

Ectoparasite of Small Ruminants in Guto-Gidda District, East Wollega, Western Ethiopia

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Abstract: A cross-sectional study on the prevalence of ectoparasites of sheep and goats was carried out in Guto-Gidda district, East Wollega, Western Ethiopia from October 2010 to May, 2011. Of the total 228 sheep and 155 goats examined, 140 (61.40%) sheep and 90 (57.69%) goats were infested with various types of ectoparasites. There was no statistical significant difference ($P > 0.05$) in prevalence between the two small ruminant species. The ectoparasites identified in both species of animals were ticks (24.74%), mange mites (15.36%), fleas (11.45%), lice (6.51%) and sheep ked (1.82%). Ticks were the most abundant ectoparasites recorded both in sheep and goats with a prevalence of 25.44% and 23.72%, respectively. The genera of ticks observed in both sheep and goats were *Amblyomma spp.*, *Rhipicephalus spp.* and *Boophilus spp.* in a decreasing order of prevalence. An overall prevalence of 15.87% mange mites was observed in both sheep and goats with 13.16% and 18.59%, respectively. The identified species of mange mites found in both species of animals were *Sarcoptes scabiei*, *Psoroptes spp.* and *Demodex spp.* in a decreasing order of prevalence. Sheep were found to be infested with two species of lice (*Linognathus spp.* and *Damalinia ovis*) while goats only with *Linognathus spp.* The fleas, *Ctenocephalides spp.*, were detected in both sheep (12.28%) and goats (10.25%) and *Melophagus ovinus* only in sheep (3.47%) were also detected. Generally, no statistically significant variation ($P > 0.05$) was observed between age groups, sexes and different body conditions in the ectoparasite prevalence in sheep and goat specific populations. Different ectoparasites tended to prefer different predilection site on the animals' body. This study showed that the growing threat of ectoparasites to small ruminant production needs well-coordinated and urgent control intervention.

Key words: Prevalence • Ectoparasites • Sheep • Goat • Ethiopia

INTRODUCTION

Ectoparasites are organisms, which inhabit the skin or outgrowth of the skin of the host for various periods [1]. The damage ectoparasite inflict may be mechanical, but the situation is complicated also by host reactions to the presence of the particular parasite, their secretion and excretion [2]. It has been estimated that more than 38 million cattle and 30 millions small ruminants, constitute the major portion of livestock resources in Ethiopia [3]. Meanwhile, small ruminants constitute about 30% of the total livestock population of the country and are among important contributors to food production in Ethiopia, providing 35% of meat consumption and 14% of milk consumption [4].

Different type of ectoparasite species widely distributed in Ethiopia and a number of individuals reported the distribution and abundance of ectoparasite species in different parts of the country [5-12]. Currently different causes of skin disease of small ruminants in Ethiopia are accountable for considerable economic losses particularly to the skin and hide export due to various defects [13].

Skin diseases caused by lice, sheep ked (*Melophagus ovinus*), ticks and mange mites are among the major diseases of small ruminants and cause serious economic loss to farmers through mortality, decreased production and reproduction, down grading and rejection of skins which also affect the tanning industries. According to tanneries report, skin diseases due to external parasites

cause 35% sheep skin and 56% goat skin rejection in Ethiopia [14]. This study was designed to see the extent of damages and the prevalence associated with ectoparasites infestation in East Wollega, western Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted in East Wollega, western Ethiopia which lies between longitude 36°32.9'N and latitude 9° 4'S. This area lies in altitudinal range of 2010m above sea level with an average annual unimodal rainfall ranging between 800 to 2400mm and temperature fluctuation of 9-22.4°C [15].

Study Population: The study animals were 384 small holders' indigenous sheep (n=228) and goats (n=156) managed under extensive management system. Simple random sampling method was used to select study animals. The sex, the age groups and the physical condition of each sampled animal was registered.

Collection and Examination of Samples: A total of 384 sheep (n=228) and goats (n=156) were examined for the prevalence of external parasites. Sheep and goat body coat were thoroughly examined by close inspection and parting the hairs against their natural direction for the presence of ectoparasites after proper restraining. For the detection of mange mites, skin scraping samples were collected from clinically affected areas using the standard techniques [16]. The collected mites were preserved in bottles containing 5% formalin. Skin scrapings from the suspected sites of infection were heated in 10% potassium hydroxide to dissolve the protein of the skin and hair. The sediment in the tube was examined under the compound microscope. The body surface of the affected animals was characterized by alopecia, marked,

accumulation of crust and fissuring. Mange mites encountered were identified based on their morphological features [17]. Hard ticks, lice, fleas and sheep ked were collected from the different parts of the body of the individual sheep and goat by hand picking. Adequate precautions were taken to preserve the whole body parts of the ectoparasites during collection [18]. The ectoparasites were preserved in 70% alcohol in clean, well-stopper glass vials. Vials were individually labeled properly with the necessary information and transported to Veterinary Laboratory of Wollega University for identification. The morphology of the ectoparasites was studied in the laboratory with the help of dissecting (x4) and compound microscope (x10) and was identified according to the keys and descriptions given by Soulsby [19] and Wall and Shearer [20].

Data Analysis: Analysis of data was carried out using SPSS Version 17. The prevalence of each ectoparasite in study animals was computed in percentage. In order to see the magnitude of variation in the prevalence of ectoparasites among sheep and goats, the data were analyzed statistically using Chi square test.

RESULTS

In the present study, 59.89% (n=230) of the small ruminants harbored ectoparasites. Among 228 sheep and 156 goats examined, 140(61.40%) and 90(57.69%) were found to harbor different types of ectoparasites. There was no statistically significant difference ($P>0.05$) between the two animal species in the overall prevalence of ectoparasites. The different ectoparasites identified in both species of animals were ticks (24.74%), mange mites (15.36%), fleas (11.45%), lice (6.51%) and sheep ked (1.82%) (Table 1).

Table 1: Prevalence of ectoparasite fauna of sheep and goats in the study area

Type of ectoparasites	Species of animals			
	Sheep (n=228)		Goats (n=156)	
	No. positives	Prevalence (%)	No. positives	Prevalence (%)
Ticks	36	25.44	21	23.72
Mites	30	13.16	29	18.59
Lice	17	7.45	8	5.13
Fleas	28	12.28	16	10.25
sheep ked	8	3.47	-	-

Ticks were the most abundant ectoparasites recorded both in sheep and goats with a prevalence of 25.44% and 23.72%, respectively. There was no significant difference ($P > 0.05$) between the proportion of sheep and goats infested by ticks. In sheep, *Amblyomma* (10.09%) was the most abundant followed by *Boophilus* (8.77%) and *Rhipicephalus* (6.58%) while in goats the same genera of ticks were encountered with a prevalence of 10.26%, 6.69% and 5.77%, respectively. In sheep the infestation rate of ticks (25.43%) was higher compared to mite infestation (13.15%) and lice (7.45%). Likewise, in goats, the prevalence of ticks (5.13%) was the highest followed by mange mites (23.71%) and lice (18.59%).

In this study, an overall prevalence of 15.87% mange mites was observed in both sheep and goats with 13.16% and 18.59%, respectively. The identified species of mange mites found in both sheep and goats were *Sarcoptes scabiei*, *Demodex spp.* and *Psoroptes spp.* with a respective prevalence of 8.77%, 2.63% and 1.76% in sheep and 5.77%, 5.13% and 7.69% in goats.

The overall prevalence of lice on the small ruminants was 6.29%. At species level the prevalence was 7.45% for sheep and 5.13% for goats. On sheep, two genera of lice were identified, *Damalinea* (5.26%) and *Linognathus spp.* (2.19%) while on goats only *Linognathus spp.* (5.13%). Lice infestation rate for the age group of <1 year and >1 year were 6.25% and 6.66%, respectively. The prevalence of lice infestation was 7.14% in male and 6.02% in female animals. The difference was not statistically significant ($P > 0.05$) in both cases.

Among the lice species, *M. cornutus* showed the highest prevalence. Sheep ked, *Melophagus ovinus*, was observed only in sheep with an overall prevalence of 3.07%. Age-wise prevalence of sheep ked was 3.47% and 0.83% for age groups of <1 year and > 1 year, respectively and while 2.38% in male and 1.39% in female animals were observed during the study period. The difference was not statistically significant ($P > 0.05$) in both cases. The fleas, *Ctenocephalides spp.* in both sheep (12.28%) and goats (10.25%) were also detected.

Different ectoparasites tended to prefer different predilection site on the animals' body. In this study each genera of tick tended to prefer a site of attachment on the sheep and goats on legs 32(13.91%), scrotum/udder 26(11.30%), under tail 13(5.65%), ears 9(3.91%), perineum 8(3.47%) neck 4(1.74%) and shoulder 3(1.30%).

Skin lesions caused by mange mites were distributed mainly on the head region. They usually infested head region 23(10%) ears 20(8.69%), neck region 6(2.60%)

and legs 10(4.35%). The most commonly areas infested with lice were head region 8(3.48%), flank 4(1.74%), perineum 3(1.30%), legs and the back of animals 2(0.86%).

In these study, fleas mostly infested areas of flank 9(3.9%), perineum 24(10.43%), neck 4(1.74%), the back 3(1.30%), scrotum/udder and shoulder 2(0.86%). Sheep ked were mostly collected from the back, neck, perineum and shoulder regions with infestation rate of 3(1.30%), 2(0.86%), 1(0.43%) and 1(0.45%), respectively.

DISCUSSION

The present study revealed an overall ectoparasite prevalence of 59.89% in both small ruminant species. Of this, 61.40% and 57.69% was in sheep and goats, respectively. It also revealed that ticks, mites, lice, fleas and sheep ked are common ectoparasites in the study area. These findings are closely related with works of Tefera [21] with a prevalence of 50.5% and 56.4% of sheep and goats, respectively in the northeast part of the country. Similarly, Mulugeta *et al.* [5] reported an infection rate of 55.50 and 58% in sheep and goats, respectively in northern Ethiopia. But it is inconsistent with reports from eastern Ethiopia [22] that could be explained with a lower prevalence. The overall ectoparasite prevalence of small ruminants in this study seems relatively higher than the results of other works carried out in some African countries [23] with infestation rate of 21.9% in sheep and 23.9% in goats in North and Central Nigeria. The higher prevalence of ectoparasites in the study area could be due to the differences in management system, breed, season and sample size.

Ticks were the most frequent ectoparasites recorded both in sheep and goats with a prevalence of 25.44% and 23.72%, respectively. Three genera of ticks (*Boophilus*, *Amblyomma* and *Rhipicephalus*) were identified both on sheep and goats. Ticks were observed to affect both poor body condition (25.99%) and good body condition (22.92%) sheep and goats ($P < 0.05$).

In the current findings, mange mites were the second highest examined ectoparasite next to tick infestation with an overall prevalence of 15.87% in both species of animals. This result agrees with previous studies reported from southern range land of Ethiopia, 14.64% in sheep and 16.45% in goats by Mulu [24]. However, it is higher than other works done in different parts of the country: 7.4% Assegid [25], 28% Dejene *et al.* [26] and 1.86% Chalachew [27].

But disagree with previous findings of Takele [28], 7.8% and 11.8%; Tadesse [10], 0.7% and 6.8%; Nigusie [29] 0% and 6.9%; Worku [30], 2.1% and 4.3% and Tefera [21], 0.4% and 6.6% in sheep and goats respectively in different parts of the country. *Sarcoptes spp.*, *Demodex spp.* and *Psoroptes spp.* were the three genera of mange mites identified with an infection rate of 8.77%, 1.75% and 2.63%, in sheep and 5.77%, 7.69% and 5.13% in goats respectively. These findings were supported by previous findings of Mulu [24], Kassaye and Kebede [31] and Yacob *et al.* [32] in different parts of the country. On the other hand, an overall infection rate of 29.4% of mange mites was observed in goats by Kumilachew *et al.* [33] which is relatively higher than the present study result. This might be due to the differences in management, climatic condition and study design, time factor and usage of acaricides. Mites of *Sarcoptes* (28%) and *Demodex* (1.42%) in goats were also reported [33].

Flea infestation with *Ctenocephalidus spp.* was one of the ectoparasite problem encountered in small ruminants of the study area with a prevalence of 12.28% and 10.25% in sheep and goats. This result is in close agreement with Tefera [21], Mulugeta *et al.* [5] and Yacob *et al.* [32].

Lice infestations were recorded both in sheep and goats with a prevalence of 7.45% and 5.13% respectively. This result is higher than observations made in central Ethiopia, 5.1% and 1.4% [34]; 0% and 0.5% [12] in sheep and goats respectively but lower than the prevalence reported by Abdulhamid [11], (14.2%); Tefera [21], 39.8% in sheep and 29.2% in goats Yesehak [35] (89.5%) on fresh sheep skin examination in different parts of the country. Such differences in prevalence with the above observations may arise from differences in agro-climate, management and health care of sheep and goats in the study sites. Louse infestation may indicate some other underlying problem such as malnutrition and chronic diseases [20].

Melophagus ovinus was observed on sheep accounting for 3.07% overall prevalence. In contrast to the present study, Kassaye and Kebede [31], Tefera [21] and Mulugeta *et al.* [5] obtained higher prevalence of sheep ked infestation with prevalence of 11.67%, 12.5% and 19.1%, respectively in different parts of Ethiopia. Environmental factors (seasonal variation between present study and previous study) during study period might have contributed to this great variation. Analysis of seasonal population of sheep ked by Legg *et al.* [36] also

indicated that ked population is mainly seen in colder, wetter areas and the infestation may be lost when the sheep are moved to hot dry district. According to Radostitis *et al.* [37] in the hot, humid tropics the parasite is restricted to cooler highlands and infestations may be lost when sheep are moved to hot dry areas. The irritation results in animal biting and rubbing with resultant damage to the fleece and development of a vertical ridging of the skin called 'cockle' [20, 38, 39].

The overall prevalence of ectoparasites recorded in the current study in young and adult sheep and goats was 55.55% and 62.50%, respectively. But in this result age of the sheep and goats did not show significant association with the prevalence of the ectoparasites. This is in agreement with reports of Tefera [21] with an infestation rate of 51.05 and 54.2% in young and adult sheep and goats, respectively. A cross sectional study conducted in Brazil by Santose and Faccini [40] described that there was no statistically significant difference in the prevalence of the lice infestation between different age groups. On the contrary, Radostitis *et al.* [37] reported that young animals are heavily infested and the number decrease as the animals mature. Likewise, Lehman [41] observes a greater susceptibility of young animals to ectoparasite and attributed it to a higher ratio of accessible surface to body volume and a poor grooming behavior.

No significant variation ($p > 0.05$) in ectoparasite infestation of sheep and was observed in relation to body condition. The absence of association between body condition and prevalence agrees with previous reports [42]. This could be due to the fact that loss of body condition in the study animals could result from other factors, such as seasonal change of forage and pasture and the presence of other concurrent disease conditions. The current study revealed that sex of the sheep and goats did not show significant association with the prevalence of the ectoparasites. A prevalence of 52.6% and 47.7% was observed in sheep and goats, respectively. Similarly, the absence of association between sexes and prevalence of the ectoparasites is also reported by Yacob *et al.* [32] and Kedir [43]. This seems to be that sex has no great effect on the prevalence of ectoparasite infestation and both sexes may have nearly equal chance to be infested. But this is inconsistent with the report of Kumilachew *et al.* [33] where the prevalence of mange mites was higher in female (31.1%) than male (25.5%) goats.

Different ectoparasite tends to prefer different predilection site on the animal's body. Generally in the current study different ectoparasites were collected from 11 predilection site on the animal's body parts like legs (19.3%), Ears (13.9%), perineum (15.65%), scrotum/udder (13.04%), neck (7.39%), udder tail (5.65%), head region(13.48%), back of animals (3.47%) and shoulder (2.60%). The predilection site mentioned in the current study corroborated with those reported by Dawit *et al.* [44], Mulugeta *et al.* [5], Mulu [24], Kassaye and Kebede [31] and Eshetu [45]. Information on predilection site of ectoparasite is helpful in spraying individual animals since it gives clue as to which part of the body requires more attention.

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