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Original Research

# Prevalence of Mange Mite Infestation on Cattle in Diga District, West Ethiopia

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**Abstract**

A cross sectional study was conducted in Diga district from November 2015 to December 2016, to determine the prevalence of mange mites and associated risk factors significantly predicting the disease in cattle and to identify the major prevailing genera of mites. Out of 384 cattle examined, 79 (20.6%) were found positive. The mites identified were *Demodex*, *Sarcoptes* and *Psoroptes.* There was no statistically significant variation between prevalence rate of the parasite and any considered associated risk factors. However, the prevalence rate of the parasitic infestation was higher in young (21.7%) than adults (19.9%) age group. Male (23.4%) were highly infested than females (18.3%). Neck (10.7%) was the most frequently infested part of animal body followed by shoulder (4.2%). Higher mange prevalence was encountered on cattle with sever skin lesion (28.2%) compared to cattle with moderate (19.2%) and mild (17.7%) skin lesion. The study revealed that high prevalence rate of mange mite infestation in the study area that requires appropriate interventions.

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## INTRODUCTION

Ethiopia's economy largely depends on crop and livestock production. Besides its direct contribution in terms of GDP and foreign exchange, livestock provides virtually all the drought power for cultivation and transportation of agricultural crops and people in rural areas of the country (Keno, 2005). However, ectoparasites have a major effect on health and productivity of livestock. These obligate parasites live on, puncture, or burrow into the surface of their host's epidermis (Colebrook & Wall, 2004). From these ectoparasites, mange mites are responsible for significant losses (Fantahun *et al*., 2012).

Most ectoparasitic mites spend their entire lives in intimate contact with their host, so that transmission from host to host is primarily by physical contact. In fact, approximately 60 mite families have members that live in or on the skin, hair, or feathers of homoeothermic vertebrates and are potential mange mites. Specifically, on domestic hosts about 50 mite species in 16 families and 26 genera may cause mange (Bochkov & Mironov, 2011).

The generalized veterinary term for an infestation by mites in an animal is called acariasis and can result in severe dermatitis, which may cause significant welfare problems, economic losses and outright deaths (Wall & Shearer, 2001; Tefera & Abebe, 2007). Mange is a contagious skin disease, characterized by crusty, pruritic dermatitis and hair loss (Kettle, 1995), and caused by a variety of parasitic mites burrowing in or living on the skin (Krantz & Walter, 2009).

Scratching and rubbing caused by mites result in extensive damage to hides and skins (Gabaj *et al*., 1992). Though mites are active in keratin layer and causes direct damage to skin, also cause indirect economic loss by decreasing or ceasing reproduction and production performance (Soulsby, 1998).

Mange diagnosis in domestic animals is based on clinical manifestations and the demonstration of mites or their developmental stages in host skin scrapings (Soulsby, 1998). Mite damage leads to skin inflammation and is often accompanied by hair and wool loss (Bowman, 2003).

The disease is contagious from exposure to infested animals, humans or contaminated objects and environments (Urquhart *et al*., 1996). Even though the prevalence of mange mite is reported in different parts of Ethiopia; investigation on the prevalence of the parasites is essential to identify the burden of the disease in selected study area. Therefore, this study was conducted to determine the prevalence of mange mites and associated risk factors significantly predicting the disease in cattle, and identify prevailing genera of mites in Diga District.

## MATERIALS AND METHODS

### Study area

The study was conducted in Diga district which is located in Oromia regional State, West Ethiopia from November 2015 to December 2016.Diga is one of the 17 districts of East Wollega zone which is situated at a distance of 343 km west of Addis Ababa and 12 km west of Nekemte. The altitude of the district ranges from 1100 to 2300 masl, the mean annual rainfall varies from 1200 to 2000 mm and the temperature ranges from 18°C to 32 °C. There is long heavy rainy season from June to September and short rainy season from March to May.

### Study Population

All extensively managed zebu cattle in Diga district were included as a study population to determine the prevalence and associated risk factors of mange mite infestation.

Study design

A cross sectional study design was conducted to determine the prevalence of the mange mite in the study area. The prevalence of mange mites, association of host and environment related risk factors with the presence of mite infestation were investigated. The host risk factors considered was age, sex and degree of skin lesion, while peasant associations were considered as environment related risk factors.

### Sample size and sampling method

The sample size for current study was determined using the formula described by Thrusfield (2005). Based on the formula 50% expected prevalence rate, 95% confidence interval and 5% desired absolute precision, the required sample size was 384. All peasant associations were purposively included during sampling. A sample was collected by using simple random sampling method from animals which were presented with skin lesion to Diga veterinary clinic.

### Sample collection and processing

The animals were inspected visually and through palpation and examination for any skin lesion and parasites. Mange mite suspected cattle were clinically identified for the presence of skin lesions such as erythema, pruritus and scales. Samples were collected by clipping the hair, scraping the edges of active lesions with scalpel as described by Chauhan and Agerwal (2006) until capillary bleeding is seen. The scraped samples were transferred to clean universal bottle and preserved by using 10% formaldehyde for analysis at Wollega University Veterinary Laboratory.

In the laboratory, a few drops of 10% Potassium hydroxide were added to the sample and allowed to stand for 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. In cases where nodular skin lesions suspected due to demodectic mange, the contents were collected and direct smear was made for

microscopic examination. Mite identification was made according to Wall and Shearer (2001) and Taylor (2007).

**Data management and analysis**

The raw data were entered and managed using Microsoft Excel worksheet. SPSS statistical software version 20 was used to determine the prevalence of the disease and the associated risk factors. The significant difference of mange prevalence was determined using descriptive statistics and Chi-Square test ($X^2$) where P – value found less than 0.05.

## RESULTS

### Overall prevalence

Table 1: Prevalence of mites identified on cattle

| Genera of the parasite | No. of positive | Prevalence (%) |
|---|---|---|
| *Demodex* | 43 | 11.2 |
| *Sarcoptes* | 19 | 4.9 |
| *Psoroptes* | 16 | 4.2 |
| *Mixed (Demodex & Sarcoptes)* | 1 | 0.3 |
| Total | 79 | 20.6 |

In the current study the prevalence of mange mite infestation was 20.6%. The genera of mite identified were *Demodex* (54.4%), *Sarcoptes* (24.1%) and *Psoroptes* (20.3%).

Table 2: Correlation and Spatial distribution of bovine mange mites on the body

| Site of skin lesion | Prevalence (%) | | | | |
|---|---|---|---|---|---|
| | Demodex | Psoroptes | Sarcoptes | Mixed | Total |
| Back | 0.52 (2) | 0.3 (1) | - | - | 0.8 (3) |
| Back ,Neck and shoulder | - | - | 0.52 (2) | - | 0.52 (2) |
| Ear and neck | - | - | 0.3 (1) | - | 0.3 (1) |
| Leg | 0.52 (2) | 0.3 (1) | 0.3 (1) | - | 1.04 (4) |
| Neck | 6.8 (26) | 2.08 (8) | 1.8 (7) | - | 10.7 (41) |
| Neck and shoulder | 0.3 (1) | 0.8 (3) | 0.52 (2) | - | 1.6 (6) |
| Neck and pelvic area | - | - | 0.3 (1) | - | 0.3 (1) |
| Neck and back | 0.3 (1) | - | 0.3 (1) | 0.3 (1) | 0.8 (3) |
| Neck and leg | 0.3 (1) | - | - | - | 0.3 (1) |
| Nose | - | 6.3 (1) | - | - | 0.3 (1) |
| Shoulder | 2.6 (10) | 0.52 (2) | 1.04 (4) | - | 4.2 (16) |
| Total | 11.2 (43) | 4.2 (16) | 4.9 (19) | 1.3 (1) | 20.6 (79) |

Mange mite lesions were detected at the highest frequency from the neck 10.7% (41 of 79) followed by shoulder 4.2% (16 of 79).

**Prevalence of mange mite infestation in relation to host risk factors**

Table 3: **Prevalence of mange mites with regard to sex, age and Degree of skin lesion**

| Risk factors | No Examined | No of Positive | Prevalence (%) | $X^2$ | CI (95%) | P–Value |
|---|---|---|---|---|---|---|
| Sex | | | | | | |
| Female | 213 | 39 | 18.3 | 1.499 | 0.829- 2.236 | 0.221 |
| Male | 171 | 40 | 23.4 | | | |
| Age | | | | | | |
| Young | 143 | 31 | 21.7 | 0.31 | 0.529- 1.424 | 0.577 |
| Adult | 241 | 48 | 19.91 | | | |
| Degree of skin lesion | | | | | | |
| Sever | 78 | 22 | 28.2 | | | |
| Moderate | 193 | 37 | 19.2 | 3.584 | 0.170-0.162 | 0.167 |
| Mild | 113 | 20 | 17.7 | | | |

*** CI=Confidence Interval * $X^2$=Chi-square**

Mite infestation was higher in adults (62.0%) than young aged animals (37.2%). Female animals (55.5%) were highly susceptible than males (44.5%) and degree of skin lesion of positive animals was sever 28.2%, moderate 19.2% and mild 17.7% (Table 3). Higher prevalence was detected on cattle with sever skin lesion. All examined study animals were local breed and managed extensively, consequently, infection rate regarding management and breed variation was not included.

Table 4: Prevalence of mange mites based on origin of animals

| PAS | No Examined | No of Positive | Prevalence (%) | $X^2$ | CI (95%) | P-value |
|---|---|---|---|---|---|---|
| Adugna | 9 | 2 | 22.2 | | | |
| Ayana | 28 | 5 | 17.9 | | | |
| Fayisa | 3 | 0 | 0.0 | | | |
| Firomsa | 41 | 8 | 19.5 | | | |
| Gamachis | 12 | 1 | 8.3 | | | |
| Garuma | 2 | 2 | 100.0 | 13.439 | 0.250-0.267 | 0.266 |
| Gudisa | 22 | 4 | 18.2 | | | |
| Ifa | 129 | 32 | 24.8 | | | |
| Jirata | 86 | 16 | 18.6 | | | |
| Jiregna | 10 | 1 | 10.0 | | | |
| Qajela | 2 | 1 | 50.0 | | | |
| Soressa | 40 | 7 | 17.5 | | | |
| **Total** | 384 | 79 | 20.6 | | | |

* CI=Confidence Interval * $X^2$=Chi-square * PAS= Peasant Association

All variables that are considered as potential risk factors were negatively associated with mange mite infestation (Sex *p*=0.221 CI=0.829-2.236; Age *p*=0.577, CI=0.529-1.424; Degree of skin lesion *p*=0.167, CI=0.170-0.162). The origin of animals is negatively associated with mite infestation ($X^2$ =13.439, P=0.266, CI=0.250-0.267) (Table 4).

**DISCUSSION**

The current study revealed that from 384 randomly selected cattle with skin lesion, 79 were found positive for mange mite infestation. Therefore, the overall prevalence of mange in the present study was 20.6%. This result was higher than the work of (Kasahun *et al*., 2015) who reported 10.7% in Northwest Ethiopia

(South Achefer District), (Tewodros *et al.,* 2012*)*13.79% in Gondar town, (Yacob *et al*., 2008) 5.9% in and around Mekelle (Bogale, 1991) 4.19% in Debre-Zeit .But the prevalence of this study was lower than the work of (Matthes & Bukva, 1993) who reported 94% in Mongolia. The variation on reports could be due to difference in ecological and management systems.

The present finding indicated that slightly higher mange prevalence on male males 40(23.4%) than female 39 (18.3%). This finding disagrees with the study of Matthes & Bukva (1993) who reported 32% in females and 1.22% in male animals. And also disagree with the finding of Bogale (1991) who indicated 4.57% in male and 3.17% in female animals in DebreZeit. The possible reason for the current finding might be male animals fight against each other on the field, so that the physical contact is greater compared to female ones.

In the present study slightly high mange prevalence was found in young 31(21.7%) than medium 48(20.17%) and Adult 0(0.0%) age group. But this finding was not in line with the work of Yacob *et al*., 2008 who reported1.06 and 2.04% prevalence in young and adult cattle, respectively, that of Bogale, 1991 who reported 7.95% in young 2.40% adult in DebreZeit.

In the current study higher mange prevalence was encountered with cattle of sever skin lesion 22(28.2%) compared to cattle with medium 37(19.2%) and low 20(17.7%) skin lesion. The higher prevalence in sever skin lesion might be due to the fact that majority of skin lesion is probably as a result of great number of mite infestation.

In the present study, the distribution of mange mites on different body parts revealed that, mange was highly prevalent on the Neck region 41(10.7) followed by shoulder area 16(4.2%), leg 4(1.04%) and back 3(0.8).

The current finding with regard to spatial distribution of mange on different body parts of cattle was not in line with the findings of Kasahun *et al., 2015*, Bukva *et al.,* 1985 and Ademe *et al.,* (2006) who reported high prevalence on shoulder followed by neck. However; according to the present finding, the most frequently infested body part with the parasite were Neck, Shoulder, Leg ,back and other adjacent body parts. While the less frequently affected body parts were the Nose area, Tip of Tail, pelvic area and belly area. With this regard, the higher prevalence of mange was recovered from Neck and shoulder; this might be due to higher exposure of these body parts to the parasites while the animals rub against the fixed objects due to itching sensation induced by any ectoparasites (Colebrook & Wall, 2004).

## CONCLUSION AND REOMMENDATIONS

The study was aimed to determine prevalence of mange mites, identifying the major prevailing genera of mite and to determine the potential risk factors significantly predicting the disease. Therefore; it is possible to conclude that the mite infestation in cattle was highly prevalent (20.6%) and three genera of the parasite was identified (*Demodex, Sarcoptes, Psoroptes*) to cause infestation. Hence, comprehensive and extensive work on different aspect of mite in cattle including treatment, control and preventive measures are necessary in the study area.

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