

Prevalence of ectoparasite infestations of cattle in Bench Maji zone, southwest Ethiopia

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Abstract

Aim: This study was conducted with the aim of determining the prevalence and type of ectoparasitic fauna and associated host-related risk factors in cattle in Bench Maji Zone, Southwestern, Ethiopia, from October 2011 to April 2012.

Materials and Methods: A total of 212 cattle (84 male and 128 female) were sampled and examined. Both physical examination and laboratory investigation were employed in the study.

Results: The study revealed that cattle in the study area were infested with single (24.5%) and multiple (2.8%) ectoparasites with an overall prevalence of 27.3% (58/212). Overall seven species of ectoparasites which belong to tick (16.0%), lice (10.4%) and mite (0.9%), were identified. Seven species of ticks which belong to three genera (*Boophilus* sp., *Amblyoma* sp., and *Rhipicephalus* sp.) were identified. Among the species of ticks *Boophilus decoloratus* (8.0%), *Amblyoma variegatum* (4.7%) and *Amblyoma coherens* (4.2%) were the dominant ones in a decreasing order. Among the three species of lice, the most prevalent was *Linognathus vituli* (4.7%) followed by *Haematopinus euysternus* (3.8%) and *Damalina bovis* (1.9%). *Psoroptes bovis* (0.9%) was the only mite species recorded in this study. For all ectoparasites there was no statistical deference ($p>0.05$) between the prevalence of any of the ectoparasite infestation with regard to sex, age and body condition score.

Conclusion: The present study revealed a high prevalence and diverse fauna of ectoparasites that could potentially hamper the productivity of cattle in the study area, hence serious attention is warranted.

Keywords: ectoparasites, Ethiopia, prevalence, ruminants

Introduction

In Ethiopia there are about 38 million cattle, 30 million small ruminants, 1 million camel, 4.5 million equines and 40 million poultry in the country [1]. In the country livestock play vital role in farming system [2]. However, poor health and productivity of animal due to disease has considerably become the major stumbling block to the potential of livestock industry [2]. Now a day parasitism represents a major obstacle to development and utilization of animal resource. In Ethiopia ectoparasites in ruminant causes serious economic loss to small holder farmers, the tanning industry and the country as a whole through mortality of animals, decreased production, down grading and rejection of skin and hide [3-5].

As a result of their activity ectoparasites may have a variety of direct and indirect effects on their hosts. Ectoparasites commonly tick, mite and lice affect the host species by the inflammation and the infection they inflict on the skin [6], and by their effect on the physiology of the animals as well as through transmission of different diseases [7,8]. Infestations by

ectoparasites significantly affect the quality of hide thereby affecting the economy of Ethiopian farmers as well as international market [9].

Although ectoparasites affect the health, productivity of ruminants, and the economy of the country [9-11]. However, currently there is a paucity of information regarding to ectoparasites of cattle in Bench Maji zone.

The present study was carried out to determine the prevalence and fauna of ectoparasites of ruminants, and associated host-related risk factors in the study area.

Materials and Methods

Study area description: The study was conducted on Bench Maji Zone, Southwestern Ethiopia from October 2011 to April 2012. The study area was located 550 km south west of Addis Ababa. The climatic condition of the area is divided into highland (19.3%), mid land (51.6%) and low land (29.1%). The average altitude of the district ranges from 1200-2200 m.a.s.l and receives annual rain fall of 1500-2000mm [12].

Study population: Between October 2011 and April 2012, a total of 212 cattle brought to the Bench Maji Zone Veterinary clinic were subjected to detailed examination for the presence of ectoparasites. The

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Table-1. Overall prevalence of ectoparasites in 212 ruminants in Bench Maji Zone

| Ectoparasite | Total No. Positive | Prevalence (%) |
|----------------|--------------------|----------------|
| Tick | 34 | 16.0 |
| Lice | 22 | 10.4 |
| Mite | 2 | 0.9 |
| Overall | 58 | 27.3 |

Table-2. Species based prevalence of ectoparasites in cattle in Bench Maji Zone

| Species of ectoparasites | Total No. Positive | Prevalence (%) |
|--------------------------------|--------------------|----------------|
| <i>Boophilus decoloratus</i> | 16 | 8.0 |
| <i>Amblyoma variegatum</i> | 10 | 4.7 |
| <i>Amblyoma coherens</i> | 9 | 4.2 |
| <i>Amblyoma gemma</i> | 4 | 1.9 |
| <i>Rhipicephalus camicasi</i> | 3 | 1.4 |
| <i>Rhipicephalus eversi</i> | 3 | 1.4 |
| <i>Amblyoma lepidium</i> | 2 | 0.9 |
| <i>Linognathus vituli</i> | 10 | 4.7 |
| <i>Hematopinus eurysternus</i> | 8 | 3.8 |
| <i>Damalina bovis</i> | 4 | 1.9 |
| <i>Psoroptus ovis</i> | 2 | 0.9 |
| Overall | 58 | 27.3 |

Table-3. Prevalence of species of ectoparasites by sex, age and body condition.

| Species of Ectoparasites | Sex | | χ^2 (p-value) | Age | | χ^2 (p-value) | Body condition scores | | | χ^2 (p-value) |
|--------------------------|---------------|-----------------|--------------------|-----------------|----------------|--------------------|-----------------------|-----------------|-----------------|--------------------|
| | Male (n=84) | Female (n=128) | | Adult (n=205) | Young (n=7) | | Good (n=44) | Medium (n=96) | Poor (n=72) | |
| <i>A. variegatum</i> | 4(4.8) | 6(4.7) | 0.001(0.980) | 10(4.9) | - | - | - | 4(4.2) | 6(8.3) | 4.338(0.114) |
| <i>A. lepidium</i> | 1(1.2) | 1(0.8) | 0.091(0.763) | 1(0.5) | 1(14.3) | 13.790(0.065) | - | - | 2(2.8) | - |
| <i>A. gemma</i> | 1(1.2) | 3(2.3) | 0.364(0.546) | 4(2.0) | - | - | - | 3(3.1) | 1(1.4) | 1.738(0.419) |
| <i>A. coherens</i> | 1(1.2) | 8(6.3) | 3.033(0.857) | 8(3.9) | 1(14.3) | 1.795(0.265) | 1(2.3) | 2(2.1) | 6(8.3) | 4.485(0.106) |
| <i>B. decoloratus</i> | 6(7.1) | 10(7.8) | 0.145(1.000) | 15(7.3) | 1(14.3) | 0.471(0.427) | 1(4.5) | 8(8.3) | 7(9.7) | 1.016(0.602) |
| <i>R. camicasi</i> | 1(1.2) | 2(1.6) | 0.050(1.000) | 3(1.5) | - | - | - | 2(2.1) | 1(1.4) | 0.939(0.625) |
| <i>R. eversi</i> | - | 3(2.3) | - | 3(1.5) | - | - | - | 2(2.1) | 1(1.4) | 0.939(0.625) |
| <i>D. bovis</i> | 2(2.4) | 2(1.6) | 0.184(0.649) | 4(2.0) | - | - | 1(2.3) | 1(1.0) | 2(2.8) | 0.715(0.700) |
| <i>L. vituli</i> | 3(3.6) | 7(5.5) | 0.406(0.743) | 9(4.4) | 1(14.3) | 1.475(0.291) | - | 5(5.2) | 5(6.9) | 3.025(0.220) |
| <i>H. eurysternus</i> | 2(2.4) | 6(4.7) | 0.743(0.483) | 8(3.9) | - | - | 1(2.3) | 6(6.3) | 1(1.4) | 3.022(0.221) |
| <i>P. ovis</i> | - | 2(1.6) | - | 2(1.0) | - | - | - | 1(1.0) | 1(1.4) | 0.582(0.748) |
| Overall | 21(25) | 50(39.1) | | 67(32.7) | 4(57.1) | | 6(9.1) | 34(35.4) | 33(45.8) | |

study population included indigenous cattle (84 male and 128 female) of different age, sex and body condition categories. The age of animals was grouped as young (between 1 and 3 years) and adults (≥ 3 years) according to the classification method used by Bitew [13]. Likewise, the body condition scores (good, medium and poor) were classified based on the criteria set by Nicholson and Butterworth [14].

Protocol design and method: Both physical and parasitological examinations were employed. Skin scrapings from suspected cases of mange were collected and preserved in 10% formalin. Mites were made to be released from scabs and crusts after addition of 10% KOH on the specimens according to the procedure described by Soulsby [15]. Ticks and lice were collected in 70% alcohol. Identification of the collected ectoparasites was carried out by the aid of stereo- and compound microscope using identification keys set by Wall and Shearer [16] and Soulsby [15].

Statistical analysis: The collected data was analyzed by a statistical software namely, SPSS version 20. Prevalence was determined by the formula described by Thrusfield [17] as the rate of number of infested animals and total number of animals in the population. Associations between explanatory variables (age, sex and body condition score) and prevalence was done by chi-square (χ^2) test. In all analysis, 95% confidence intervals and $P < 0.05$ were set to indicate significance.

Results

Overall prevalence of ectoparasites: Of the 212 cattle examined in this study, 58 (27.3%) were found infested with one or more species of ectoparasites, which

accounts for 16.0%, 10.4% and 0.9% for tick, lice and mite respectively (Table-1).

As indicated in Table-2, overall four genera comprising seven species of ticks, three genera consisting of three species of lice, and a single species of mites were identified in this study. Among the ticks, *Boophilus decoloratus* (8%), *Amblyoma variegatum* (4.7%) and *Amblyoma coherens* (4.2%) were the most prevalent, and the least identified tick species was *Amblyoma lepidium* (0.9%). In this study, out of the three species of lice recorded *Linognathus vituli* (4.7%) was the most prevalent followed by *Hematopinus eurysternus* (3.8%) and *Damalina bovis* (1.9%). With regard to mites, *Psoroptus ovis* was the only mite species identified with a prevalence of 0.9%.

Sex wise prevalence of ectoparasites: The overall prevalence of external parasite infestation in male and female animals was 25.0% and 39.1%, respectively. The difference in the prevalence in male and female animals was not statistically significant ($p > 0.05$). In both sexes *B. decoloratus* and *A. variegatum* were the dominant ectoparasites (Table-3).

Age wise prevalence of ectoparasites: The overall prevalence of ectoparasites in the adult and young age groups was 32.7% and 57.1%, respectively. Nonetheless, the present study revealed no statistical difference ($p > 0.05$) in the prevalence of the various species of ectoparasites between the two age categories (Table-3).

Prevalence of external parasites by body condition: The overall prevalence of external parasites in animals with good, medium, and poor body condition was 9.1%, 35.4% and 45.8%, respectively. In all the three examined hosts, there was no disparity in harboring

any of ectoparasite infestations between the different body condition categories (Table-3).

Discussion

The result of the present study showed a wide range of single and multiple ectoparasites infestation with an overall prevalence of 27.3% in the study area. This result was lower than the report of by Tadesse et al. [18] (73.3%) from Ethiopia, Islam et al. [19] (65.5%) from Bangladesh. Variation in geographical locations, climatic conditions, and management practices in the different study areas might have contributed for the disparity in prevalence.

In this study tick (14.5%) infestation was the outstanding ectoparasites followed by lice (12.1%) and mite (3.4%). This finding was in agreement with earlier studies on ruminants [11,20,21] who reported the predominance of ticks. In contrast to our finding, a higher prevalence of 39.6% [18] and 64.07% [22] of ticks has been reported. The lower prevalence of ticks in cattle in the present study area could be attributed to the relatively good access to veterinary services, and it could also be due to the long dry season of the study period, because tick infestations tend to decrease during the dry season compared to the wet seasons [23]. Climatic determinants of the study areas such as humidity and prolonged sunlight favor the multiplication and maintenance of the parasite in the environment [24].

Out of the seven species of ticks recorded, the most prevalent was *B. decoloratus* (8.0%) followed by *A. variegatum* (4.7%). The dominance of *B. decoloratus* followed by *A. variegatum* in cattle was previously reported [2,25-28]. The dominance of *Boophilus* species over *Amblyoma* species was because of the dependence of native distribution of ticks on the distribution of host species and climatic condition [29]. As observed by Endale [30] there existed no statistical significant difference ($p>0.05$) in the prevalence of ticks between the different sex, age, and body condition score categories. This could be related to the management system where animals are allowed to graze together in communal fields in the mixed farming system of the study area.

The overall prevalence of lice recorded in the present study was 10.4%. Our finding was in consent with the result of Tadesse et al. [18] who reported a prevalence of 9.5%. On the contrary, this result was in disagreement with the finding of Rony et al. [22], Nigatu and Teshome [21] (63.5%). These disparities could be attributed to differences in the agro-ecology, climatic condition, and sample size used in the study areas. Out of the three species of lice recorded in cattle *L. vituli* (4.7%) was outstanding followed by *H. euystermus* (3.8%) and *D. bovis* (1.9%). Dominance of *L. vituli* followed by *H. euystermus* was also reported previously [21,22,31]. In general the lice species recorded in this study have commonly been identified in ruminant in Ethiopia [18, 21] and elsewhere [22]. In

this study there was no significant difference ($p>0.05$) in the prevalence of lice infestation among the different sex, age and body condition categories in the three hosts examined. Similar observation was made by Nigatu and Teshome [21]. This might be due to the management practice in the study area where animals are kept together which facilitates transmission of lice by direct contact [6].

The overall prevalence of mite in cattle was 0.9% and *P. ovis* was the only mite species identified in the area. Our finding was in close agreement with the report of Tadesse et al. [18] (0.4%). On the contrary, prevalence of mites as high as 95.5% [21] was reported from Western Ethiopia. This discrepancy might be due to difference in the ideal macro and micro environment (high temperature, humidity and sun light) in the study areas which favors the breeding and multiplication of mite [32]. Although prevalence of *P. ovis* was lower in this study its potential to cause serious skin lesions should not be undermined [32]. There was no significant dispersion in the infestation of animals by mites with regard to sex, age and body condition categories in ruminants. Age and sex are not determinant factors in the infestation of mites [8].

Conclusion

Overall ruminants in Bench Maji zone in Southwest Ethiopia were found to be infested with diverse ectoparasitic fauna implying their effects on productivity of these animals and on the economy of farmers and the country at large. Hence, Very good veterinary services and management practice should be put in the place to control infestations of these valuable animals. Moreover, further epidemiological investigations that consider different agro-ecology and management system is warranted for appropriate control of ectoparasites.

Authors' contribution

Tesfaheywet Zeryehun Shiferaw implemented study design, involved in the acquisition of data and data analysis. Tesfaheywet Zeryehun Shiferaw and Simeon Haile Onu drafted the manuscript. Both authors revised the manuscript, read and approved the final manuscript.

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Competing interests

Authors declare that they have no competing interests.

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