

Full Length Research Paper

Epidemiological study on ectoparasite infestation of small ruminants in Sodo Zuria District, Southern Ethiopia

Yishak Israel, Tsegalem Abera and Befekadu Urga Wakayo*

College of Veterinary Medicine, Jijiga University, P.O.Box 1020, Jijiga Town, Somali Regional State, Ethiopia.

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A cross-sectional study was conducted to estimate magnitude of small ruminant ectoparasite infestation in Sodo Zuria district from November, 2013 to March, 2014. Out of the total 758 small ruminants, 51.5% sheep and 48.9 % goats were found infected with ectoparasite infestation ($p=0.471$). Standard identification of 383 ectoparasite specimens demonstrated ticks (34.6%), lice (7.1%), fleas (6.1%) and mange mites (2.8%). Tick and flea infestation were predominant in sheep ($p<0.01$) whereas mange mite infestations was more common in goats ($p < 0.01$). The tick species observed, in order of importance, were *Ripicephalus evertsi evertsi*, *Amblyoma variegatum*, *Boophilus decoloratus*, *Amblyoma coherences* and *Ripicephalus pulchellus* (exclusive to sheep). The flea species observed were *Ctenocephalides felis* and *Ctenocephalides canis*. Regarding mange mites, *Sarcoptes scabie* was more frequent and affected both sheep and goats whereas *Demodex caprea* was found only in goats. Among lice species identified, *Linognatus ovillus* and *Damalina ovis* were higher in sheep whereas *Linognatus stenopsis* was more common in goats ($p<0.05$). Generally, female animals were affected by ectoparasites more frequently (56 %) than males (44.4%) ($p=0.001$). Small ruminants older than one year (53.8%) were affected more frequently than younger animals (45.8%) ($p=0.029$). Ectoparasite infestation was more frequent in animals with poor body condition (59%) than those having medium (41.9%) and good (43.6%) body condition ($p=0.000$). Small ruminant flocks in Sodo Zuria district were widely affected by ectoparasite infestation which leads to substantial morbidity. Effort to raise awareness of farm households and improve control services is recommended.

Key words: Goats, parasites, prevalence, sheep, Wolaita zone.

INTRODUCTION

Small ruminants constitute 30% of the total livestock population in Ethiopia and represent a major contributor to food production (CSA, 2004), providing 35% of meat consumption and 14% of milk consumption (Asfaw et al., 1998). Hide and skin account for 12 to 16% of the total

export in Ethiopia and small ruminants contribute a significant portion of these exports (Mahmud, 2000). However, the contribution of small ruminants to food supply, household income and export income are below the existing potential which is attributed to several

*Corresponding author. E-mail: fikeurga@gmail.com Tel: +251911731254.

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constraints including; diseases, poor feeding, poor managements and poor technological inputs (Chalachew, 2001).

Parasitic infections are of paramount economic importance in small ruminants and result in lowered resistance, loss of production and even mortality (Singla, 1995). Among these infections skin diseases caused by lice, sheep keds, fleas, ticks and mange mites are among the major diseases of small ruminants and causes serious economic loss due to; mortality, decreased production and reproduction as well as downgrading and rejection of skin. Moreover, ectoparasites are very important vectors for numerous microbial infectious diseases affecting livestock (Radostits et al., 2007). Some 35% of sheep and 56% of goat skin rejections in Ethiopia are due to affection by ectoparasites. The figures portray seriousness of negative economic impact posed by ectoparasites on livelihoods, the tanning industry and the national economy in the country (Chanie et al., 2010). The present study estimated the magnitude of ectoparasite infestation in sheep and goat flocks sampled from Sodo Zuria district.

MATERIALS AND METHODS

Study area

Sodo Zuria district is part of Wolaita zone in South Nations Nationalities and Peoples Region (SNNPR) - Ethiopia. The zone is located between 6°36'N to 7°18'N latitude and 37°12'E up to 38°24'E longitude. The zonal capital, Wolaita Sodo town, lies about 383 km's south of Addis Ababa. Altitudes in the zone vary between 1650 to 2500 meters above sea level. The mean annual rainfall and temperature vary between 800 to 1400 mm and 15 to 25°C, respectively. Topographically, Wolaita zone consists of rugged and undulating mountains, rolling hills, plateaus and flat steep slope that extend to the Abaya Lake and Omo River. Integrated agro-forestry crop-livestock production farming system is the basis of livelihood. The livestock resource of the area comprises 923,633 cattle (local and improved), 231,115 sheep, 118,178 goats, 4,212 horses, 38,238 donkeys, 3,031 mules, 550,489 poultry, and 53,781 bee colonies (WZAD, 2011).

Study design

A cross sectional study of randomly sampled small ruminant holdings was conducted from November, 2013 to March, 2014 in Wolaita Zuria district. The study population constituted indigenous sheep and goats kept in small flocks and managed under traditional extensive farming system.

Animals

Study was conducted on sheep and goat flocks in four agro-ecologically similar accessible Keble's: (1) Wachika Bush, (2) Offa Gandaba, (3) Tome Gerera and (4) Humbo Larena of Sodo zuria district. A total of 758 small ruminants were selected for investigation. Sample size was calculated according to Thrustfield (2005) using an expected prevalence of 55.5% (Yacob et al., 2008) and 5% desired absolute for each species. Sheep and goats were

selected by simple random sampling from small ruminant holding sampling frame in respective keble's.

Examination

Species and sex of study animals was recorded. Body condition was subjectively scored as poor (sharp bony prominence), medium (bony prominence noticeable but not sharply angled) and good (bony prominence rounded and barely noticeable). Age of animals was noted as young (≤ 1 year) and adults (> 1 year). Examination for ectoparasites was performed by multiple fleece parting in opposite direction to normal hair or wool resting inspection and palpation of skin for parasites and/or lesions over entire body.

Specimens

Visible ectoparasites (ticks, lice and fleas) were collected manually (hand, brush or comb) from their attachment sites. Visible ectoparasites collected from individual animals were placed in labeled universal bottles containing 70% alcohol. Skin scraping was taken from suspected cases of mange mite infestation (exhibiting scales, crusts, alopecia and/or itching). A blade was dipped in a drop of mineral oil on the side and scrapping was carried out until capillary oozing is observed (Walton and Currie, 2007). The scraped samples were placed in labeled universal bottles containing 10% formalin.

Ectoparasite identification

Specimens from each animal were transported to Wolaita Sodo Regional laboratory for ectoparasite species identification.

1. Tick specimens were placed on petridish and examined under stereomicroscope for morphological species classification as outlined by Walker et al. (2003).
2. Lice specimens were similarly examined for morphological classification as biting or suckling type and subsequent species identification according to Wall and Shearer (1997).
3. Identification of flea species was done under stereomicroscope using morphological criteria outlined by Soulsby (1982).
4. Mange mite species identification was performed under low power microscope according to keys given by Wall and Shearer (1997).

Statistical analyses

Data gathered from field and laboratory works were entered on Microsoft excel spreadsheets and analyzed using Statistical Package for the Social Sciences (SPSS-20). Distribution of ectoparasites infestation in different kebele's and across risk factors like species, age groups, sexes and body condition score was summarized in percentages and compared using Chi-square test. Statistical significance was ascribed at $p < 0.05$ or less.

RESULTS

Overall, 381 (50.3%) animals were affected by ectoparasites. The frequency of ectoparasite infestation in sheep and goats was 203 (51.5%) and 178 (48.9%), respectively ($p=0.471$). The prevalence of ectoparasite

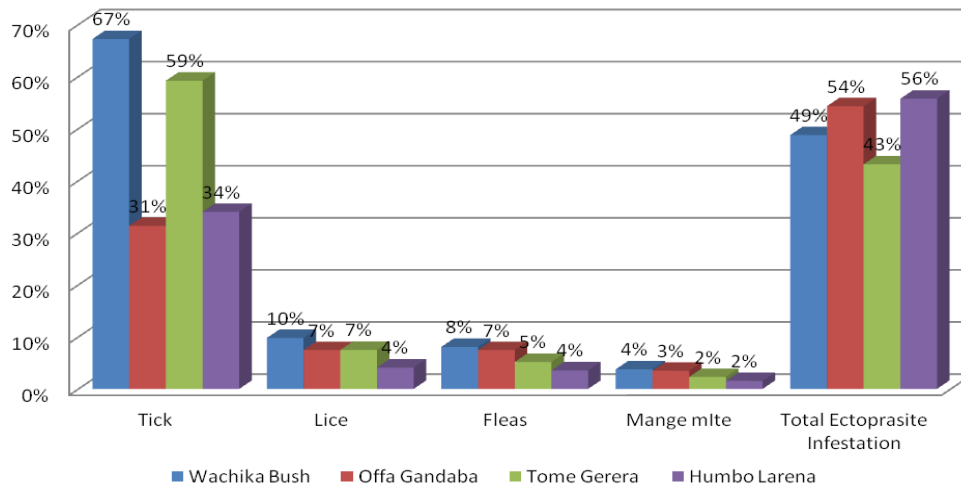


Figure 1. Prevalence of small ruminant ectoparasite infestation in different kebeles' (%).

infestation in the different kebeles' was comparable (Figure 1). Female animals were affected by ectoparasites more frequently 215 (56 %) than males 166 (44.4%) ($p=0.001$). Adult small ruminants 229 (53.8%) were more frequently affected by ectoparasites than young animals 152 (45.8%) ($p=0.029$). Frequency of ectoparasite infestation in animals with poor, medium and good body condition scores was 200 (59%), 44 (41.9%) and 137 (43.6%), respectively ($p=0.000$). Except for 2 (0.6%) cases of mixed ectoparasite infestation, tick and flea in first sample and tick and lice in second, remaining cases involving single ectoparasites including; 260 (68.2%) ticks, 53(13.9%) lice, 45 (11.8%) flea and 21 (5.5%) mange mite infestations. Distribution of small ruminant ectoparasite did not vary significantly between different kebeles' (Figure 1). Tick and lice (*Linognathus ovillus* and *Damalina ovis*) infestations were more frequent in sheep ($p<0.01$). In contrast, infestation by fleas ($p=0.007$) and mange mites ($p=0.000$) were higher in goats (Table 1). Tick, flea and mange mite infestations were higher in female than male small ruminants ($p<0.05$) and prevalence of tick infestation was higher in animals with poor body condition score ($p<0.05$). Meanwhile, no statistically significant variation in ectoparasite infestation pattern was observed between the two age groups (Table 2).

DISCUSSION

Ectoparasites like mange mites, lice, keds and ticks are widely distributed in all agro-ecological zones in Ethiopia, causing serious economic losses in small holder farms (Kumsa et al., 2012). Likewise, current findings indicated that ectoparasite infestation was uniformly widespread (50.3%) in Sodo Zuria district. The problem was more frequent in sheep than goats which could be

attributed to better body grooming habits in latter species (Mullen and Durden, 2002). Adults (> 1 year) and female animals were affected by ectoparasites more frequently than their respective counter parts.

In agreement, Yakob et al. (2008) reported prevalence of 53% and 15% for adult and young small ruminants in Wolaita Sodo. Maternal grooming and separate housing could be reducing exposure in younger animals. On the other hand, females are suggested to face higher parasitic challenge at pregnancy related to immunosuppression. Observations that animals with poor body condition had higher ectoparasite infestation rate suggest negative effect on productivity. Ectoparasites induce itching or worry (reduce time on grazing) and suck blood (compete for nutrients), both of which compromise the nutritional status of host animals (Radostitis et al., 2007). The ectoparasites identified in this study were ticks, lice, fleas and mange mites in the given order of frequency. Ticks are the main ectoparasites affecting small ruminants in Ethiopia. Similar spectrum of small ruminant tick genera were reported in Wolaita Sodo (Yacob et al., 2008; Abebe et al., 2011). Ease of detecting ticks as compared to fleas which jump frequently to avoid access and mange mites which are not visible to the naked eye could be a contributing factor. The current prevalence of small ruminant lice infestation (7.1%) is comparable to 5.3% reported from Bahir-dar (Tsfaye et al., 2012) but lower than 54.6% reported from around Gondar town (Fantahun and Mohamed, 2012). Variations could reflect differences in agro-ecology, season of study and management conditions in different localities. The prevalence of fleas infestation observed in this study (6.1 %) was between the 1.2% (Abebe et al., 2011) and 12.7% (Tsfaye et al., 2012) reported from different parts of Ethiopia. Meanwhile, current prevalence of small ruminant mange mite infestation (2.8 %) is in agreement with 0.4% (sheep) and 6.6% (goats) reported by Tefera

Table 1. Prevalence of ectoparasite infestation in small ruminants.

Type	Ectoparasite	Animal		
	Species	Ovine	Caprine	Overall
Tick	<i>Rhipicephalus evertsi evertsi</i>	60 (37)	41 (41)	101 (38.5)
	<i>Amblyoma varigatum</i>	44 (27.2)	24 (24)	68 (26)
	<i>Boohphilus decoloratus</i>	34 (21)	23 (23)	57 (21.75)
	<i>Amblyoma coherance</i>	19 (11.7)	12 (12)	31 (11.8)
	<i>Rhipicephalus puchillus</i>	5 (3.1)	-	5 (1.9)
	<i>Host overall</i>	162 (41.1)**	100 (27.5)	262 (34.6)
Lice	<i>Linognatus stenopsis</i>	1(4.2)	24(80)**	25(46.3)
	<i>Linognatus. ovilluis</i>	16(66.7)**	5(16.7)	21(38.9)
	<i>Damalina ovis</i>	7 (29.2) *	1(3.3)	8(14.8)
	<i>Host overall</i>	24(6.1)	30(8.2)	54 (7.1)
Flea	<i>Ctenocephalides felis</i>	11(73.3)	20(64.5)	31 (67.4)
	<i>Ctenocephalides canis</i>	4(26.7)	11(35.5)	15(32.6)
	<i>Host overall</i>	15(3.8)	31(8.5) **	46 (6.1)
Mange	<i>Sarcoptes scabie</i>	3 (100)	12(66.7)	15 (71.4)
	<i>Demodex caprea</i>	-	6 (33.3)	6 (28.6)
	<i>Host overall</i>	3(0.8)	18(4.9)**	21 (2.8)

** and * Represent statistical variation at $p < 0.01$ and $p < 0.05$, respectively.

Table 2. Prevalence of ectoparasites according to sex, age and body condition of study animals.

Determinant		Ectoparasites			
		Tick	Lice	Fleas	Mange mite
Sex	Female	146 (38)	22 (6)	30 (7.8)	17 (4.4)
	Male	116 (31)	31(8.3)	16 (4.3)	4 (1.1)
	p -value	0.043	0.219	0.042	0.005
Age group	Young	107 (67.8)	17 (5.1)	24 (7.2)	5 (1.5)
	Adult	155 (36.4)	37 (8.7)	22 (5.2)	16 (3.8)
	p- value	0.223	0.058	0.238	0.061
Body condition	Poor	141(41.6)	22 (6.5)	25 (7.4)	13 (3.8)
	Medium	33 (31.4)	6 (5.7)	2 (1.9)	3 (2.9)
	Good	88 (28)	26 (8.3)	19 (6.1)	5 (1.6)
	p -value	0.001	0.561	0.122	0.216

(2004). Tick infestation was more frequent in sheep whereas flea and mange mite infestation were more common in goats ($p < 0.01$). Differences could be attributed to better habitat provided by thicker sheep coat and easier diagnostic access in goats. The main tick species observed, in order of importance, were *R. evertsi eversti*, *A. variegatum*, *B. decoloratus*, *A. coherences* and *R. pulchellus*. The latter was exclusive to sheep. Among lice species identified, *L. ovilluis* and *D. ovis* tend to

frequent sheep whereas *L. stenopsis* was more common in goats ($p \leq 0.05$). *C. felis* was the flea species frequently recovered from small ruminants in this study.

Conclusion

The study demonstrated that ectoparasite infestation was a common problem facing small ruminant flocks in Sodo

Zuria district. The condition led to substantial morbidity and could render skin/hide produce unsuited for leather processing. Prevailing scenarios reflect shortfall of control strategies and significant economic loss due to small ruminant ectoparasite infestations.

Conflict of interest

The authors declare that they have no conflicts of interest.

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