academicJournals

Vol. 10(5), pp. 128-134, May 2018
DOI: 10.5897/JVMAH2017.0649
Article Number: 23517EE56822
ISSN 2141-2529

http://www.academicjournals.org/JVMAH

Journal of Veterinary Medicine and Animal Health

Full Length Research Paper

Status of mange infestation in indigenous sheep and goats and their control practices in Wag-Himra zone, Ethiopia

Adane Agegnehu, Basaznew Bogale*, Shimelis Tesfaye and Shimelis Dagnachew

College of Veterinary Medicine and Animal Sciences, University of Gondar, Gondar, P. O. Box 196 Ethiopia.

Received 26 September, 2017: Accepted 2 March, 2018

A cross sectional study was conducted from December 2016 to April 2017 to estimate the status of mange infestation in indigenous sheep and goats and identify the major species of mites and potential risk factors in selected districts with different agro-ecological zones of Wag-Himra zone. In addition, a questionnaire survey was conducted to assess the awareness and control practices of livestock owners on mange mite's infestation. From a total of 384 small ruminants (120 sheep and 264 goats), 105 (27.33%) were positive for mange mites infestation on skin scraping examination. *Sarcoptes scabiei* was the only mange mites species identified with a prevalence of 33.3% (n=40) in sheep and 24.6% (n=65) in goats. Host factors such as species, sex, age and body condition were not found as a risk factor of *S. scabiei* infestation in the current study. However, there was a statistical significant (P<0.031) difference in prevalence of *S. scabiei* infestation in small ruminants between the three agro-ecological zones. The pathological lesions (crusts formation and loss of hair) caused by *S. scabiei* were observed on the face, head, ear and tail regions. The result of the questionnaire survey indicated that mange was considered as an important disease by small ruminant holders. From the interviewed livestock owners, 86.27% respondents explained that they use modern acaricides for the treatment of mange. The results of this study indicates that the agro-ecology had effect on the prevalence of *S. scabiei* in sheep and goats in the study area.

Key words: Cross sectional, ectoparasites infestation, small ruminants.

INTRODUCTION

Goats and sheep represent important sources of protein in the world, supplying a good percentage of the daily meat and milk products in urban and rural areas. Small ruminants are important contributors to the economy of Ethiopia (CSA, 2013). They are also important contributors to food production; providing 25% of meat and 14% of milk for domestic consumption (Metaferia et al., 2011). In addition, manure from these animals is very important as source of organic fertilizer from any farming populations in the country. Reports have indicated that

*Corresponding author. E-mail: basaznew2008@yahoo.com. Tel: 251918020923.

skin utilization is estimated to be 75% for goat and 97% sheep skin, with expected off-take rate of 33 and 35% for sheep and goat, respectively (Tadesse and Mebrahitu, 2010; Zeryehun and Tadesse, 2012). However, raw skin production from sheep and goats in Ethiopia has faced serious challenges as a result of skin diseases caused by external parasites (Bisrat, 2013). Ectoparasites such as mites, ticks, lice and fleas affect large numbers of sheep and goats in Ethiopia causing a wide range of health problems including mechanical tissue damage, and predispose to myiasis and dermatophilosis. Infestations increase susceptibility to other diseases and create sites for secondary invasion by pathogenic organisms and reduced productivity (Mersha et al., 2010). They have the ability to parasitize wide range of hosts (Sumbria et al., 2016). Though mites are active in keratin layer and causes direct damage to skin, also cause indirect economic loss by decreasing/ceasing reproduction and production performance (Soulsby, 1982).

Mange has been reported as one of the most prevalent and widely distributed skin disease in Ethiopia by degrading skin quality (Yacob, 2013). In Amhara Region mange has been the great threat for the production of small ruminants (Demissie et al., 2000). Despite national and regional efforts and emphasis given to the control programs against parasitic skin diseases, reports have shown that the problem seems to be still alarming (Seid et al., 2014; Yacob, 2014; Bedada et al., 2015).

This study was conducted to isolate and identify mange species and estimate their prevalence and assess their control practices by small ruminant owners in different agro-climatic conditions in the study area.

MATERIALS AND METHODS

Description of study area

This study was carried out in three selected districts (Gazgibla, Sekota and Ziquala) of Wag-Himra administrative zone, Amhara Regional State from November 2016 to April 2017. The districts represent three agro-ecological conditions; highland, midland and lowland, respectively. WagHimra zone is located between 12°C 23' and 13°C 16' north longitudes and 38°C 44' and 39°C 21' east latitudes, in the eastern part of the country. The annual rainfall, which is erratic in distribution, varies between 350 and 650 mm (CSA, 2013).

Study animals

The animals were indigenous breeds of sheep and goats kept in small flocks and managed under extensive farming system in different agro-climates. The sampled sheep and goats were stratified by sex, age and body condition. Animals aged up to one year were classified as young stock while those above two years were categorized as adults (Gatenby, 1991; Steele, 1996).

Study design and sample size determination

A cross-sectional study design was used. Semi-structured questionnaires were used to gather information on the level of awareness of sheep and goat owners about mange and its control practices. Purposive sampling techniques were used to select study districts based on their agro-ecology. In each study site, the farmers were randomly selected from a list prepared from the previous extension activities by the veterinary office. The sample size for the study was determined as described by Thrusfield (2005). Descriptive statistics (percentage, frequency distribution and correlation analysis) were used to determine the prevalence and associated risk factors.

Sample collection and examination

Skin scrapings were collected only from sheep and goats suspected for having clinical sign of mange encountered during field visits. Both superficial and deep skin scrapings were made to diagnose both burrowing and non-burrowing mites.

This was made by clipping the hair around affected areas with scissors, scraping the edges of the lesion with the scalpel blades until capillary blood was evident. The samples were collected in sterile plastic bottles containing 70% alcohol and taken to the parasitology laboratory of College of Veterinary Medicine and Animal Sciences, University of Gondar for proceeding diagnosis. Multiple sites were scrapped to increase the likelihood of mange mites' detection. The scraped material was then treated with 10% KOH solution in the test tubes and centrifuged at 1500 rpm for 5 min (Gupta and Singla 2012). The supernatant was discarded and the sediment was examined under a compound microscope using X10 and X40 magnification. Morpho-anatomical diagnosis keys provided by Soulsby (1982) and Pangui (1994) were used to identify the scabies agents.

Questionnaire survey

Semi-structured questionnaire format were prepared and used to collect information about the general attitude of the individual sheep and goat owners and to assess preventive and control practices against mange and evaluate risk factors on the occurrence of the disease. A total of 153 sheep and goat owners were selected. The information was collected by interviewing randomly selectedsheep and goats owners. The important points included in questionnaire survey were purpose of keeping animals, species of animals (sheep, goats) affected by mange, affected age group (young, adults), seasonality of the disease (wet, dry), effect of the disease on live animals and skin sale and control practices (modern, traditional).

Statistical analysis

Raw data was carefully recorded and stored in Microsoft Excel database system used for data management. Data were analysed using the SPSS for windows, version17.0.Descriptive statistics, percentages and 95% confidence intervals were used to summarize the proportion of infested and non-infested animals. The effects of different environmental and host risk factors were analyzed by using logistic regression and Chi-square test. Statistical significance was set at $p \leq 0.05$.

RESULTS

Questionnaire survey

The result of the questionnaire survey indicated that all

Table 1. Questionnaire survey results.

Focal point	Frequency (n)	Response (%)
Purpose of farming		
For income generation	128	83.66
For home meat and milk consumption	25	16.33
Affected species		
Goat	130	84.9
Sheep	23	15.03
Age group of animals affected		
Adult	123	80.39
Young	30	19.6
Seasonality of mange mites		
Dry season	131	85.62
Wet season	22	14.37
Effects of mange on sale		
Live animal	109	71.2
Skin	44	28.75
External parasite causing skin disease		
Mange mites	136	88.88
Lice	17	11.11
Way of treatment		
Modern	132	86.27
Traditional	21	13.72
Participation of farmers in the control practice		
Yes	149	97.38
No	4	2.61

respondents (153, 100%), practice keeping sheep and goats in the study area. The farmers in those study area keep their animals with the objectives of income generation (85.66%) and home meat and milk consumption (16.33%).

From interviewed respondents, 71.2% replied that mange mite infection had great enforcements to sale their live animals and skins. Concerning the treatment of mange mites, 86.27% of the respondents indicated that mange is more commonly treated using modern acaricides while 13.72% use traditional treatments (ethno-medicines) as well (Table 1).

In addition, 88.8% respondents explained that among external parasites, mange mites and lice infestation are the dominant ones that cause skin diseases and goats are highly affected (84.9%) than sheep's (15.03) by mange mites. Concerning the age groups, 80.39% of the respondents replied that adults are more affected than young animals. In relation to seasonal variation of mange occurrence, 85.62% of the respondents agreed that the infestation is highly aggravated during the dry or after the rainy season, whereas 14.3% of the respondents replied that mange is a problem during the wet season (Table 1).

Species and characteristics of lesion of mange

In the present study, the only isolated mange mite species affecting both sheep and goats was *S. scabiei*. In sheep and goats, *S. scabiei*a affected only the non-woolly areas of the body and lesions were observed mostly around the head, face and ear areas and nodule formation was the characteristics of lesions (Figure 1, A, B, C). The lesions were characterized by loss of hair,

Figure 1. Sheep (A) and Goat (B, C) infested with sarcoptic mange.

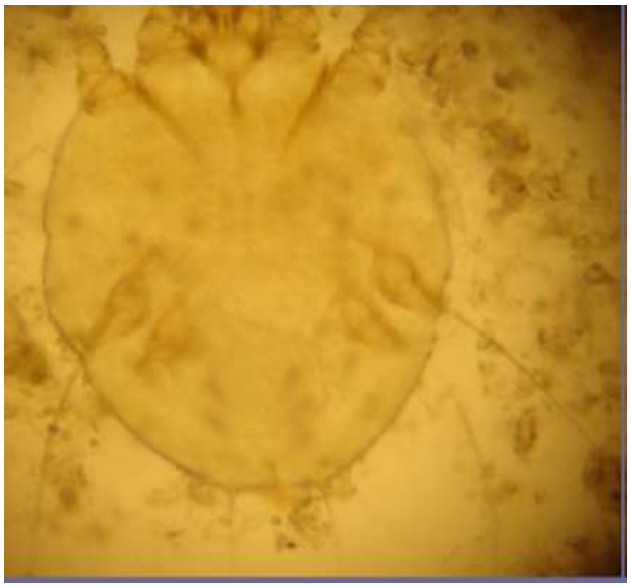

Figure 2. Ventral view of *Sarcoptes* mites.

ragged wool and crust formations and cracking and wrinkling of the skin.

Prevalence of *S. scabiei*

Out of 384 animals (120 sheep and 264 goats) examined, 105 (27. 33%) were found to be infested with *S. scabiei* (Figure 2). Of these, 65 (24.60%) were goats and 40 (33.33%) were sheep. The difference in the prevalence between the two host species was not statistically significant (X^2=3.1519, p=0.076 (Table 2).

In this study, both male and female sheep and goats were infested with *Sarcoptes* mange with an overall prevalence of female and male sheep as 32.55 and 35.29%, respectively while the prevalence in female and male goats was 22.39 and 30.55%, respectively without a statistical difference in prevalence between sex categories in both host species (Table 2).

The overall prevalence of *S.* scabiei in young and adult sheep was 34.28 and 32.94%, respectively (Table 3). The overall prevalence of *Sarcoptes* mite in young and adult goats was 30.43 and 22.5%, respectively. However, there was no statistically significant deference (p>0.05) between the prevalence of age groups in both host species (Table 2).

An overall prevalence of 32.5 and 33.75% *Sarcoptes* mites infestation in sheep and 28.8% and 22.15% in goats was recorded in animals with good and poor body conditions, respectively without any statistical significant difference (p > 0.05) (Table 2).

The prevalence of *S. scabiei* in highland, midland and

Table 2. Prevalence of *Sarcoptes* spp. in sheep and goat based on different risk factors.

Risk factor	Number examined	Prevalence (%)	95%CI	x^2(P-value)
Species				
Sheep	120	40(33.3)	0.24-0.41	
Goat	264	65(24.6)	0.19-0.29	3.1519(0.076)
Female	278	71(25.5)	0.20-0.30	
Male	106	34(32.0)	0.23-0.40	1.6501(0.199)
Age				
Adult	280	72(25.7)	0.20-0.30	
Young	104	33(31.7)	0.22-0.40	1.3817(0.240)
Body condition				
Poor	247	64(25.9)		0.20-0.31
Good	137	41(29.9)	0.22-0.37	0.7154(0.398)
Agro-ecology				
Lowland	130	26(20)		0.13-0.26
Midland	172	46(26.7)	0.20-0.33	
Highland	82	33(40.2)	0.29-0.50	10.4280(0.005)
Overall	384	105(27.33)		

Table 3. Prevalence of *Sarcoptes* spp. in sheep and goats in the three agro-ecological zones.

Goat			Sheep			x^2(p-value)
Lowland	**Midland**	**Highland**	**Lowland**	**Midland**	**Highland**	
n=111	n=121	n=32	n=19	n=51	n=50	
Sarcoptes	22(19.8)	32(26.4)	11(34.4)	4(21.0)	22(44)	10.4288(0.005)

lowland was 44.0, 27.4 and 21.0% in sheep and 34.3, 26.4 and 19.8% in goats, respectively. The prevalence of *Sarcoptes* spp. in highland, midland and lowland was 44.0, 27.4 and 21.5 % in sheep and 34.3, 26.4 and 19.8 % in goats, respectively. The overall prevalence of *S. scabiei* infestation significantly varied (X^2=10.4288, P=0.005) among the three agroecological zones/ districts (Table 2).

Factors affecting the prevalence of *S. scabiei*

Univariable logistic regression analysis indicated that, agro-ecological variations were the only factors that showed a significant (p<0.031) association in the prevalence of *S. scabiei* infestation between the study populations. A significant association (p<0.031) between *S. scabie* infestation and agro-ecology was observed in which sheep and goats reared in highland areas were1.46 times at risk for sarcoptic mange than those reared in midland and sheep and goats reared in midland were 0.547 times less likely to be affected than those reared in lowland.

DISCUSSION

In the present study, the only isolated mange mite species affecting both sheep and goats was *S. scabiei* with an overall prevalence of 27.33%. This species was also identified in different agro-ecological areas in Ethiopia (Mulugeta et al., 2010; Fekadu et al., 2013). This value was higher than the prevalence reported by Sertse and Wossene (2007) in Amhara Regional State, and by Beyecha et al. (2014) in central Oromia. The possible explanation for these differences in prevalence among different works could be variations in environmental and host factors, study seasons, control practices and management systems.

In this study, sex was not associated with prevalence of

S. scabiei which was in agreement with the work of Sheferaw et al. (2010) and Enquebaher and Etsay (2010). However, the prevalence was slightly higher in male than female goats in this study. This may be due to frequent contact of male goats at the time of mating and fighting.

The higher prevalence was observed in young animals than adult ones in the present study. This result agreed with the findings of Kasaye and Kebede (2010) and Shiferaw et al. (2010) who reported higher prevalence of *S. scabiei* in young animals than the old age group. It might be related to the degree of movement and frequent contacts of young animals with other flocks. Furthermore, age was reported to have no significant effect on the prevalence of mange mites (Yacob et al., 2008). Mange mite infestation is described to be independent of age and sex (Soulsby, 1982). Therefore, sex and age of the host animals are not contributing factors for the differences in the prevalence of mange in the study area.

In the current study, the highest level of prevalence was observed in animals with good body condition compared to the prevalence in poor body condition. This result disagreed with the findings of Sretse and Wossene (2007a) who reported that poor body conditioned goats were 4.3 times at risk for sarcoptic mange than good body conditioned goats with the explanation that poorly nourished animals appear to be less competent in getting rid of infestation as compared to that of well-managed animals (Sertse and Wossene, 2007).

In the present study, the highest prevalence of *S. scabiei* in goats was observed in highland (40.24%) area than midland (24.74) and lowland (20%) area. This finding disagreed with previous reports of Beyecha et al. (2014). This might be associated with difference in animal population which causes favorable condition for the transmission of mites between animals (Sertse and Wossene, 2007). Therefore, incidence of mange mite is higher in wet, cold areas which are optimum for reproduction, multiplication and mite development favoring its infestation (Olubumni et al., 1995*).*

Agro-ecological variations was a factor that yielded significant ($p<0.0.31$) association to the prevalence of *S. scabiei* infestation among the study population. Goats found in highland areas were 1.46 times at risk of acquiring *S. scabiei* infestation than midland areas. This finding disagreed with those reports by Pangui (1994). The high prevalence of the *S. scabiei* in the highland may be associated with the ideal micro climate environment in these areas which favors the breeding and multiplication of mange mite eggs to their developmental stages (Pangui, 1994).

The result of the questionnaire survey indicated that all respondents (100%) keep sheep and goats in the study area. The farmers in those study area keep their animals with the objectives of income generation and home meat and milk consumption (85.66%). The majority of interviewed respondents (71.2%) replied that mange mite infestation had great enforcements to sale their live sheep and goats and skins.

From the present study, it is possible to conclude that *Sarcoptesscabiei* is prevalent in sheep and goats in the study area which underlines the need of effective control measures.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

http://academicjournals.org/articles/view/1009963198Bedada H, Terefe G, Hailu Y (2015). Current status of ectoparasites in sheep and management practices against the problem in ectoparasites controlled and uncontrolled areas of Arsi Zone in Oromia Region, Ethiopia. J. Vet. Sci. Technol. S10:002.

Beyecha K, Kumsa B, Beyene D (2014). Beyecha, K., Kumsa, B., & Beyene, D. (2014). Ectoparasites of goats in three agroecologies in central Oromia, Ethiopia. Comp. Clin. Pathol. 23(1):21-28.

Bisrat G (2013). Defect Assessment of Ethiopian Hide and Skin: The Case of Tanneries in Addis Ababa and Modjo, Ethiopia. Glob. Vet. 11(4):395-398.

Central Statistical Agency (CSA) (2013). Agricultural sample survey Statistical bulletin 570, Addis Ababa.

Demissie A, Siraw B, Teferi K, Tsertse T, Mammo G, Mekonnen D, Shimelis S (2000). Mange: a disease of growing threat for the production of small ruminants in the Amhara National Regional State. In The Opportunities and Challenges of Enhancing Goat Production in East Africa. Proceedings of a conference held at Debub, University Awassa, Ethiopia. pp. 80-91.

Enquebaher K, Etsay K (2010). Epidemiological study on menge mite, lice and sheep keds of small ruminants in tigray region, northern Ethiopia. Ethiop. Vet. J. 14(2):51-65.

Fekadu A, Tolosso YH, Ashenafi H (2013). Ectoparasites of small ruminants in three Agro-ecological districts of southern Ethiopia. Afr. J. Basic Appl. Sci. 5(1):47-54.

Gatenby MR (1991). Sheep.12 In: The Tropical Agriculturalist, Coste, R. and J.A. Smith (Eds.). Macmillan and CTA (Waeningen), London, UK. pp. 6-11.

Gupta SK, Singla LD (2012). Diagnostic trends in parasitic diseases of animals. In: Veterinary Diagnostics: Current trends. Gupta RP, Garg SR, Nehra V and Lather D (Eds.), SatishSerial Publishing House, Delhi. pp. 81-112.

Kasaye E, Kebede E (2010). Epidemiological study on mange mite, lice and sheep keds of small suminants in Tigray Region, NorthernEthiopia. Ethiop. Vet. J. 14(2):51-65.

Mersha C, Tamiru N, Asegedech S (2010). Ectoparasites are the Major Causes of Various Types of Skin Lesions in small ruminants in Ethiopia. Trop. Anim. Health Prod. 42:1103-1109.

Metaferia F, Cherenet T, Gelan A, Abnet F, Tesfaye A, Ali JA, Gulilat W (2011). A review to improve estimation of the livestock's contribution to the national GDP.Ministry of Finance and Economic development and Ministry, Addis Abeba, Ethiopia.

Mulugeta Y, Yacob HT, Ashenafi H (2010).Ectoparasites of small ruminants in three selected agro-ecological sites of Tigray Region, Ethiopia. Trop. Anim. Health Prod. 42(6):1219-1224.

Olubumni PA (1995). The prevalence of caprine sarcoptic mange due to Sarcoptes scabiei var capri in Ile-Ife area of Nigeria, its control and management. Bull. Anim. Health Prod.Afr. 43(2):115-120.

Pangui LJ (1994). Mange of domestic animals and methods of control. Rev. Sci. Tech. Off. Intl. Epiz.13:1227-1243.

Seid K, Amare S, Tolossa YH (2016). Mange mites of sheep and goats in selected sites of Eastern Amhara region, Ethiopia. J. Parasite. Dis. 40(1):132-137.
Sertse T, Wossene A (2007). A study on ectoparasites of sheep and goats in eastern part of Amhara region, northeast Ethiopia. Small Ruminant Res. 69(1):62-67.
Sheferaw D, Degefu H, Banteyirgu D (2010) Epidemiological study of small ruminant mange mites in three agro-ecological zones of Wolaita, Southern Ethiopia. Ethiop. Vet. J. 14(1):31-38.
Sheferaw D, Degefu H, Banteyirgu D (2010). Epidemiological study of small ruminant mange mites in three agro-ecological zones of Wolaita, Southern Ethiopia. Ethiop. Vet. J. 14(1):31-38.
Soulsby EJL (1982). Helminthes, Arthropods and protozoa of domestic animals.7th edition. University of Cambridge. Baillie Tindal, London. pp. 321-324.
Steele MR (1996). Goats In: The Tropical Agriculturalist, Coste, R. and J.A. Smith (Eds.). Macmillan and CTA (Waeningen), London, UK. pp. 79-86.
Sumbria D, singla LD, Gupta SK (2016). Arthropod invaders pedestal threats to public vigor: An overview. Asian J. Anim. Vet. Adv. 11: 213-225.
Tadesse A, Mebrahitu K (2010). Study on ectoparasitic defects of processed skins at Sheba Tannery, Tigray, Northern Ethiopia. Trop. Anim. Health Prod. 42:1719-1722.
Thrusfield M (2005). Veterinary Epidemiology, Sampling in Veterinary Epidemiology.3rd edition. UK. Blackwell Science Ltd. pp. 182-198.
Yacob H, Yalew T, Dinka A (2008). Ectoparasite prevalence's in sheep and goats in and around Wolita Soddo, Southern Ethiopia. Rev. Med. Vet. 159:450-454.
Yacob HT (2013). Skin defects in small ruminates and their nature and economic importance: The case of Ethiopia. Glob. Vet. 11(5):107-112.
Yacob HT (2014). Ectoparasitism: Threat to Ethiopian small ruminant population and tanning industry. J. Vet. Med. Anim. Health 6(1):25-33.
Zeryehun T, Tadesse M (2012). Prevalence of mange mite on small Ruminants at Nekemte veterinary clinic, East wollega zone, North west Ethiopia. Middle–East J. Sci. Res. 11(10):1411-1416.