Global Veterinaria 5 (5): 287-290, 2010
ISSN 1992-6197

Study on Prevalence and Effect of Diazinon® on Goat Mange Mites in Northeastern Ethiopia

[1]Wondwossen Kumilachew, [2]Sefinew Alemu, [2]Wudu Temesgen, [2]Haileleul Negussie and [3]Hailu Mazengia

[1]Kombolcha Regional Veterinary Laboratory, Amhara Region, Kombolcha, Ethiopia
[2]Department of Clinical Medicine and Epidemiology, Faculty of Veterinary Medicine, University of Gondar, P. O. Box 196, Gondar, Ethiopia
[3]Department of Animal Production and Technology, College of Agriculture and Environmental Sciences, Bahir Dar University, Bahir Dar, Ethiopia

Abstract: A study on mange mites was carried out with the aim of determining prevalence, assess potential risk factors and evaluate the effect of 0.06% 600EC diazinon® in northeastern Ethiopia. Secondary data and skin scraping examinations from 350 goats (244 female and 106 male) were used for the study. An overall infection rate of 29.4% of mange mites was observed. The prevalence of mange mites in poor body condition animals (48%) was higher ($P < 0.05$) as compared to moderate body condition (15.5%) animals; and it was higher in female (31.1%) than male (25.5%) goats. Mites of *Sarcoptes* (28%) and *Demodex* (1.42%) were identified. Mange mites were detected at highest frequency from head region. The study indicated reduction of mange mites' prevalence after dipping of goats in 0.06% 600EC diazinon®. In conclusion, the present incidence of mange mites was still high enough to cause significant economic losses in the study area. Therefore, strengthening the control effort was suggested.

Key words: Demodex · Goats · Sarcoptes · Skin

INTRODUCTION

External parasites of small ruminants can result in mortality, affect reproduction and production and cause down grading and rejection of skins [1]. In Ethiopia, external parasites were the cause for rejection of 35% of sheep and 56% of goats' skins [2], of which mange infestation accounts for rejection of 33 and 21% of sheep and goats skins, respectively [3].

Mange was a serious problem in Amhara national regional state affecting sheep and goats; three tanneries in the region reported that mange was a cause for rejection of 443 602 pieces of skin per annum [1]. The region, therefore, carryout ectoparasites control in small ruminants using 0.06% 600EC diazinon®.

However, the level of mange mites and the effect of control were not known. Therefore, this study was carried out to estimate current prevalence, assess potential risk factors involved and to study effect of 0.06% 600EC diazinon® for the control of goats mange mites in Amhara national regional state, northeastern Ethiopia.

MATERIALS AND METHODS

Study Area and Study Population: The study was carried out in selected zones of Amhara national regional state, Waghemra and Oromiya zones. The study area has altitude ranging from 1500-1800m above sea level, gets annual rainfall of 750 to 900mm and average annual temperature of 25 to 30°C. There is a long dry season from October to January and a short dry period from May to June [4]. Indigenous goats which had skin problems were the study subjects.

Study Design and Sampling: The study was done from secondary data and active cross-sectional study involving skin scraping examinations from 350 goats (244 female and 106 male). Study animals were grouped

Corresponding Author: Sefinew Alemu, Department of Clinical Medicine and Epidemiology, Faculty of Veterinary Medicine, University of Gondar, P. O. Box 196, Gondar, Ethiopia, E-mail: sefiale@yahoo.com.

into poor body condition and moderate body condition based on their physical body condition as described by Steele [5]. Skin scrapings mange mites' status was considered as variable of interest verses risk factors. Body condition, sex and dipping in 0.06% 600EC diazinon® were considered as explanatory variables.

Acaricide dip of 0.06% concentration, prepared by adding one liter of 60% 600EC diazinon® (Adamitulu, Zeway, Ethiopia) into 1000 liter of water, was used to immerse goats for mange mites control trial. Percentage reduction of mange mites' prevalence before and after three round dipping of goats in the 0.06% 600EC diazinon® was calculated from mange mites control trial at Sekota, Waghemra zone, Amhara national regional state. History for the presence of skin problem was asked for a studied goat in addition to distant visual inspection deep inspection by parting the hair in the direction opposite to hair normally rests. Skin scrapings were collected from the most active lesions of the head, neck, thorax, flank, rump, tail and legs. Samples were properly labeled and transported to Kombolcha Veterinary Laboratory for examination of mange mites. In the laboratory, skin scrapings were digested by adding few drops of 10% potassium hydroxide and a gentle heat to hasten digestion and to free the mites. After 30 minutes, a drop of the sediment was examined for the presence of mites on a slide with cover slip under the lower power of the microscope. Mite identification was made according to Wall and Shearer [6] and Taylor *et al*. [7].

Data Management and Analysis: Data obtained was analysed using Statistical Packages for Social Science (SPSS) (Version 17). The significance of differences between the prevalences of mange mites in the different groups of goats was determined using chi-square test. In all the analyses, confidence level was held at 95% and P=0.05 was considered as significance.

RESULTS

A total prevalence of 29.4% mange mites (103 of 350) was observed. Different levels of mite infestation were detected in female and male goats (Table 1). Higher prevalence of mange mites was observed in goats which had poor body condition as compared to goats which had moderate body condition. The difference between the prevalence was statistically significant ($p < 0.05$).

Mange mites were detected at highest frequency on the head region, 58.2% (46 of 79) and at lowest frequency on the legs, 3.44% (1 of 29) (Figure 1).

Table 1: Prevalence of mange mites in goats by the different risk factors

Potential risk factors tested	No. of animals Examined	Positive (%)	P-value
Sex			
Female	244	76 (31.1)	
Male	106	27 (25.5)	0.284
Body condition			
Poor	150	72 (48)	
Moderate	200	31 (15.5)	0.000
Total	350	103 (29.4)	

Demodex and *Sarcoptes* were identified with respective prevalences of 1.42% and 28%, respectively (Table 2).

Table 2: Prevalence of *Sarcoptes* and *Demodex* between different groups of goats

Groups of goats	No. of animals Examined	Species of mite identified: Demodex (%)	Sarcoptes (%)
Sex			
Female	244	5 (2.04)	71 (29.1)
Male	106	-	27 (25.5)
Body condition			
Poor	150	4 (2.66)	68 (45.3)
Moderate	200	1 (0.5)	30 (15)
Total	350	5 (1.42)	98 (28)

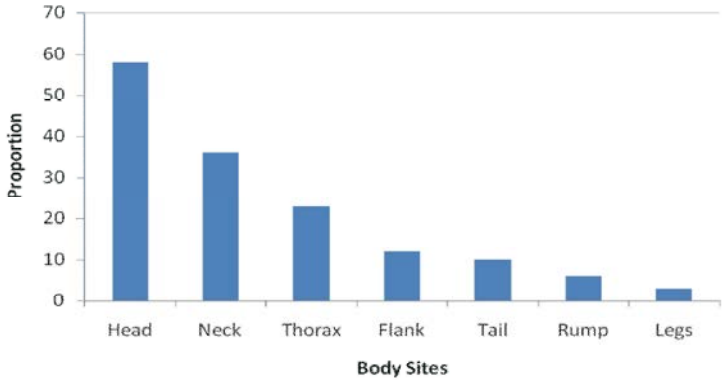

Fig. 1: Distribution of mange mite in different anatomical sites of goats.

Table 3: Prevalence of mange mites in goats before and after three round dipping

Examination for mange status	Number of animals Grossly examined for mange	Positive for mange (%)
Before dipping	26699	11504 (43.1)
After third dipping	26993	516 (1.91)
Percentage reduction		41.2

From the secondary data, higher prevalence (43.1%) of mange mites was observed by gross examination before intervention as compared to the prevalence calculated after three round dipping of goats in 600EC (60%) diazinon (Table 3). There was statistically highly significant difference between the prevalence's of mange mites before dipping and after three round dipping in 600EC (60%) diazinon ($p < 0.05$).

DISCUSSION

In the active cross-sectional study of mange mites, overall prevalence of 29.4% (103 of 350) was observed. This level of prevalence of mange mites in this current study was lower than the prevalence of mange mites (43.1%) before application of 600EC (60%) diazinon in Waghemra zone and from other previous reports of mange mites in goats with skin problems. Demissie *et al.* [8] reported mange mites with prevalence of 59.6% from their study in Amhara national regional state. However, it was higher than the prevalence of mange mites (1.91%) in goats with skin problems after three round dipping of goats in 600EC (60%) diazinon in Waghemra zone. This difference in prevalences between the current study and the previous studies particularly that of Amhara national regional state is likely to be associated with the control measure; however, reduction of mange mites to the level of 1.91% might be associated with the feasibility of control intervention in the small area, Waghemra, but the feasibility of control intervention reduced when it was applied in wider area and resulting in higher level of mange mite prevalence.

When the level of infestation of mange mites were calculated for the two sex groups of goats, prevalences of 31.1 and 25.5% were observed in female and male goats, respectively. This result of current study supported the general perception that female animals are more affected by non-sex related diseases as parturition and lactation cause relaxation of the natural immunity of female animals [9].

In the present study, prevalences were compared in animals which have poor body condition and in animals of moderate body condition. The highest level of prevalence (48%) was observed in animals which had poor body condition while the lowest prevalence (15.5%) was observed in animals which had moderate body condition. This might be due to nutritional status, as well-fed animals can better withstand parasite infestation than animals on an inadequate diet, which can influence the level of immunity. Alternatively, mange might be the cause for poor body condition; hence high prevalence was calculated in this group of animals.

In this current study, two genera of mites, *Demodex* and *Sarcoptes,* were identified. Out of the total 350 goats with skin problems, 28% (98 of 350) were due to *Sarcoptes* while the rest 1.42% (5 of 350) were due to *Demodex*. This finding is in agreement with the work of Numery [10] who reported *Sarcoptes* and *Demodex* with prevalences of 33.3 and 1.36%, respectively. When the levels of infestation of mites of the two genuses were compared regarding to sex and body condition, *Sarcoptes* was observed with prevalences of 29.1 and 25.5% in female and male goats and with prevalences of 45.3 and 15% in poor and moderate body conditined animals, respectively.

The distribution of mange mites was studied on seven anatomical sites. Mange mites were detected at the highest frequency from the head region 44.7% (46 of 103) followed by the neck region 33% (34 of 103) and the region of the thorax 12.6% (13 of 103). The level of detection of mites was less in the regions of the flank, tail and rump. Only one goat was positive from skin scrappies of the legs. According to Talley and Sparks [11] papules due to demodectic mange usually appear on the face, neck, or axillary region. This might be associated with the frequency of contact with infected animals and with contaminated inanimate objects. The region of the head has more chance to come in contact with during sniffing, fighting and licking each other.

In the study of mange mites in Waghemra zone, significant amount of percentage reduction (41.2%) was calculated before dipping compared to the prevalence calculated after three round dipping of goats in 600EC (60%) diazinon. In summary, sex and body condition are important factors affecting occurrence of mange mites in goats. High levels of prevalences were observed in female goats and in goats which had poor body condition. Mites of the genera, *Sarcoptes* and *Demodex*, with *Sarcoptes* the highest prevalence were identified. Mites were frequently identified in decreasing order from head region, neck, thorax, flank, tail, ramp and leg region. Even though the study revealed low level of mange mites prevalence compared to previous reports reported before the

application of diazinon in the region, the prevalence has a tendency to rise. However, even the current level of mange mites is enough to cause significant economic effect in the study area.

In conclusion, the region and concerned authorities should give attention and continue the control activity againest these parasites; farmers should be aware regarding to the importance of appropriate feeding and to give more care for their female goats.

REFERENCES

1. Ministry of Agriculture and Rural Development (MoARD), 2008. The effect of hide and Skin quality on Domestic and export markets and evaluation of the Campaign agaimnst ecoparastites of sheep and goats in Amhara, Tigray and Afara Regions, official report to Regions and other sectors, Addis ababa, Ethiopia.
2. Bayou, K., 1998. Control of sheep and goat skin diseases. By Ian, B.C. and Kassa B. (eds.). In: Proceedings of Control of Sheep and Goat Skin Diseases for Improved Quality of Hides and Skins, February13-14, 1998, FAO, Addis Ababa, Ethiopia, pp: 13-15.
3. Zeleke, T., 1998. History of hides and skins improvement in Ethiopia. In: Ian, B. L. Kassa, B. (Ed.) Proceedings of an in-service training exercise on hides and skins improvement, FAO, Addis Ababa, pp: 8-12.
4. Central Statistical Authority for Ethiopia (CSAE), 2008. Statistical report on livestock and farm implements 2001/2002 Results for Amhara Region, Part IV, May 2003. Addis Ababa, Ethiopia,
5. Steele, M., 1996. Goats. In: the tropical agriculturalists, London and basing stock, MACLUAN education ltd, ACCT. pp: 79-83.
6. Wall, R. and D. Shearer, 2001. Veterinary Ectoparasites, Biology, Pathology and Control, Second Edition, Blackwell Sciance Ltd, UK, pp: 29-31.
7. Taylor, M.A., R.L. Coop and R.L. Wall, 2007. Veterinary parasitology. 3rd ed. Blackwell publishing Ltd. UK, pp: 141.
8. Demissie, A., B. Siraw, K. Teferi, T. Tsertse, G. Mammo, D. Mekonnen and S. Shimelis, 2000. Mange: A disease of growing threat for the production of small ruminants in the Amhara National Regional State. In: R. C. Merkel, G. Abebe and A. L. Goetsch (eds.): Opportunities and Challenges of Enhancing Goat Production in East Africa. Proceedings of a conference held at Debub University, Awassa, Ethiopia from November 10 to 12, 2000. E (Kika) de la Garza Institute for Goat Research, Langston University, Langston, OK, pp: 80-91.
9. Craig, T.M., 1998. Epidemiology of internal parasites, effect of climate and host on reproductive cycle on parasite survival: Small ruminant for the mixed animal practitioner; Western Veterinary conference. Las Vegas, Nevada.
10. Numery, A., 2001. Prevalence and Effects of Ectoparasites in Goats and Fresh Pelts and Assessment of Wet Blue Skin Defects at Komoblcha Tannery, South Wollo, DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University.
11. Talley, J. and D. Sparks, 2009. External Parasites of Goats. *Proceedings of the 24th Annual Goat Field Day*, April 25, Langston University, USA, pp: 111-118.