

Full Length Research Paper

Ectoparasites of small ruminants presented at Bahir Dar Veterinary Clinic, Northwest Ethiopia

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The study was undertaken to estimate the prevalence of ectoparasites in small ruminants of Bahir Dar area. A total of 395 small ruminants (280 sheep and 115 goats) were examined for the presence of different ectoparasites. From the 395 small ruminant examined, 193 were positive for one or more type of ectoparasite with an overall prevalence of 48.9%. Ectoparasites identified in sheep were: ticks (31.4%), fleas (13.2%), lice (3.8%), keds (1.8%) and mixed infections (4.6%) with total prevalence of 54.8%; whereas, in goat ectoparasites encountered were: tick (12.2%), fleas (11.3%), lice (9.7%) and mixed infections (1.7%) with total prevalence of 34.9%. From identified ticks, *Rhipicephalus* had the highest proportion followed by *Amblyomma* and *Hyaloma*. *Ctenocephales felis* was the most frequently observed flea species in both sheep and goats. However, low prevalence of *Ctenocephales canis* was also encountered. Lice genera observed were *Bovicola* and *Linognathus*. The former was seen in both host species; but, the later was observed only in goats. The Ked (*Melophagus ovinus*) was observed only in sheep. The overall prevalence was significantly ($p<0.05$, $OR=2.2$) higher in sheep (54.8%) than goat (34.9%). Total ectoparasite prevalence was significantly ($p<0.05$) higher in young than adult small ruminants. Occurrence of ectoparasites infestation between the two sexes was not significantly different. Tick prevalence was markedly ($p<0.05$) higher in sheep than in goat; whereas, lice was significantly ($p<0.05$) higher in goats than sheep. This study demonstrates high infestation of ectoparasites in small ruminants signifying the need for control activities to be undertaken in the area to reduce their impact on the growth and productivity of small ruminants as well as on the leather industry.

Key words: Ectoparasite, sheep, goat, prevalence, Bahir Dar, Ethiopia.

INTRODUCTION

It has been estimated that there are more than 38 millions of cattle and 30 million small ruminants in Ethiopia (CSA, 2007). The current level of contribution of the livestock sector in Ethiopia is below the expected potential. Export of livestock and livestock by-products have contributed to the economy of the country by providing foreign exchange earnings accounting about 15 and 40% of all export earnings and export from

agriculture exports, respectively (FAO, 1996). But this is much lower than would be expected, given the size of the livestock population in the country (Berhanu et al., 2007). Small ruminant production is an important agricultural enterprise and constitutes about 30% the total livestock population of the country (Gryscels and Anderson, 1988). However, their contribution to food consumption, rural income and export economy is below the expected potential, because small ruminant husbandry is constrained by compound effect of disease, poor feeding, and poor management (Chalachew, 2001).

Skin parasites of small ruminants such as ticks, lice, fleas, mites and keds are the major agents causing

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Table 1. Overall prevalence of ectoparasites in sheep and goats.

Type of ectoparasite	Sheep (n = 280)		Goat (n = 115)		Overall prevalence (%)
	Number of infected	Prevalence (%)	Number of infected	Prevalence (%)	
Ticks	88	31.4	14	12.2	25.8
Fleas	37	13.2	13	11.3	12.7
Lice	10	3.8	11	9.7	5.3
Keds	5	1.8	0	0	1.3
Mixed	13	4.6	2	1.7	3.8
Total	153	54.8	40	34.9	48.9

serious economic loss to small holder farmers, the tanning industry, and the country as whole (ESGPIP, 2009). The leather industry is one of the growing economic sectors in the country (MoARD, 2009), but has lost revenue due to decline in quality and fall in export price (CSA, 2007). According to reports from tanneries, hide and skin problem due to external parasites causes 35% of sheep, 56% of goat skins to be rejected in Ethiopia (Bayou, 1998). Apart from the direct effects of ectoparasite infestations on animal production and productivity, they are also efficient vectors of many diseases caused by protozoa, viruses, bacteria and rickettsia to man and domestic animals (Radostits et al., 2000).

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). Therefore, the objectives of this study were to estimate the prevalence of ectoparasite infestation and identify major risk factors associated with the occurrence of external parasites in small ruminants in and around Bahir Dar town.

MATERIALS AND METHODS

Area description

The study was conducted from November 2010 to March 2011 at Bahir Dar town which is found in Amhara National Regional State (ANRS). The ANRS is found in the Northwestern part of Ethiopia at a road distance of 567 km from Addis Ababa. Geographically the region is located between 11° 36' North latitude and 37° 23' East longitude. The livestock population of ANRS comprises about 10.6 million cattle, 5.7 million sheep, 4 million goats, 2.1 million equine, 0.017 million camels and 13.5 million poultry. Smallholder mixed crop-livestock farming dominates the farming system (80%) and livestock in the area is an integral part of the farming system in which it supplies milk, meat, manure, draft power, skin and hides to the local community (BBOA, 2006).

Design implemented

A cross sectional study was conducted in animals presented at the

Bahir Dar Veterinary Clinic. Animals coming to the veterinary clinic for various purposes were selected randomly and examined for the presence of ectoparasites. Prior to examination, each animal selected was categorized based on its sex, age and species. The ages of animals were determined by the method described by Alello and Mays (1998). When lambs and kids were less than 6 months of age, they were considered as young and animals more than 6 months old were included in the adult age group.

Animals examined

A total of 280 sheep and 115 goats were examined to study the distribution of various species of ectoparasites. A greater number of sheep was sampled because of their predominance in the area. The animals originated from Bahir Dar surroundings including from nearby rural areas. The animals were examined for the presence 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.

Sample collection

Ectoparasites including: ticks, lice, keds, and fleas were collected by hand from their attachment site, put in universal bottle containing 70% methanol (Soulsby, 1982). Samples were then transported to Bahir Dar regional Veterinary laboratory for further identification of the parasites.

Data management and analysis

Microsoft excel spread sheet was employed for data storage. The collected data was then analysed using StataCorp (2009). Chi-square test and logistic regression were used to examine the effects of the various risk factors on the presence or absence of ectoparasites. In all the analysis, comparisons having $p < 0.05$ were considered to be statistically significant.

RESULTS

Overall prevalence of ectoparasites

From 395 small ruminant examined, 193 were positive for one or more type of ectoparasite with an overall prevalence of 48.9% (Table 1). Ectoparasites identified in

Table 2. Frequencies and percentages of ectoparasites identified.

Ectoparasite group	Sheep (n=280)		Goat (n=280)	
	Frequency	Prevalence (%)	Frequency	Prevalence (%)
Rhipicephalus	70	25.0	6	5.2
Amblyoma	20	7.5	1	0.9
Hyaloma	10	3.6	2	1.7
Bovicola	9	3.2	0	0.0
Linognaths	6	2.2	12	10.4
<i>C. felis</i>	45	16.1	14	12.2
<i>C. canis</i>	3	1.1	1	0.9
Ked	5	1.8	0	0.0

*C = *Ctenocephales*.

Table 3. Prevalence (%) of ectoparasite in sheep and goat by age.

Ectoparasite	Sheep (n = 280)			Goat (n = 115)			Overall prevalence
	Adult	Young	Total	Adult	Young	Total	
Ticks	30.2	35.3	31.4	11.3	14.3	12.2	25.8
Fleas	9.4	25	13.2	7.5	20	11.3	12.7
Lice	4.2	1.5	3.8	10	8.6	9.7	5.3
Keds	1.9	1.5	1.8	0	0	0	1.3
Mixed	3.8	7.4	4.6	0	5.7	1.7	3.8
Total	49.5	70.6	54.8	28.8	48.6	34.9	48.9

sheep were: tick (31.4%), flea (13.2%), lice (3.8%), ked (1.8%) and mixed infections (4.6%) with total prevalence of 54.8%; whereas, in goat ectoparasites encountered were: tick (12.2%), fleas (11.3%), lice (9.7%) and mixed infections (1.7%) with total prevalence of 34.9%. The overall prevalence of ectoparasite infestation was significantly ($P < 0.05$, $OR = 2.2$) higher in sheep (54.8%, 95% CI= 48.4-60.2%) than in goats (34.9%, 95% CI= 26-43.6%). From identified ticks, *Rhipicephalus* account for the highest proportion followed by *Amblyomma* and *Hyaloma*. *C. felis* was the most frequently observed flea species in both sheep and goats. However, low prevalence of *C. canis* was also encountered (Table 2). Among the ectoparasites identified in the area, ticks were the highest followed by fleas and lice (Table 1). The prevalence of ticks was significantly ($P < 0.05$) higher in sheep than goats whereas lice was significantly ($P < 0.05$) higher in goats than in sheep.

Prevalence of ectoparasites in sheep and goat by age

The prevalence of ectoparasites was significantly ($p < 0.05$) higher in the younger animals than adults. Infestation of fleas in the younger groups (23.3%) was particularly marked compared to the flea infestation in the adult group (8.9%) and this seemed to account in large

part for the significant overall difference in ectoparasite infestation between the two age groups (Table 3).

Prevalence of ectoparasites in sheep and goat by sex

Ectoparasite prevalence in the male and female small ruminants of both species was 45.9% (95% CI=39.2-52.5%) and 51.9% (95% CI=44.5-59.4%), respectively and the difference was not statistically significant ($P > 0.05$). The overall prevalence of ectoparasites in female and male sheep was 25.7 and 52.9%, respectively; whereas, in female and male goats the prevalence was 42 and 29.2%, respectively (Table 4).

DISCUSSION

Overall ectoparasite prevalence of small ruminant in the present study area was 54.8% in sheep and 34.9% in goat with an overall prevalence of 48.9%. A study conducted in three selected districts of Northwestern Amhara Region reported an overall ectoparasites prevalence of 44.9 and 43.5% in sheep and goats, respectively (Amare, 2010). The relative higher prevalence in the present study could be attributed to the sampling methodology the present study employed

Table 4. Prevalence (%) of ectoparasite in sheep and goat by sex.

Types of Ectoparasite	Sheep (n = 280)			Goat (n = 115)			Overall prevalence
	Male (153)	Female (127)	Total	Male (65)	Female (50)	Total	
Ticks	33.9	28.3	31.4	10.7	14	12.2	25.8
Fleas	11.8	14.9	13.2	10.8	14	11.3	12.7
Lice	2.6	4.7	3.8	7.7	12	9.7	5.3
Keds	1.9	1.6	1.8	0	0	0	1.3
Mixed	2.6	7.1	4.6	1.5	2	1.7	3.8
Total	52.9	56.6	54.8	30.7	42	34.9	48.9

where animals coming to the veterinary clinic which might be susceptible to ectoparasite infestations were sampled. There was a significant difference in the prevalence of ectoparasite between the two host species where sheep showed higher prevalence. Goats are considered to be relatively resistant to ectoparasites probably because of their self grooming, licking, scratching, rubbing and grazing behavior which could contribute for rapid ectoparasite elimination (Pegram et al., 2004). But, a study in Tigray by Makelesh (2010) showed significantly higher ectoparasite prevalence in goat than sheep. Sertse and Wessone (2007) also reported higher ectoparasite prevalence in goat than sheep. However, the present study agree with study in wolaita soddo by Yacob et al. (2008a) where sheep were reported to be more infested (68.7%) than goats (28.4%).

Ectoparasite prevalence was significantly higher in young (63.1%) than adults (43.8%). Sertse (2004) reported an overall prevalence of ectoparasites 42.0 and 54.2%, in lambs (young) and adult sheep, respectively; and in kids (young) and adult goats prevalence of 60.1 and 54.2% was reported, respectively. On the other hand, Lehman (1993) observed a greater susceptibility of young animal to ectoparasites. The higher prevalence in young animals could be attributed to their poor grooming behavior. Moreover, acquired immunity added to the relative thicker skin of older animals may also contribute to greater resistance against ectoparasites in older age category.

The present study found that the prevalence of ticks was significantly higher in sheep than in goats. This may have been due to differences in the feeding behavior of sheep and goats where goats usually browse and have pronounced grooming behavior which could reduce the chance of infection and help to detach more ticks from their body. In the current study, a relatively lower prevalence of tick infestation (31.4% in sheep and 12.2% in goat) was observed as compared to Abunna et al. (2009) who reported a higher prevalence of tick infestation in sheep (87.5%) and goat (89.9%) in Mieso district. Zelalem (1994) also reported a higher tick prevalence of 65.5% in sheep and 33% in goat in Dire Dawa region, Eastern Ethiopia. The lower prevalence in

the study could be due to an ectoparasite control campaign that was undertaken against ectoparasites for three consecutive years (2008 to 2010) in the Amhara National Regional State (Woldemariam, 2011). However, the present study showed relatively high prevalence as compared to the report by Tadesse (2010) in Bedelle district who showed 16.3% in sheep and 15.5% in goat. Haffize (2001) also reported a very low prevalence of 1.7% in goat and 0.9% in sheep in central Ethiopia and 4.8% in sheep and 0% in goat at Adama, Oromia regional state. Environmental variations and differences in the time of year when the study was conducted could also contribute to differences in the prevalence of tick infestation in various areas of the country as temperature and relative humidity are the major ecological determinants for the reproduction and growth of tick populations (Latif and Walker, 2004).

Ticks have contributed the highest proportion (52.8%) for the overall ectoparasite prevalence. Yacob et al. (2008a) also reported a higher proportion (46.3%) of tick for the overall prevalence. The higher proportion of tick among the ectoparasites could be due to various factors including the fact that ticks are easier to find compared to, for example, fleas which jump frequently.

Two flea species were identified namely: *C. felis* and *C. canis*. There was no significant difference ($p>0.05$) for the occurrence of flea species between sheep and goats. Similarly, a study by Yacob et al. (2008a) in Wolaita reported that there was no significant difference in flea prevalence between sheep and goat. Relatively high flea prevalence was encountered in the present study with 13.2% in sheep and 11.3% in goat compared to the study by Tadesse et al. (2011) in Kombolcha which reported a total prevalence of 8.57% in sheep and 1.51% in goat. In the present study, the general flea infestation was significantly ($p<0.05$) higher in young than adult animals in both species. Significantly higher flea infestation was also noticed in younger small ruminants by Yacob et al. (2008a). The higher prevalence in the younger animals might be associated to the shorter hair and thinner skin in young animal in which the flea can easily access the skin and penetrate it without difficulty. It has been observed that kids and lambs are more severely affected by fleas

and louse than adult animals (Kusiluka and Kambarage, 1996).

The prevalence of lice was significantly ($P < 0.05$) higher in sheep (13.6%) than in goats (9.7%). The finding in Wolaita sodd reported by Yacob et al. (2008a) Contrasts with the present finding where *Bovicola ovis* was found only in sheep. However, a consistent result with the present study was reported by Yacob et al. (2008b) where lice infestation was found both in sheep and goats around Adama. The variation might possibly be attributed to management factor such as overcrowding, feeding and climate variations among the study areas. Lice infestation was reported to be higher in debilitated animals that suffer from malnutrition and intestinal parasitism (Pugh, 2002).

In the present study, the total prevalence of sheep ked (*Melophagus ovinus*) was 1.8% in sheep; no keds were observed in goats. Sertse (2004) report that 12.5% of the sheep examined were positive for *M. ovinus* and higher prevalence in wooly sheep than in hairy or sheared sheep. Kassaye and Kebede (2010) also reported a higher overall prevalence of sheep keds (11.67%). The variation in the infestation rates might be due to the agro ecological variations among the study areas and the type of sheep breeds that are kept.

The result presented here suggests that lambs and kids need special attention to prevent them from severe ectoparasite infestation. The high prevalence of ticks in small ruminants of the area highlights the need for control measures.

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