

Prevalence of Ovine Ectoparasites in and Around Ambo Town, Ethiopia

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Abstract: A cross sectional study was carried out from November 2011 to March 2012 with the objectives of determining the prevalence and potential risk factors associated with ecto-parasites of sheep and to assess the effects of ectoparasites on the skin in and around Ambo. A total of 450 sheep were used to study the prevalence of ectoparasites on live animals. The result obtained from live sheep demonstrates 53.1% of sheep were infested with one or more ectoparasites. The major ectoparasites identified on sheep were lice (24.0%), tick infestations (19.2%), Fleas (10.3%). The most prevalent species of lice was *Damalina ovis* with an overall prevalence of 18.0% while *Linognathus spp* was only 5.8%. Out of ticks the most prevalent genus was *Boophilus* with a prevalence of 9.1% followed by genus *Amblyomma* and *Hylomma* with a prevalence of 5.3% and 2.9%, respectively finally genus *Rhipicephalus* with prevalence of 1.8%. The least prevalent ectoparasites were fleas with prevalence of 10.2%. There was no significant difference in the overall prevalence of lice, ticks and fleas ($P>0.05$). The overall infestation with ectoparasites was high in the males (64%) than females (47.9%). Comparison of overall ectoparasites infestation rate between sex groups has shown no significant variation ($P>0.05$). Analysis in the overall occurrence of ectoparasites had revealed statistically significant difference ($P<0.05$) in prevalence on sex for fleas. Overall ectoparasites prevalence were higher in the adults (53.5%) than young (52.6%) and also higher in good body condition (55.5%) than poor body condition (55.1%), however, no significance variation ($p>0.05$) was observed in prevalence of ectoparasites in age and body condition groups. From the result of this study it is possible to conclude that ectoparasites infestation has significant draw back in the production of sheep at the study area.

Key words: Ambo • Ectoparasites • Prevalence • Sheep

INTRODUCTION

Sheep play a vital role as sources of meat, milk and wool for smallholder keepers in different farming systems and agro-ecological zones of the country [1- 5]. They are also sources of foreign currency [6]. With an estimated 25.02 million sheep and 21.88 million goats [7], owing to their high fertility, short generation interval and adaptation even in harsh environment, sheep and goats are considered investment and insurance to provide income to purchase food during season of crop failure and to meet seasonal purchases of improved seed, fertilizer and medicine for rural house hold [8].

Annually, 16.6 million pieces of skins are produced in the country, based on the off take rates of 33% and 32.5% for sheep and goats, respectively [9]. Although

large number of sheep and goats are slaughtered per annum, the production of high quality skins remains very low [10, 1]. In Ethiopian tanneries, 35% of sheep and 56% of goat skins have been downgraded and rejected due to defects caused by external parasites [10].

Of these, the most important problems that result in poor quality skin and hide products are external parasites such as lice, ticks, ked, fleas and mange mites that cause noticeable lesion in the coat [12, 13]. Their end result may be mortality, decreased productivity and reproduction, downgrading and rejection of skins. External parasites are problem in both extensive and intensive livestock production systems [14].

Studies on ectoparasites distribution, current status and species of ectoparasites involved, their magnitude and their relative importance for the tanning industry

would provide much information for the control reasons of ectoparasites which contributes to increments of rural and export incomes. Therefore the objectives of this study were to identify ovine ectoparasites and determine prevalence and potential risk factors associated with ectoparasites in the study area.

MATERIALS AND METHODS

Study Area: The study was undertaken in Ambo town, Western Shoa Zone, Oromia regional state, Ethiopia. Ambo town is located at 107 km to the west of Addis Ababa. The latitude and longitude of the land is 8°59'N37°51'E and an elevation of 2101 meters. The maximum and minimum temperature of the area is 24°C and 13°C, respectively. The area receives a bimodal rain fall in which the heavy rain is registered from June to September where as the low rainfall of the area is registered in March to May. The type of farming practiced in the area is mixed type that is both crop production and livestock rearing is commonly observed. According to the current document of Ambo Woreda ministry of agricultural Bureau [15] the total animal population of the area is 1,862,482 cattle, 1,552,237 ovine and caprine, 320,953 equine, 450,021 poultry and 166,638 beehives.

Study Subjects: The study animals were sheep kept under extensive and intensive management system in Ambo town and the surrounding farming kebeles were used for the study considering different age groups (young and adult), sex groups (male and female), body condition (poor and good).

Sample Size and Sampling Method: Simple random sampling strategy was followed to assess the ectoparasites from the individual animals. To determine the sample size an expected prevalence of 50 % was taken in to consideration since there was no previous study conducted in the area. The desire sample size for the study was calculated using the formula given by Thrusfield [16] with 95% confidential interval and 5% absolute precision and it was 384, however, to increase the precision of the study, 450 sheep were examined.

Study Methodology: A cross sectional study was employed to assess the ectoparasites of sheep in the area, their prevalence and the magnitude of these parasites in relation to age, sex, body condition and effect of ectoparasites on the skin. During physical examinations

the age group (young and adult) and body condition score of the animal (poor and good) was performed as described by Gatenby [17].

Sample Collection: Ectoparasites samples collection and examination was carried out from sheep which were treated with acaricides and not. The examination of each animal was conducted by visual inspection and palpation of skin for lesions, if any and by the eventual identification of ectoparasites. When skin lesions were evidenced the detailed history was taken from the owner and subsequently, a skin sample was taken from at least two sites covering the adequate depth and peripheral edges. Some of the approaches used for diagnosing skin diseases are presented as follows:

Lice, sheep ked and ticks were collected in 70% ethyl alcohol and were identified by the method described by Urquhart *et al.* [18].

Skin scraping from suspected cases of mange were collected and preserved in 10% formalin and taken to laboratory where 10% KOH was added to the specimen so that mites may be released from scabs and crusts before examination following procedures indicated by Urquhart *et al.* [18]. The identification of the mange mite species was based on the morphological characteristics described by Urquhart *et al.* [18].

Clinical Examination

Lice: The neck, shoulder, breast, ribs, back, flank and rump areas of both sides of the body were examined for presence of lice by parting the hair. From each site five partings of about 10 cm long were examined. From clinically positive animals, specimens were collected, preserved in 10% formalin and later identified /confirmed in the laboratory.

Ticks: Ticks were collected using alcohol by dabbing the tick and the surrounding skin to remove embedded living ticks. Care was taken to ensure that the mouthparts were not left behind during the traction with thumb forceps.

Data Management and Analysis: All data was entered in to Microsoft Excel 2003 and analyzed with SPSS version 16 for windows program. Percentage and Pearson's chi-square (X^2) were the tests used to analyze the data pertaining to the sex, age, body condition, over all prevalence of ectoparasites and effect of ecto-parasite on the skin. Significance was considered when p-value is less than 0.05.

RESULTS

Out of 450 sheep examined for ectoparasites, 239 (53.1%) sheep were infested with one or more of ectoparasites. Overall seven genera of external parasite which belongs to lice, ticks and fleas were found infesting sheep in the study area (Table 1). The major ectoparasites identified were lice 24.0%, followed by ticks 19.1 % and fleas 10.2%.

The commonest sites of lice attachment was the skin of neck, shoulder, flank and rump, while the main attachment sites for ticks were ventral abdomen, sternum, under the tail, scrotum in males and udder in females and feet, especially the area just below the fetlock joint, head /ear and belly. The most prevalent species of lice was *Damalina ovis* with an overall prevalence of 18.0% while *Linognathus spp* was only 5.8%. Out of ticks the most prevalent genus was *Boophilus* with a prevalence of 9.1% followed by genus *Amblyomma* and *Hylomma* with a prevalence of 5.3% and 2.9%, respectively finally genus *Rhipicephalus* with prevalence of 1.8%. The least prevalent ectoparasites were fleas with prevalence of 10.2%.

Prevalence of Ectoparasite in Different Age Groups:

Overall ectoparasites prevalence were higher in the adults (53.5%) than young (52.6%) and no significance variation (P>0.05) was observed. Of these the most prevalent ectoparasites were lice with prevalence of 22.8 % in young and 24.4% in adult followed by ticks with prevalence of 20.6% in young and 18.2 % in adults. The least prevalent ectoparasites were fleas with prevalence of 9% in young and 10.9% in adults (Table 2).

Prevalence of Ectoparasites by Sex Groups:

In this study the overall prevalence of ectoparasites in male sheep was 64 % and 47.9 % in females, however no significant difference was observed (P>0.05). Of these the most prevalent ectoparasites were lice with prevalence of 23.6 % in males and 23.9 % in females. The second most prevalent ectoparasites was Ticks, 24.3 % in males and 16.7 % in females followed by fleas with 16.2 % in male and 7.3 % in female (Table 3).

Prevalence of Ectoparasites by Body Condition:

In this study the overall prevalence of ectoparasites with good body condition sheep were 55.5 % and 55.2 % in those with poor body condition and no significant difference was observed (P>0.05). Of these the most prevalent

Table 1: Overall prevalence of ectoparasites in sheep

Ectoparasites	Number (n=450)	Percentage (%)
Lice overall	107	24.0%
<i>Damalina ovis</i>	81	18.0%
<i>Linognathus spp</i>	26	5.8%
Mixed lice infestations	21	4.7%
Ticks overall	86	19.1%
<i>Amblyomma</i>	24	5.3%
<i>Rhipicephalus</i>	8	1.8%
<i>Hylomma</i>	13	2.9%
<i>Boophilus</i>	41	9.1%
Mixed tick infestations	9	2%
Fleas	46	10.2%
Overall ectoparasites	239	53.1%

Table 2: prevalence of ectoparasites by Age groups

Ectoparasites	Young (n=175)	Adult(n=275)	X ²	Pvalue
Lice overall	40 (22.8%)	67 (24.4%)	0.151	0.927
Ticks overall	36 (20.6%)	50 (18.2%)	4.67	0.322
Fleas	16 (9%)	30 (10.9%)	0.364	0.547

Table 3: Prevalence of ectoparasites by sex groups

Ectoparasites	Sex group		X ²	P value
	Male (n= 148)	Female(n=302)		
Lice overall	35 (23.6%)	72(23.9%)	.056 ^a	0.4880
Ticks overall	36 (24.3%)	50 (16.7%)	6.583 ^a	0.160
Fleas	24 (16.2%)	22 (7.3%)	8.633 ^a	0.003
Overall ectoparasites	95 (64%)	144 (47.9%)		

Table 4: Prevalence of Ectoparasites by Body Condition

Ectoparasites	Body condition		X ²	P value
	Good (n= 198)	Poor(n=252)		
Lice overall	46 (23.2%)	61 (24.2%)	4.853 ^a	0.088
Ticks overall	46 (23.2%)	50 (19.8%)	5.730 ^a	0.220
Fleas	18 (9.09%)	28 (11.1%)	.493 ^a	0.483
Overall ectoparasites	110 (55.5%)	139 (55.1%)		

ectoparasites were lice with prevalence of 23.2 % in good body condition sheep and 24.2 % in poor body conditioned sheep. The second most prevalent ectoparasites were ticks 23.2 % in good body conditioned sheep and 19.8 % in poor conditioned sheep and the least prevalent ectoparasites were fleas with 9.09 % in good body condition and 11.1% in poor body condition (Table 4).

DISCUSSION

In this study high prevalence of sheep ectoparasites recorded in the study area (53.2%) is suggestive of the importance of these health problems in sheep population of the study area. This result is comparable to finding of Sertse [19] in Amhara region with a prevalence of 50.4%.

Lice infestations were the most prevalent ectoparasites recorded with a prevalence of 24%. From the 107 sheep positive for lice, 18% were infested with *Damalina ovis*, 5.8% with *Linognathus spp* and 4.7 % were having mixed infestation.

The overall lice prevalence obtained in this study is higher than observations made in northern Ethiopia, 0.37% by Kassaye and Kebede [20] in Tigray and lower than observations made in Amhara region 39.8% by Sertse [19] in southern Ethiopia, Sodo by Yacob *et al.* [21] 25.7% and in Arsi zone, 75.5% by Wondimu [22]. Such differences in prevalence with the above observations may arise from differences in agro climate, management and health care of animals, farmers' know-how about ectoparasites in the study sites and the sensitivity of the diagnostic method used to reveal ectoparasites.

Of the lice infestations *Damalina ovis* was the most prevalent external parasite recorded in sheep in the area. Considering the high prevalence of *Damalina ovis* in the study area and mobile nature of the parasite, the economic importance of lice both for farmer and for the tanning industry could be immensely very high.

There has been no statistically significant difference in the occurrence of lice infestation between different age, sex and body condition groups ($P>0.05$). This result was in contrary with previous work of Kassaye and Kebede [20] and Sertse [19], who reported that there were statistically significant difference in the occurrence of lice infestation between age groups, sex and body condition. But this study was in accordance with the study of Bekele *et al.* [23] in Wolmera district of Oromia Region in which no statistically significant difference was observed in the occurrence of lice infestation between different age, body condition and sex groups of the animal. This difference could be attributed to the management condition where most animals are kept together providing greater chance of direct contact which contributed for transmission and maintenance of external parasites. Lice are transmitted by direct physical contact; lousy sheep in a flock is the means of spread to new animals [12; 24] or by contact with the contaminated areas of the environment [13].

Ticks were the second most important ectoparasites observed on sheep accounting for 19.1% overall prevalence. Four genera of ticks (*Amblyomma*, *Boophilus*, *Hylomma* and *Rhipicephalus*) were identified. From the 86 sheep positive for ticks, 5.3% were infested with *Amblyomma*, 9.1% with *Boophilus*, 2.9% with *Hylomm*, 1.8% with *Rhipicephalus* and 2% were having mixed infestation.

In the present study a relatively lower prevalence of the tick infestation (19.2%) in sheep was observed when compared to previous works by Yacob *et al.* [21] in southern Ethiopia, 31.78% and Abunna *et al.* [25] in Mieso, 89.7% and higher prevalence when compared to reports of Sertse, [19] in Amhara region, 3.8% and Ali [26] in eastern Ethiopia, 6.6%. These variations were due to differences in the environmental conditions (study season and design). Indeed, low tick prevalence may be related to an impaired tick development due to unfavorable climatic conditions (intermittent and weak rainfall in the study area during the study period coupled to relative moderate temperatures).

In this study statistically no significant difference observed in the occurrence of tick infestation between different age groups, body condition and sex groups ($P>0.05$). This result was in line with the study of Bekele *et al.* [23] in which no statistically significance was observed in the occurrence of tick infestation between different age group, body condition and sex of the animals.

Sex, age and body condition had no effect on the prevalence of ticks in sheep and this might be linked to the management system of the animals where they are kept together in communal grazing lands with all groups allowed to graze together.

Flea infestation was one of the ectoparasitic problems encountered in the study area with an overall prevalence of 10.2%. The overall prevalence of fleas in this study was found to be lower than the observations made by Bekele *et al.* [23] in Wolmera (32.31%), Yacob *et al.* [21] in Wolayita Sodo (11.21%) and greater than observations by Sertse [19] in Amhara region (0.2%) and Ali [26] in eastern Ethiopia (0.4%).

In this study a statistically significant difference in the occurrence of fleas infestation was observed between sex ($P < 0.05$), while there has been no statistically significant difference in the occurrence of fleas infestation between different age and body condition groups ($p>0.05$). According to Tesfaye *et al.* [27] flea infestation is usually associated with close contact of animals with dog or cat and also the same host.

Moreover, high humidity often above 70% required for oviposition of their eggs [28] and proves favorable for the contamination of life cycle and hence, contributed to their widespread availability in the area.

CONCLUSION

In this study, ectoparasites belong to lice (*Damalina ovis*, *Linognathus spp*), ticks (*Amblyomma*, *Rhipicephalus*, *Hylomma*, *Boophilus*) and fleas were the most important external parasites affecting the health and productivity of sheep in and around Ambo town. Most sheep of the area are found to harbor either single or multiple burdens of external parasite infestations. Lack of awareness about the significance of the problems among owners and inaccessibility for control schemes have contributed to the widespread nature of external parasite in the area.

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REFERENCES

1. Ehui, S.K., M.M. Ahmed, Berhanu, S.E. Gebremedhin, A. Benin, Nin Pratt and L. Lapar Ma, 2003. 10 years of Livestock Policy Analysis. Policies for improving productivity, Competitiveness and sustainable livelihoods of smallholder livestock producers. ILRI (International Livestock Research Institute), Nairobi, Kenya, pp: 118.
2. Kassahun, A., 2004. The State of Ethiopia's Farm Animal Genetic Resources-Country Report: A Contribution to the First Report on the State of the World's Animal Genetic Resources. ESAP (Ethiopian Society of Animal Production) Newsletter; Issue, pp: 10.
3. Markos, T., 2006. Productivity and Health of indigenous sheep Breeds and Crossbreds in the Central Ethiopian Highlands. Faculty of Medicine and Animal Science department of Animal Breeding and Genetics. Ph.D. dissertation. Swedish University of Agricultural Sciences, Uppsala, Sweden.
4. Getahun, L., 2008. Productive and Economic performance of Small Ruminant production in production system of the Highlands of Ethiopia. PhD dissertation. University of Hohenheim, Stuttgart-Hoheinheim, Germany.
5. FAO (Food and Agricultural Organizations of the United States), 2009. FAO STAT data.
6. Berhanu, G., D. Hoekstra and T. Azege, 2006. Improving the Competitiveness of Agricultural Input Markets in Ethiopia: Experiences since 1991. Paper presented at the Symposium on Seed-fertilizer Technology, Cereal productivity and Pro-Poor Growth in Africa: time for New Thinking 26th Triennial Conference of the International Association of Agricultural Economics (IAAE), Gold Coast, Australia.
7. Central Static Authority (CSA), 2009. Agricultural sample survey. Statistical Bulletin (2008/09) 302, Addis Ababa, Ethiopia.
8. Asfaw, W., 1997. Country report: Ethiopia. Preceding of the seminar on Livestock Development Policies in Eastern and Southern Africa, July 28-Aug.1, Mbabany, Swaziland, pp: 398-398.
9. Tadesse, H., 2005. Pre-slaughter defects of hides/skin and intervention options in east Africa: Harnessing the leather industry to benefit the poor. Regional Workshop Proceedings, April 18-20, Addis Ababa, Ethiopia, pp: 19-30.
10. Kassa, B., 2005. Pre-slaughter defects of hides/skin and intervention options in east Africa: Harnessing the leather industry to benefit the poor. Regional Workshop Proceedings, April 18-20, Addis Ababa, Ethiopia, pp: 71-84.
11. Zewdu, K., 1995. Hides and skins in Ethiopia. Proceedings of the 2nd Annual Conference of the Ethiopian Society of Animal Production. Addis Ababa, Ethiopia, pp: 6-14.
12. Mullen, G.R. and L.A. Durden, 2002. Medical and Veterinary Entomology. Elsevier Science, USA, pp: 591.
13. Pugh, D.G., 2002. Sheep and Goat Medicine. 1st Edn., W.B. Saunders Company, Philadelphia, pp: 468.
14. Phillips, C.J.C., 2005. The Effect of External Parasite and their Control on the Welfare of Livestock Center for Animal Welfare and Ethics. School of Veterinary Science, University of Queensland, pp: 63.
15. Ambo Woreda ministry of agricultural Bureau report (AWMAB), 2010.
16. Thrusfield, M., 2005. Veterinary Epidemiology. 3rd Edn Blackwell Science Ltd., Edinburgh, UK, pp: 626.
17. Gatenby, M.R., 1991. Sheep. Coste, R. and Smith, J.A (eds.), the Tropical Agriculturalist, Macmillan (London) and CTA (Wageningen), pp: 6-11.
18. Urquhart, G.M., J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings, 1996. Veterinary Parasitology, 2nd ed., Blackwell Science Ltd, UK, pp: 141-205.

19. Sertse, D.F., 2004. Investigation on Ectoparasites of small ruminant in selected site of Amhara region state and their Impact on the Tanning industry. MSc Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia, pp: 5-7.
20. Kassaye, E. and E. Kebede, 2010. Epidemiological Study on mange mite, lice and sheep keds of small ruminant in Tigray region, northern Ethiopia. *Ethiop. Vet J.*, 14(2): 51-65.
21. Yacob, T.H., A.T. Yalew and A.A. Dinka, 2008. Ectoparasites prevalence in sheep and in goats in and around Walaita Soddo, Southern Ethiopia, *Revue Méd. Vét.*, 159(8-9): 450-454.
22. Wondimu, H., 2010. Major ectoparasites of Small Ruminant in Arsi Zone of Oromia region: Prevalence, Species Composition and Acaricidal Efficacy of Medicinal Plant Against Lice of sheep, Msc Thesis, Faculty of veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia, pp: 37-40.
23. Bekele, J., M. Tariku and R. Abebe, 2011. External parasite infestation in small ruminant in wolmera district of oromia Region, central Ethiopia, *J. Anim. Vet. Adu*, 10(4): 518-523.
24. Tayler, M.A., R.L. Coop and R.L. Wall, 2007. *Veterinary Parasitology* 3rd Edn., Blackwell Science Ltd., pp: 874.
25. Abunna, F., D. Kasasa, F. Shelima and F. Megersa, 2009. Survey of tick infestation in small ruminant of miesso district, West Harerge, Oromia Region, Ethiopia. *Trop. Anim. Health Pro*, 41: 969-972.
26. Ali, A., 2009. Major ectoparasite of sheep and goats in Haromaya Woreda, eastern Ethiopia. DVM Thesis, Jimma University, School of Veterinary Medicine. Jimma Ethiopia, pp: 21-24.
27. Tesfaye, A., Z. Amdework and M. Sileshi, 2007. Survey of major external parasites of veterinary importance in Tigray region. *Ethiop. Vet. J.*, 11: 137-142.
28. Wall, R. and D. Shearer, 1997. *Veterinary entomology: arthropod ectoparasites of veterinary importance*, 1st eds. Champan and Hall, United Kingdom, pp: 1-439.