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Mange Mites Infestation of Small Ruminants and the Associated Risk Factors in Wolaita Zone

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Abstract: A cross sectional study was conducted from November 2011 to April 2012 with the objective of estimating the prevalence of mange mites infestation on small ruminants, sheep and goats and identifying the potential risk factors and major species of mites in three agro-ecological zones of Wolaita, Southern Ethiopia. A total of 450 animals were examined, out of these 229 sheep and 221goats. Among the examined small ruminants, 4.1% and 2.2% goats and sheep were found infested with various species of mange mites. The overall prevalence of both sheep and goats together was 3.1%. Two genera and three species of mange mites were identified, namely *Demodex caprae* and *Demodex ovis* account for 0.9% and *Sarcoptes scabies* account for 1.8% prevalence. The genus Sarcoptes was more prevalent in the study area. Significantly higher infestation rate of mange mite was recorded in poor body condition small ruminant than the moderate one. From the identified species *Sarcoptes scabies* and *Demodex caprae* were significantly higher ($P < 0.05$) in poor body condition animals. Hence, awareness creation of the sheep and goats breeder by the animal health extension workers will be a key to control and reduce the problem of mange mites.

Key words: Sheep · Goats · Mange · Risk factors · Wolaita · Ethiopia

INTRODUCTION

Sheep commonly suffer from a variety of skin diseases, many of which are serious welfare concerns and important causes of production loss [1]. Ectoparasites of sheep are found either in or on the skin, with the exception of some flies, whose larval stages may be found in the somatic tissues of the host. In all cases, diagnosis of infection depends on the collection and identification of the parasite(s) concerned [2]. Mange mites known to infest sheep and goats include *Psoroptes communis* variety *ovis, Sarcoptes scabiei ovis, Psorergates ovis, Chorioptes bovis* variety *ovis* and *Demodex ovis.* Mange is a contagious parasitic disease of sheep, caused by the burrowing mite, *Sarcoptes scabiei*. Affected sheep scratch, develop skin lesions (papules, crusts of dried serum and blood, excoriations), become hypersensitive and anorectic and may develop pyoderma as a result of bacterial contamination of the lesions in which the disease is usually transmitted through contact of infested animal with healthy ones [3, 4]. Failure to prevent, recognize or effectively manage ectoparasitic skin diseases frequently results in substantial production losses and poor animal welfare. The objective of this study was to estimate the prevalence and distribution of major mange species identification and the associated risk factors of the mange mites of small ruminants in Wolaita zone.

MATERIALS AND METHODS

Study Area and Population: The study was conducted in three agro-ecological zones of Wolaita Zone, namely Abella Faracho and Abella Mareka (low land), Galda and Galako (midland) and Kokate-Maracharie and Dalbo-Wogane (highland) from November 2011 to May 2012.

Study Animals and Sampling Methods: A total of 450 traditionally managed small ruminants, of which 221 goats and 229 sheep were randomly selected from backyard production system. The proportion of small ruminant selected from lowland, midland and highland areas were 170, 140 and 140, respectively. The sample size for the study was determined based on the report of Desie *et al*. [5] and taking into account the 5% desired absolute precision. The study animals were selected following the systematic random sampling method described by Thrusfield [6].

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Study Design and Methods: For the study a cross-sectional study was employed to estimate the prevalence and the associated risk factors of mange mite infestation. After the study animals selected their origin, age, sex, breed, body condition and species were recorded. Then clinical examination was performed by visual inspection and palpation all parts of the skin surface for lesions. During this from animals showing the clinical signs of hair loss, scratching, itching and crusts as well as apparently healthy and suspected cases deep and superficial skin scrapings were taken into universal bottle. Then, the samples were labeled and taken to Sodo Regional Veterinary Laboratory and examined with stereomicroscope. The observed mange mites identified as described by Kaufmann [7] and Soulsby [8]. Age and Body Condition Score of the goats and sheep were determined according to Steele [9] and Gatenby [10] respectively.

Data Analysis: All collected data were recorded and managed on Microsoft Excel and STATA Version 11.0 statistical software (STATA Corp., TX) was used for all descriptive and statistical analysis.

RESULTS

From a total of 450 examined small ruminant 14 (3.1%) were found to be infested with one or more species of mange mites. Out of the total positive animals Sarcoptes, Demodex and mixed (Sarcoptes and Demodex) accounted for 1.8%, 0.9% and 0.4%, respectively (Table 1). A total of 229 and 221 sheep and goats were examined and about 5 (2.2%) sheep and 9 (4.1%) goats were found to be infested by mange mites. Also the prevalence of mange mites and the associated risk factors (or age, sex, agro-ecology and body conditions) indicated in Table 2.

Table 1: Species of mange mites identified and their prevalence according study animal species

	Animal Species		
Mange mite species	Goats(n=221)	Sheep (n=229)	Overall prevalence (N=450)
S. scabies	2.3%	1.3%	1.8% (8)
D. caprae	1.4%	-	0.7% (3)
D. ovis	-	0.4%	0.2% (1)
Mixed	0.5%	0.4%	0.4% (2)
Total	4.1%	2.2%	3.1% (14)

Table 2: Overall prevalence of mange mites vs. associated risk factors

Factors for analysis	Total animals examined	Mange mites percent prevalence
Agro climate		
Lowland	170	4.7% (8)
Midland	140	2.9% (4)
Highland	140	1.4% (2)
Age		
Young	142	2.1% (3)
Adult	308	3.6% (11)
Sex		
Female	304	3.0% (9)
Male	146	3.4% (5)
Species		
Sheep	229	2.2% (5)
Goats	221	4.1% (9)
Body Condition score		
Poor	63	12.7% (8)*
Moderate	224	2.7% (6)
Good	163	- (0)
Total	450	3.1% (14)

*X^2 = 24.5837, *P=0.000*

Table 3: Analysis of the prevalence of mange mite species vs. body conditioned small ruminants

	Body condition score			
Mite species	Moderate	Poor	x^2	P-Value
Sarcoptes scabies	1.8% (4)	6.4% (4)	10.490	*P=0.005*
Demodex caprae	0.5% (1)	3.2% (2)	7.242	*0.027*
Demodex ovis	0.45% (1)	-	-	-
Mixed	-	3.2% (2)	-	-

Poor body conditioned animals showed significantly higher ($P < 0.05$) infestation rate of *Sarcoptes scabies* (6.4%) than those of the moderate (1.8%) body condition of small ruminant. During this study period no mange mites was observed on good. Similarly poor body conditioned study animals had significantly higher (P<0.05) prevalence of *Demodex caprae* and mixed infestation than moderate body conditioned animals.

DISCUSSION AND CONCLUSIONS

The overall prevalence of mange mites infestation recorded in the current study was 3.1%. This observation is almost comparable with the reports of Desie *et al*., 3.98% [5] from selected sites of Wolaita zone. However, it is lower than the previous studies that found prevalence between 8.11% and 48.8% from various parts of the country [11-13]. These differences accounted to the variation in agro-ecology, season of the study and possibly the management system (i.e. use of acaricides) prevailing in the areas. Demissie *et al*. [13] reported the occurrence of seasonal variation in mange mites' infestation of small ruminants.

The current study recorded prevalence of 1.8% *Sarcoptes scabies* in small ruminants. This finding is comparable to the report from various parts of the country [14, 15]. Also with this study prevalence of 0.9% *Demodex* species recorded. This observation is in line with various reports from different parts of the country [12, 14]. Among the examined small ruminants a prevalence of 4.1% and 2.2% was recorded in goats and sheep, respectively and this comparable to that reported by Desie *et al*. [5] on both species in selected sites of Wolaita zone.

Absence of significant difference in mange mite infestation due to sex, age, agro-climate and species of animal in the present study is line with the observation and report of Zeryehun and Tadesse [15]. Among the considered risk factors except in body condition no significant difference observed in mange mites' infestation. Significantly higher mange infestation in poor body condition ($P < 0.05$) than the moderate body conditioned animals. This finding is in a general agreement with the reports of Kumilachew *et al*. [12], Zeryehun and Tadesse [15] and Zeryehun and Mengesha (16). Also Sertse and Wossene [17] reported that goats with poor body conditions affected about four folds more than sheep by Sarcoptes species. Both *Sarcoptes scabies* ($P < 0.05$) and *Demodex caprae* ($P < 0.05$) were significantly higher in poor body condition animals.

The prevalence of sarcoptic mange is comparatively higher in the study areas. Sarcoptic mange infestation is a major cause for animal emaciation and decrease in immune response [18] and weakness, which can lead to death. Animal health extension works to aware the animal breeder will be a key to control and reduce the problem of mange mites.

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