad Jammu and Kashmir, and major ectoparasites identified were ticks, lice and mites.

The ectoparasite prevalence was significantly ( $P < 0.05$ ) higher in females (32.89%) than males (21.12%) (Table 1) and could be attributed to extra nutritional requirements needed by female in reproduction and lactation. Similar observation was reported by Orji *et al.* (2012) in goats of Nigeria. Obi *et al.* (2014) found 70.70% of overall prevalence of goats in Uli Nigeria and females had more infestation of 70.8% as against 29.2% in male goats. The prevalence of ectoparasites was significantly ( $P < 0.05$ ) higher in young (35.31%) than adult goats (27.01%) in the present study. Sertse (2004) reported an overall prevalence of ectoparasites as 60.1% and 54.2% in kids (young) and adult goats of Amhara region of Ethiopia, respectively. Tesfaye *et al.* (2012) observed that total ectoparasite prevalence was significantly ( $P < 0.05$ ) higher in young than adult small ruminants of Northwest Ethiopia. He also observed that lice was significantly ( $P < 0.05$ ) higher in goats than sheep. The higher prevalence in young animals could be attributed to their poor grooming behaviour. Moreover, acquired immunity added to the relative thicker skin of older animals may also contribute to greater resistance against ectoparasites in older age category. Kusiluka and Kambarage (1996) observed that kids and lambs are more severely affected by fleas and louse than adult animals. Yakhchali and Hosseine (2006) observed that according to age and sex, the heaviest infestation rate (13% and 13.5%) was observed in female sheep and goats with 5-year-old sheep and goats, respectively in Urmia Suburb, Iran. The result of the present study showed an overall ectoparasite

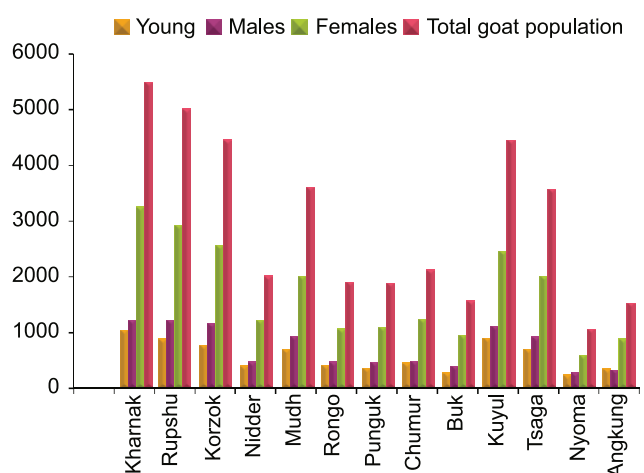


Fig. 1. Geographical distribution of field study area (Pashmina belt) showing total population of goats based on number of flocks of goats, age and sex.

Table 1. Overall prevalence (%) of ectoparasite in goats according to the sex and age

Ectoparasite infestation (goats)	Sex		Age	
	Male (1,368)	Female (1,368)	Adult (>6 months) (2,736)	Young (<6 months) (1,368)
Animals sampled				
Number of infected animals	289	450	739	483
% Prevalence	21.12%	32.89%	27.01%	35.31%
Overall prevalence (%)	27.01		29.78	

prevalence in goats as 27.01% by sex and 29.78% by age (Table 1). This result was lower (73.3%) than the report of by Tadesse *et al.* (2011) from Ethiopia. Variation in geographical locations, climatic conditions, and management practices in the area might have contributed for the variation in ectoparasite prevalence. The flock numbers and flock sizes might have also contributed to the variation in their prevalence.

The ectoparasites were present on the animals throughout the year, being most abundant in fall and winter (>65%) and the least in summer. Although ectoparasites were present on the goats throughout the year, their numbers seemed to increase particularly after summer when the grazing pastures lost their greenery with higher fodder scarcity of Changthang and ectoparasites attacked the weak and lean animals. Yakhchali and Hosseine (2006) observed that seasons of highest infestation were fall and winter (50%), the least being spring and summer in sheep and goats of Urmia Suburb, Iran. Neog *et al.* (1992) also found that prevalence of infection was higher in young and female animals in the winter. Hence nutrition and freezing temperature were considered the most important factors that influenced the seasonal variation in numbers. Seasonal changes in the general indices of ectoparasites paralleled seasonal changes in the relative abundance of feed and fodder availability. Favourable climates, poor management, poor animal health and poor awareness of farmers are believed to have contributed for the widespread occurrence of ectoparasites in Changthang.

In addition, organophosphate-based dips like Butox (Deltamethrin, Dosage: 4 ml/litre of water) and Neomec (Ivermectin, Dosage: 1mg/5 kg BW S/C) have been offered as a broad spectrum control against all the ectoparasites in Changthang. Dipping remains the most common method of the prevention in short summer season (May-September). Due to short summer season, it was not possible to go for dipping programme throughout the year as a result of which ivermectin remains most useful in winter which can be given through subcutaneous route easily in any period. This is why ivermectin remains in large demand for the people of the area. The therapeutic efficacies of subcutaneous injection of ivermectin at 0.2 and 0.4 mg/kg and extra-label pour-on administration of eprinomectin at 0.5 and 1 mg/kg BW resulted in a low number of engorged female ticks in relation to untreated control goats and at the highest dose rate (0.4 mg/kg), the female engorgement weights were significantly lower and the pre-oviposition period significantly longer than those observed in ticks

recovered from untreated control goats (Lifschitz *et al.* 2008). The end result of ectoparasitism was decreased Pashmina production in terms of quality and quantity, decreased milk production, significant blood loss resulting to anaemia, hide quality lowers as infested animals scratch, rub and bite the affected areas and this end up with skin damage, increase susceptibility to disease and infection, transmit diseases etc. The result presented here suggests that young ones and female ones need special attention to prevent them from severe ectoparasite infestation. The high prevalence of lice in Pashmina goats of the area highlights the need for control measures.

This study, extending into 13 villages of Changthang, took into consideration the population of Pashmina goats, levels of infestations of ectoparasites involved age and sex related epidemiology. In general, the individual climatic conditions, fodder availability of this area and the importance of the Pashmina goats for Pashmina in the national economy are all factors that call for more efforts to study the ectoparasites problem. The study of ectoparasites is important, as the animals are already deprived of nutrition in the fodder scarcity region and to reduce burden of parasitism. In contrast to the frequency of occurrence of these parasites, infestation is not taken into consideration very seriously by farmers, which calls for an extension work to be carried out in this area, a fact that represents an obstacle to the control measures. Therefore, further studies are needed to estimate what economic losses are caused by these parasites and to establish measures for their control by creating awareness through KVK and animal husbandry departments.

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