

Comparative Study on the Statues of Small Ruminant Mange Mite in Selected Districts of South Wollo Administrative Zone

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Abstract: A cross sectional study was conducted on 193 Sheep and 191 goats from the middle of November to the end of April 2014 with the objectives to assess the prevailing over all status of mange mite and to compare the distribution of mange mite in between two agro climatic zones and hosts in corresponding to mite species composition. A total of 384 head of small ruminants were examined to whom 192 were selected from each agro ecological districts. Among the examined small ruminants, 7.85% goats and 4.66% sheep were found infested with an overall prevalence of 6.25%. During the study period 8.42% females and 4.12% males, 5.43% of young and 6.67% adult head of small ruminant were the victim of mange mite. 17(7.76%) of the total poor body conditioned sheep and goats were positive than 4.24% of good body conditioned. Agro climatically 4.17% and 8.33% were found infested respectively from highland and midland to which 10.42% goats and 6.25% sheep were from Kombolcha and 5.26% and 3.09% respectively were from Kutaber. A statistically insignificance differences ($P > 0.05$, $X^2 < 3.84$) were concluded on the interaction of all risk factors and hosts. During the study period Sarcoptese, Demodex and psoroptese was the identified mite with over all respective prevalence of 4.17%, 1.56% and 0.52% from which 5.76% Sarcoptese, 2.09% Demodex and 0% Psoroptese were identified on goats and 2.59% 1.04% and 1.04% respectively were identified on Sheep. Therefore, this finding had revealed the requirement of further effort over actions being made by the region.

Key words: Agro ecology • Mange mite • Prevalence • Small ruminant • Goat • Sheep

INTRODUCTION

Ethiopia's economy is primarily based on agricultural sector which contributes 40-50% of the gross domestic product (GDP), over 90% of the foreign exchange earnings and about 85-90% of the employment opportunities in the country [1]. The majority of agricultural output is generated from crop and livestock integrated production systems. Live stock production is an important sector of Ethiopia's agricultural economy, providing a significant contribution to gross domestic and export products and raw materials for industries with an estimates of 25.02 million sheep and 21.88 million goats, small ruminants represent important components of the farming system, providing about 12% of the value live stock products consumed at the farm level and 48% of the cash income generated [2]. Owing to their high fertility short generation interval and adaptation even in harsh environment small ruminants are insurance for income

generation to purchase food during season of crop failure and to meet seasonal purchase such as improved seed, fertilizer and medicine for rural house hold [3].

Skin and hide is still the second leading foreign currency generating sector. Annually 16.2 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 [4, 5]. At optimum off take rates Ethiopia can export about 700,000 sheep and 2 million goats annually and at the same time supply 1,078,000 sheep and 1,128,000 goats for domestic market [2] According to the FAO statistical year book [5] report about 1.56×10^5 tones meat were produced by small ruminants in Ethiopia. Even though small ruminants are important components of the Ethiopian farming system, their contribution to food production, rural income and export income are far below the expected potential [6]. In Ethiopian tanneries, 35% of sheep and 56% of goat skins have been downgraded and rejected [7]. This is because small ruminant production in Ethiopia

is constrained by the compound effects of diseases, poor management and poor nutrition. Among the disease of goats and sheep, infestation by mange mites and ticks, as well as dermatophilosis play a considerable economic loss particularly to the skin and hide exporting sector [8].

In Amharic region, various dermatological problems affecting skin quality in goats have been reported. According to [9], apart from losses of productivity and skin rejection, mange was estimated as a cause of death for 57.3% of goats in the region. Based on reports and its significant economic impact, the region practiced ectoparasite control including mange mites in sheep and goats using acaricides as a measure to intensify the productivity of these animals and to maximize export earnings from their skins. Therefore, the major objectives of this study were to assess the prevailing over all status of mange mite besides the government controlling endeavor in the region and to compare the distribution of mange mite in between two agro ecological districts and both hosts in corresponding to mite species composition responsible for mange.

MATERIALS AND METHODS

Study Area Description: The study was carried out in two agro ecologically different districts that were purposively selected from South Wollo Administrative Zone of Eastern Amhara, North Eeastern Ethiopia, viz. Kutaber and Kombolcha, coordinates 11°16'0" N and 39°31'60" E with an elevation of 800 to 3200, 11°4' N 39°44' E, 11.067° N 39.733°E, respectively. Districts experiences bimodal rain fall, short rain fall from March to May and long rainfall from June to September. Annual rain fall ranges from 750 to 900 mm with a relative humidity of 23.9% to 79% [1].

Study animals; The study was conducted between November 2013 and March 2014 on a total of 384 small ruminants. The study population was selected from an indigenous breeds kept under extensive management system to whom 193 were sheep and 191 goats in the two agro-ecological sites that were subjected to detailed examination for the presence of skin lesions. Records were also taken with regards to age, sex and body condition as a predictor value in correlation with agro ecological environment.

Body condition score for each animal was estimated based on [10] ranging from score1 (emaciated) to score 5(obese) to which recorded as poor if it has put on score 1 and 2 while good for else. Age estimation was carried out by examination of the teeth eruption using the

approach forwarded by [11]. Those animals were recorded as young while their age was estimated bellow one year and adults for above.

Study Design: Cross sectional study design was employed to determine the prevalence of mange mites and to investigate the species of mange mite infesting sheep and goats. The sample size were calculated using the formula given by [12] by taking an expected prevalence of 50% and the study considered 95% of confidence interval with 5% absolute precision.

The two districts were selected purposively to represent the different agro climatic zones. At Kutaber district peasant association were selected by simple random sampling technique and Sheep and goats from each peasant association were selected by systematic random sampling technique for animal that were presented for vaccination against some disease such as sheep pox and pasteurilosis. Skin scrap was also collected from sheep and goats presented at kutaber veterinary clinic for treatment. In Kombolcha district Skin scrap was made on small ruminants that were presented to Kombolcha veterinary clinic with a history of itching and developed evident sign.

Clinical Observation: Animals with problems of skin lesions and history of itching were examined closely by inspection and palpation fallowed by skin scrapping.

Skin Scraping Examinations: Examination of skin scraping was made in supplementary with clinical observation essential in the diagnosis of mange mite.

Data Analysis: Raw data recorded was entered into Microsoft Excel spread sheet and analyzed using SPSS (17.0) statistical soft ware. The associations of mange mite infestation between risk factors were compared using P value and X^2 .

RESULT

Identification of mange mite species were carried out on samples collected from clinically and sub clinically infected sheep and goats in Kombolcha and Kutaber districts. The result obtained from this study showed that out of the 384 examined small ruminant 24 (6.25%) were found infested with three species of mange mites. Out of the total positive animals Sarcoptes, Demodex and Psoroptese accounted for 4.17%, 1.56% and 0.52% respectively (Table 1).

Table 1: Species of mange mites identified and their overall prevalence during study period

Parasites mite	Positive	Prevalence (%)	
Sarcoptese	16	4.17	$X^2=0.367, p=0.222$
Demodex	6	1.56	$X^2=0.400, p=0.343$
Psoroptese	2	0.52	$X^2=1.000, p=0.751$
Total	24	6.25	

Table 2: Segmented prevalence of mange mite in both agro ecology vs host

Agro-ecology	Host	Total examined	Positive & prevalence
Midland	Goat	96	10 (10.42%)
	Sheep	96	6 (6.25%)
	Total	192	16 (8.33%)
Highland	Goat	95	5 (5.26%)
	Sheep	97	3 (3.09%)
	Total	192	8 (4.17%)

$X^2=0.92, p=0.06$

Table 3: Overall prevalence of mange mites vs. associated risk factors

Factor for analysis	Total animal examined	Positive	Prevalence
Animal species			
Caprine	191	15	7.85
Ovine	193	9	4.66
Test statistics $P=0.239$, OR, 95% CI = [0.709-3.669], OR=1.978			
Sex			
Female	190	16	8.42
Male	194	8	4.12
Test statistics $P=0.154$, OR, 95% CI = [0.786-4.632], OR=1.908			
Age			
Young	129	7	5.43
Adult	255	17	6.67
Test statistics $P=0.560$, OR, 95% CI = [0.304-1.907], OR=0.761			
Agro ecology			
High land	192	8	4.17
Mid land	192	16	8.33
Test statistics $P=0.086$, OR, 95% CI = [0.190 -1.116], OR = 0.460			
Body condition			
Poor	129	17	7.76
Good	165	7	4.24
Test statistics $P=0.180$, OR, 95% CI = [0.748 - 4.721], OR= 1.878			
Total	384	24	6.25

Table 4: Prevalence of isolated mange in two agro ecology

Agro ecology	Host	Total	Isolated mite		
			Sarcoptese (%)	Demodex (%)	Psoroptese (%)
Highland	Goat	95	4(4.21)	1(1.05)	-
	Sheep	97	2(2.06)	-	1(1.03)
	Total	192	6(3.13)	1(0.52)	1(0.52)
Midland	Goat	96	7(7.29)	3(3.13)	-
	Sheep	96	3(3.13)	2(2.08)	1(1.04)
	Total	192	10(5.21)	5(2.60)	1(0.52)

$X^2=0.092, p=0.096$

The table above (Table 2) shows that; there is no significant difference in distribution of mange mite in the study area ($P > 0.05$), in Kombolcha (midland) the distribution of mange is 10.42%, 6.25% and in Kutaber (high land) 5.26%, 3.09% in goat and sheep respectively. There is no significant difference between agro ecology and disease distribution $P > 0.05$ (Table-2). This study showed that there was almost all an intimate extent of infestation burden in between midland and highland with prevalence rate of 8.33% and 4.17% respectively.

The table below (Table 4) illustrates higher tendency of goats to contract mange mite than did for sheep with dominancy of Sarcoptese mite. Psoroptese mite was identified on sheep examined from both districts while no Demodex were confirmed on high land sheep (Kutaber).

DISCUSSION

Over All Prevalence, Shoat: The present study revealed an overall prevalence of 6.25% accounting 4.56% in sheep and 7.58% in goats. This finding on sheep was matched with 4.5% made in Nekemte [13] and higher than 1.7% in wollayta [14]. In goats prevalence of 55.37% and 11.7% was registered in kombolcha by [15, 16] respectively. This discrepancy might be due to the different management status and the use of acaricides and related control practices. But, the finding of the current study in goat was higher than the prevalence reported in east wollega of Nekemte veterinary clinic 9.24% [17] and 5.89% in wollayta [18].

Over All Prevalence of Pathogen: At the time of study three genera of mange mites namely; Sarcoptes, Demodex and Psoroptese were identified from both Kombolcha and Kutaber. The two genera of mange mites have been commonly reported from different parts of Ethiopia but the later was not as such common especially after 10 years ward of document observation. The overall prevalence of Sarcoptes, Demodex and Psoroptese was 4.17%, 1.56% and 0.52% respectively. Likewise to the previous research out puts Sarcoptic mange was still the dominant mange mite confirmed in this study too. The overall prevalence of Sarcoptes identified in the present study was roughly lined with 4.2% in Wollayta [19], lower than recorded in Nekemte 7.93% [20] and higher than 2.81% in Sidama zone [17].

The comprehensive prevalence of the genus Demodectic mite in this finding was roughly approached with a report of 1.88% from Wollayta [21] but lower than 4.22% reported from Nekemte [22]. During this study

Psoroptuse mite was identified only from Sheep ever identified in the study area on small ruminants that might be due to the natural preference of mite on highly coated parts of animal, perhaps better on the cited host, although in all published research out puts it was higher on goats. Nonetheless, this finding was lower than 0.95% reported from sidama zone [23] and 1.8% in central Ethiopia [18].

Over All Prevalence of Sex: When we looked at the prevalence of mange mites in the two sex groups of sheep and goats, an overall prevalence of 8.42% was observed in female and 4.12% in male where females were more infested than males unlike recorded in Wollayta 3.4% on male and 3.0% in female [24] and 4.3% on male and 3.87% on female [25] which were comprehensively lower than in both sexes. However, there was no significance difference ($p=0.154$) in sex groups. This finding was in agreement with previous observation made elsewhere in the country. [26, 27] and have reported that sex has no significant effect on the prevalence of mange mites.

Overall Prevalence of Age: Although there was no statistically significant difference ($p>0.05$), mange mite infestation at the present finding were being higher in adult age group than young. [28] Reported higher prevalence of 3.6% mange mite in adult small ruminants than 2.1% young age group. Furthermore, age was reported to have no significant effect on the prevalence of mange mites [29]. Mange mite infestation is described to be independent of age and sex [30]. Therefore, sex and age of the host animals are not contributing factors for the differences in the prevalence of mange in the study area.

Over All Prevalence of Body Condition: In the present study, 7(4.24%) of good body conditioned small ruminants were found positive that have statistically insignificance difference ($p>0.05$) with poor body conditioned of 17(7.76%). This prevalence on good and poor body conditioned studied animals were roughly approached to 3.1% and 8.6% respectively reported from goats in Kombolcha [31]. In contrary no prevalence was reported on good body conditioned studied small ruminants from Wollayta [32]. In a different report by [33] prevalence of 15.3% mange mite infestation in poor body condition and 3% in good body condition goats was documented in selected sites of Amhara region. The deviation for the present study might be associated with the enhancement of animal owner awareness immediately taken therapeutic intervention before animals got emaciated.

Agro Ecological Prevalence: The current study were aimed to compare the prevalence of mange mite in between kutaber and kombolcha where agro climatically highland and midland respectively. On the basis of this research the respective prevalence of 8(4.17%) and 16(8.33%) were recognized from highland and midland. This finding was higher than documented results studied from highland and midland zones of Wollayta with a respective percentage prevalence of 1.4% and 2.9% [34] and also findings of 0.55% and 1.24% [35]. There was no statistically significance association ($P>0.05$) in the two agro ecological sites, implying that distribution of mange mite could independently and equally infested regardless of cold and medium climatic zones. In these study area particularly it might be due to frequent and vicinal interaction among livestock of kutaber and Kombolcha through the boarder of Dessie zuria and Tehuledere whereas. Furthermore, Marketing of mite incubated sheep and goats in between two areas combined with none extreme variation of two agro ecology (not as the difference in between highland and lowland) may contribute for the stabilization of mange mite at both studied districts.

CONCLUSION

During the study period the extent of mange mite was not a mint, rather implies the impact imposed by them was vast even to the highland areas. The finding of different species of mange mite on both sheep and goats coupled with the versatile efforts made by the government worsens the magnitude of the disease and calls the concerned body to put it under control, although undeniable reduction was existed from time to time. There for from the bases of the above conclusion the fallowing recommendation had forwarded; an immense research should be conducted on small ruminant, especially on sheep and high land areas that many researchers did not concentrated. This is because a number of researches out puts were recorded on goats of the lowland region unlike the present finding. There should be massive coverage of small ruminants while spraying campaign to avoid comparative disadvantage of peasants and re-infestation of the treated which were evident on remote areas of Kutaber. Certification should be accustomed after spraying for easy control of disease and commencement of modern marketing system thereby increase the income generation potential of the two administrative districts. There should be implementing stringent measures to halt

uncontrolled livestock movement, which otherwise may enhance a continuous spread of the disease into other areas.

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