Prevalence of Bovine Demodeciosis and its Associated Risk Factors in Ethiopia

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ABSTRACT

A cross-sectional study was conducted from October 2014 to April 2015 in Bahir Dar, Amhara Regional State, Ethiopia to determine prevalence of bovine demodicosis. A total of 384 cattle of different groups of age, sex and breed were examined by taking deep skin scrapings. There was no statically significant difference observed between two categories of breeds ($x^2 = 0.006, p=0.938$), though prevalence was lower in cross breeds (4.8%) than local breeds (5%). There was no statically significant difference among three categories of age ($x^2 = 1.686; P=0.430$), with prevalence rate of 3.0%, 2.9% and 6.0% in less than one year, one to three year and greater than three years, respectively. The prevalence of demodicosis in female and male was, 5.9% and 3.9%, respectively, with statistically insignificant difference between them ($x^2 = 0.808, P=0.369$). Statically insignificant difference was also found between the two management systems ($x^2 = 2.768; P = 0.096$), higher prevalence was observed on cattle managed under semi-intensive management system 7.5% than extensive ones 3.6% management systems. There was statically significant variation detected among different site of infestation ($x^2 = 17.361, P = 0.027$), the highest prevalence was found on shoulder 3.4% followed by neck, (0.8%), dew lap, fore limb and generalized (0.3%). In conclusion the overall prevalence (4.9%) of Demodex bovis infestation was recorded.

Keywords: Cattle, demodicosis, prevalence, skin scraping

Livestock is an important component of nearly all farming systems in Ethiopia and provide draught power, milk, meat, manure, hides, skins and other products. Currently, the population of livestock found in Ethiopia is estimated to be 53.4 million cattle, 25.5 million sheep and 22.78 million goats (CSA, 2011). Livestock contribute 15-17% of GDP and 35- 49% of agricultural GDP, and 37- 87% of the household income (Gebremariam et al., 2010).

The existence of various skin diseases (dermatophilosis, demodicosis, sarcoptic and psoroptic mange, ticks and lice infestations) affecting cattle is frequently reported from different parts of Ethiopia. These skin diseases are accountable for considerable economic losses particularly to the skin and hide export. Apart from quality degradation of skin and hides skin diseases induce associated economic losses due to reduction of wool quality, meat and milk yield, losses as a result of culling and occasional mortalities and related with cost of treatment and prevention of the diseases (Yacob et al., 2013).

Demodex species mites belong to the order Prostigmata black-head rashes, and family Demodicidae. Demodicosis in cattle is caused by a microscopic mite, D. bovis. The disease is well described and quite common in tropical zones, but rare and most likely underestimated in temperate regions (Turton, 2007).

Demodectic mange in cattle is known to be usually a chronic and benign disease. Lesions consist of papules and small nodules filled with a creamy-colour caseous material possibly associated with hair loss mainly observed in the periocular region, on the neck, and on the shoulders. Under certain circumstances, like stress, nutritional deficiencies, concurrent diseases and hot and humid weather, the condition can extend to most parts of the body and lead to a loss of body condition (Wall and Shearer, 2001).
Diagnosis is confirmed by finding the mite during microscopic examination of deep skin scrapings of the affected area. Though, Bovine demodicosis are prevalent in Ethiopia but the distribution of the disease in and around Bahir Dar was not studied. Therefore, the present study was made to determine the prevalence and associated risk factors of bovine demodicosis in and around Bahir Dar district.

MATERIALS AND METHODS

Study area

The study was conducted in Bahir Dar city, from November 2014 to April 2015. Bahir Dar is located in the North Western part of Ethiopia at a physical distance of 567 kilometers from Addis Ababa, the capital city of Ethiopia. The study area is located at 11°29’ – 11°41’ N latitude and 37°16’ – 37°27’E longitude. The landscape is flat with some small hills to the East and West. The average elevation in the town is about 1795 meters above sea level (m.a.s.l). The study area experiences average annual rainfall that ranges from 1200-1600 mm and it has mean annual temperature of 26°C (CSA, 2011).

Study population

The study population subjected to this study were cattle of different breed, age, sex and kept under Semi-intensive and extensive management systems.

Study design and sample size determination

Cross sectional study design was employed on cattle to determine the prevalence of Demodicosis in Bahir Dar. The sample size were calculated using the formula given by Thrusfield (2005) by taking an expected prevalence of 50% and the study considered 95% of confidence interval with 5% absolute precision.

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 n = \frac{(1.96)^2 \times P_{\text{exp}}(1 - P_{\text{exp}})}{d^2}
\]

Where, \( n \) = sample size;

\( P_{\text{exp}} \) = expected prevalence

\( d \) = desired absolute precision = 5%

Data analysis

All collected data were entered and managed in Microsoft Excel worksheet and analysed using statistical package for social sciences (SPSS) software version 20. The prevalence of demodicosis was expressed as percentage by dividing the total number of cattle positive to demodicosis to total number of cattle examined; Chi-Square test (\( \chi^2 \)) used to test the association between variables. At \( p<0.05 \) was considered as statically significant.

RESULTS

Out of the 384 cattle examined in and around Bahir Dar, 19(4.9%) were found to be positive for \( D. \) \textit{bovis}. Prevalence of bovine demodicosis was found 5.9% in female and 3.9% in male animals. There was no a statistically significant variation detected between the two sex groups (\( P>0.05 \)).

The prevalence of demodicosis in cattle under different age categories observed were highest in age group > 3 years 6.0% while the lowest prevalence 2.9% was observed in age group between 1 - 3 years. However, statistically significant difference was not observed among the three age categories (\( P>0.05 \)).

The prevalence of bovine demodicosis found to be 5% and 4.8% in local and cross breeds, respectively. There was no statistically significant difference between the two breeds (\( P>0.05 \)).

There was no statistically significant variation detected between the two management systems (\( P>0.05 \)); however relatively higher prevalence of bovine demodicosis (7.5%) was recorded in animals kept under semi-intensive management system than extensive management system (3.6%). The site of infestation was recorded highest on shoulder (3.4%) and lowest on hind limb, back and ear.
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The site prevalence was statistically significant (P<0.05).

**DISCUSSIONS**

In the current study, the overall prevalence of demodicosis on cattle in the study area was 4.9%. Almost similar results have earlier been reported by Yacob et al. (2008), with prevalence of 5.9%, in and around Mekelle and Bogale (1991), with prevalence of 4.19% in Debrezeit. These differences might be due to the differences in climatic condition, season, animal management system, and the effort exerted towards the control of the parasites (Urquahart, 1996). The variation could also be due to time of sampling and methods followed to detect the parasites in sampled animals.

A non significant variation was observed in sex wise prevalence rates. The possible explanation for this could be both male and female animals were equally exposed to demodex. The absence of significant sex related difference was also reported by Mersha et al. (2013) and Tewodros et al. (2012). On contrary, Yacob et al. (2008) reported 2.22% in male and 1.67% in female animals in Adama and Bogale (1991) reported 4.57 and 3.17% in male and female animals in Debret-Zeit respectively.

Based on the present findings, the prevalence’s of *D. bovis* was higher in greater than three years of age. However, this variation was not statically significant (p> 0.05). Similar prevalence rates have also been reported by Tewodros et al. (2012) Yacob et al. (2008). In contrast Bogale (1991) reported 7.95% prevalence in young and 2.40% prevalence in adult in Debret-Zeit.

The prevalence rate of bovine demodicosis in local breeds (8.8%) was found higher than cross bred breeds (2.2%). Again this difference was not statically significant (p>0.05). This finding is in agreement with the previous work of Yacob et al. (2008) and Mersha et al. (2013).

The prevalence rate of demodicosis was found higher in semi intensive (7.5%) than extensive (3.6%) management system with non significant variations. These results are in accordance with Mersha et al. (2013) and Tewodros et al. (2012) However, Yacob et al. (2008) higher prevalence rates in extensive systems than for semi-intensive system.

The highest frequencies of occurrence of demodicosis were detected on shoulder (3.4%) as compared to dewlap, fore limb and generalized (0.3%). The difference was statically significant (p<0.05). This result is in agreement with Tewodros et al. (2012) and Mersha et al. (2013) Youssefi et al. (2012) and Ademe et al. (2006) stated that the distribution of nodules of *D. bovis* on the host’s body has typical pattern with shoulder as major predilection sites. The variations on various site of infestation might be due to the living style of the parasite as commensals that leads for suddenly pathogenic states or due to the frequent exposure of neck and shoulder for various stress conditions like yoke sore, traumatic injury and kick by ploughing instruments which facilitate the mite to feed easily by puncturing the host cell and sucking out the cell contents of the injured area.

**CONCLUSION AND RECOMMENDATIONS**

*Demodex bovis* effect is tremendous that reduce many animal products whether directly or indirectly. *Demodex bovis* mites were found to be resilient diseases in cattle. This implied that the mite is economically important for its being hide damaging nature. The female cattle which are above three years old, local breed that managed at the semi-intensive production system were observed the most susceptible to *D. bovis*. Therefore, awareness creation in livestock owners about the control and prevention of demodicosis and further epidemiological investigation in the study area are recommended.

**REFERENCES**


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