

# Study on Major Cattle Ectoparasites in and Around Adama, Central Ethiopia

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## Abstract

Ectoparasites (ticks, lice and mange mites) are frequently reported in Ethiopia. These ectoparasites are one of the major diseases of cattle causing serious economic loss to the farmers, the tanning industry and the country as a whole. A cross sectional study was conducted from November 2017 to April 2018, to estimate prevalence of ectoparasite of cattle in and around Adama town. Four-hundred twenty one cattle were randomly sampled in Adama veterinary clinic and at pasture in surrounding kebeles. The overall prevalence of ectoparasites were 36.3% (95% confidence interval, 31.72-41.14), where the cattle were infested with the major ectoparasites like ticks, lice and mite. Ticks, lice and mite were detected with prevalence of 33.9%, 1.9% and 0.5% on cattle respectively. Three genera of ticks (*Amblyomma* 20.97%, *Hyalomma* 25.87% and *Rhipicephalus* 43.35%), two genera of lice (*Linognathus* 62.50% and *Damalinea* 37.50%) and two genera of mite (*Sarcoptes* 50.00% and *Demodex* 50.00%) were identified. This study revealed ectoparasite infestation is insignificantly associated ( $p > 0.05$ ) with origin and sex. The parasites distribution was significantly associated ( $p < 0.05$ ) with age, breed and body condition. It is concluded that ectoparasites are very important in the study area, which could inhibit the production of cattle. Hence, appropriate acaridae should be used to increase the output of the animals.

**Keywords:** Adama, cattle, ectoparasites, prevalence

## INTRODUCTION

Ethiopia has the largest livestock population of any African country. There are approximately 53.9 million cattle, 48.5 million small ruminants, more than 0.9 million camels, 9 million equines and 50.37 million chickens [1]. The livestock sector represents a significant part of the global economy, particularly in the developing countries. Thus, livestock provides energy, food, raw material, and manure for crops. It is therefore not surprising that the livestock sector has emerged as an important economic source for a vast majority of the rural population and a target for agrobusiness in the dairy, meat, and various other products in the processed foods sector [2]. However, poor health, management and productivity of animals due to disease have considerably become major obstacle to the potential of livestock industry [3].

Now days, parasitism represents a major problem to development and utilization of animal resource. In Ethiopia ectoparasites in ruminant causes serious economic loss to small holding farming system, the tanning industry and the country as a whole through mortality of animals, decreased production, performance and down grading quality of skin and hide. Ectoparasites, such as ticks, mites and lice have veterinary importance which affect economics of cattle production [4, 5, 6].

The exportation of hide and skin is important income source and a good root of foreign exchange in the country. Yet as much one quarter to one third of all skin processed at tanneries are unsuitable for export due to various defects. Up to 65% of these defects occur in pre-slaughter stage of production while the animal is still alive. A considerable portion of these pre-slaughter defects are directly related to skin disease caused by parasites or to secondary damage that occur when the animal scratch itself to relieve the itching associated with some of these disease [7].

Among the ectoparasites infesting cattle, Ticks are very significant and harmful because of their blood sucking habits and direct debilitating effect [8]. Although, only relatively few of more than 889 species of Tick in the world are important to man and domestic animals, these few species must be controlled if livestock production is to meet World needs for animal protein. Over 79 different species are found in eastern Africa but many of these appear to be of little or no economic importance [9].

In Ethiopia, there are 47 species of Ticks found on livestock and most of them have importance as vector and disease causing agents and also have mechanical damaging (Tick bite) effect on skin and hide production [10]. Ticks, besides being important vectors for diseases like Theileriosis, Anaplasmosis, Babesiosis and Ehrlichiosis (heart water) in domestic animals; they also cause nonspecific symptoms like anemia, dermatosis, toxicities and paralysis [11].

Lice are one of the common parasites of domestic cattle. The most abundant and clinically important Lice are the chewing louse. The chewing lice may cause less individual damage than the various species of sucking lice, it present in larger numbers and so it can extremely damage. Poor control may be associated with a failure to detect or identify lice infestation in its initial stages and by the time clinical diagnosis is achieved the entire

herd may be infested [12].

Mites are the important ectoparasites of cattle with great veterinary and medical significance. Infestation by mites may result in severe dermatitis, which is known as mange [13]. They are transmitted through contact with affected animals and contaminated materials. Due to their behavior, mites may have direct and indirect effect on their host. These could be a direct harm (blood loss, skin inflammation, purities, etc.) or indirect when they present at high density (cause disturbance and self-wound) [8]. The economic impact of mange mite's may go on a marked decrease in weight gain, reduced milk production, hide and skin damage, costs related to prevention and eradication program, markedly reduces feed intake, and secondary bacterial infection may further contribute to loss of condition. The mite damage the skin usually accompanied by irritation, rubbing and scratching. On a larger scale, mite infections have great impact on the local and international trade of animals [14].

Generally, ectoparasites cause significant effect on the health and productivity of cattle. Various skin diseases resulting from tick, lice and mite infestation have been frequently reported in Ethiopia which badly affecting the product, health, and economy of the country [15, 16]. The information regarding to prevalence of ectoparasites of ruminants in Adama as reported by Yacob *et al* [16] shows that, 13% prevalence of ectoparasites in and around Adama town. There is a need of frequent asses to status of ectoparasites and tick borne disease and their control measures at this area. However, in the current study, an attempt was made to know the current status of the ectoparasites in the study area. Therefore, the objectives of this study are to estimate the prevalence of ectoparasites in and around Adama town and to identify genera of ectoparasites in the study area.

## MATERIALS AND METHODS

### Study Area

The study was conducted in and around Adama town of East showa zone of Oromia Regional State. Adama town is found 99 km east of Addis Ababa with varying ranges of altitude from 1400-2300 meter above sea level. It receives annual rain fall of 600-1150 ml with a mean minimum and maximum temperature of 12 and 33C<sup>0</sup> respectively [17]. The area experiences three seasons: rainy, winter and spring. The main rainfall usually occurs from late June to late September. Cattle, sheep, goats, donkeys and poultry are kept by the majority of households in the area. The majority of household income comes from agriculture. Livestock and labor activities contribute the remaining income [18].

### Study Animals

The study was conducted on cattle in and around Adama and these animals were constituted both cross (81 heads) and local (340 heads) breeds of cattle of both sexes in the study area. But the mostly populated breed in the area was indigenous or local breeds which kept under traditional management system.

### Study Design

A Cross-sectional study was conducted from November 2017 to April 2018 to determine the prevalence of ectoparasites in and around Adama town by considering origin, age, sex, breed and body condition of the animals. The date, origin, breed and sex of animals were recorded when sampling and examining of animal and body condition scores and age were recorded based on the criteria's set by Nicholson and Butterworth [19] and Gatenby [20] respectively.

### Sample size determination

The sample size was determined by the formula of Thrusfield [21] Using random sampling (lottery) methods and 95% confidence interval with required 5% precision.

$$n = \frac{1.96^2 p_{exp}(1-p_{exp})}{d^2}$$

Where n=required sample size

P<sub>exp</sub> = expected prevalence

d=required precision

The expected prevalence of the ectoparasites was 63% with required precision (d) of 5% (0.05). By using above formula, the required sample size was calculated to be 359, but 421 animals were sampled to increase the precision of the expected prevalence of the ectoparasites.

### Study methodology

#### Physical and parasitological examination

Both physical and parasitological examination was employed. Skin scraping was done for suspected cases of mange and preserved in 10% formalin and it was boiled by 10% KOH. Ticks and lice were collected in 70% alcohol (ethanol). Ectoparasites were differentiated by using under stereo and compound microscope [22].

#### Data Analysis

The result from physical and parasitological examination was entered into Microsoft excel 2010 and the data was analyzed by statistical package for social science (SPSS)-version 16 computer software program. Finally, Chi-square (x<sup>2</sup>) was used to compare the statistical associations with in different variables.

## RESULTS

### Prevalence of ectoparasites

The overall prevalence of ectoparasites in the present study was 36.3%, which accounts 33.9%, 1.9% and 0.5% ticks, lice and mite respectively.

Table 1: overall prevalence of ectoparasites in cattle

| Ectoparasites | Positive animals (%)<br>(n=421) | 95% CI      |
|---------------|---------------------------------|-------------|
| Tick          | 33.9                            | 29.4-38.7   |
| Lice          | 1.9                             | 0.82-3.7    |
| Mite          | 0.5                             | 0.06-1.7    |
| Overall       | 36.3                            | 31.72-41.14 |

n=number of examined animals

Genera of tick, lice and mite

In the present study three genera of ticks (*Amblyomma*, *Hyalomma* and *Rhipicephalus*), two genera of lice (*Linognathus* and *Damalinia*) and two genera of mite (*Sarcoptes* and *Demodex*) were detected.

Table 2: Overall prevalence of tick, lice and mite by their genera

| Ectoparasites | Genera of ectoparasites                   | Positive animals(Cattle) % |
|---------------|---|----------------------------|
| Tick(n=143)   | <i>Amblyomma</i>                          | 20.97                      |
|               | <i>Hyalomma</i>                           | 25.87                      |
|               | <i>Rhipicephalus</i>                      | 43.35                      |
|               | <i>Amblyomma</i> and <i>Hyalomma</i>      | 1.39                       |
|               | <i>Amblyomma</i> and <i>Rhipicephalus</i> | 2.79                       |
| Lice(n=8)     | <i>Hyalomma</i> and <i>Rhipicephalus</i>  | 5.59                       |
|               | <i>Linognathus</i>                        | 62.50                      |
|               | <i>Damalinia</i>                          | 37.50                      |
| Mite(n=2)     | <i>Sarcoptes</i>                          | 50.00                      |
|               | <i>Demodex</i>                            | 50.00                      |
| Total         |   | 36.3                       |

n=number of animals infected by ectoparasites

Risk factors for ectoparasites infestation

*Sex, breed, age and body condition score*

The statistical analysis was done for the prevalence of ectoparasites infestation with risk factors (sex, breed, and age and body condition). There were statistically significant ( $p < 0.05$ ) association with breed, age and body condition and higher ectoparasites infestation rate was seen on female than male animals. There was no statistical significances ( $p > 0.05$ ) association between sex groups.

Table 3: overall prevalence of ectoparasites based on sex, breed, age and body condition scores

| Risk factors   | Positive animals (%) | $\chi^2$ | p-value |
|----------------|----------------------|----------|---------|
| Sex            | Male(n=216)          | 34       | 1.989   |
|                | Female(n=205)        | 39       |         |
| Breed          | Local(n=340)         | 32       | 16.598  |
|                | Cross(n=81)          | 54.3     |         |
| Age            | Young(n=105)         | 40.9     | 11.851  |
|                | Adult(n=316)         | 33.6     |         |
| Body condition | Poor (n=75)          | 60       | 29.855  |
|                | Medium(n=159)        | 28       |         |
|                | Good(n=186)          | 34       |         |
| Overall        | 36.3                 |          |         |

n=number of animals

*Origin*

Based on origin, the prevalence of ectoparasites in Adama town and surrounding area was indicated in figure one below.

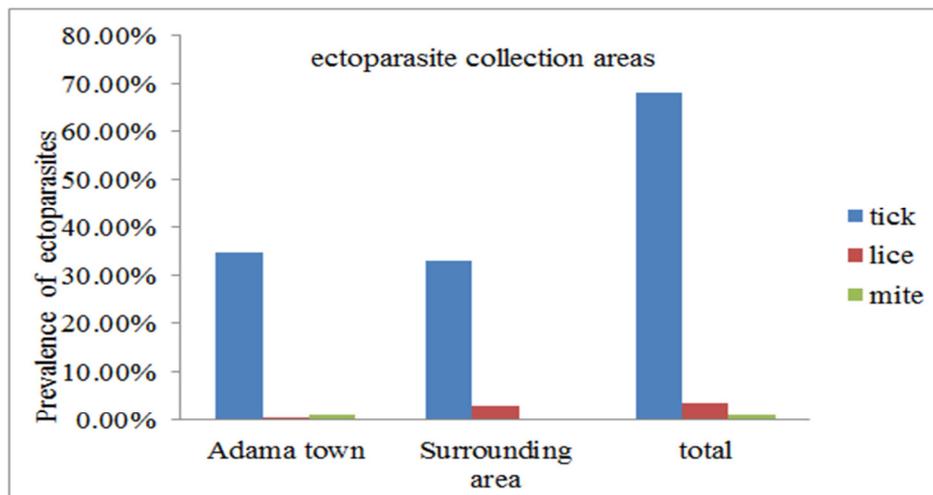


Figure 1: The prevalence of ectoparasites in Adama and Surrounding area

## DISCUSSION

The result of the present study reveals that three major ectoparasites of cattle, which were namely, ticks, lice and mite in and surrounding area of Adama town on cattle with overall prevalence of 36.3%. Out of the overall prevalence, 33.9% tick infestation was the important ectoparasites followed by 1.9% lice and 0.5% mite. This finding was in agreement with earlier study of Nigatu and Teshome [23] who have reported the predominance of tick in western Amhara. In contrast to present finding, higher prevalence of ticks 64.07% has been reported by Rony *et al.* [24] in Bangladesh. 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 according to the report of Abebe and Shiferaw [25]. Climatic determinants of the study areas such as humidity and prolonged sunlight favor the multiplication and maintenance of the parasites in the environment [26].

The genera of ectoparasites obtained in the study area were: *Amblyomma*, *Hyalomma*, *Rhipicephalus*, *Linognathus*, *Damalinia*, *Sarcoptes* and *Demodex*. These findings of tick genera in the study area agrees with Yacob *et al.* [16] who also identified *Amblyomma*, *Boophilus* and *Hyalomma* tick genera in central Ethiopia. In the present study *Rhipicephalus* was predominant tick genera that was the finding line with Abreha *et al.* [27] and Tomassone *et al.* [28] who have reported the predominance of *Rhipicephalus* specious infestation of cattle. This finding was disagreeing with the previous findings of Abebe and Shiferaw [25] in different parts of Ethiopia. This observation supports the fact that, the genus *Rhipicephalus* occupies a wide range of climatic and ecological zones in different habitats throughout Ethiopia. From this study result, *Hyalomma* was the second abundant tick genus in and around Adama that disagrees with previous study of Ica *et al.* [28] who reported the predominance of *Hyalomma* spp in Turkey.

*Amblyomma* was the least prevalent of tick genus in the study area and it does not agree with previous studies which had been conducted in different parts of Ethiopia that indicates *Amblyomma variegatum* was the most abundant with the highest prevalence than the findings reported by Gebremichael [29] and Assefa [30] in North Omo and Asella respectively. *A. variegatum* was the most widely distributed cattle tick in Ethiopia [31] and has a great economic importance that also causes the greatest damage to hides and skins because of its long mouth part which renders the commodity valueless on world market if the infestation is high [32].

The overall prevalence of lice in present study was 1.9%. This finding disagrees with previous study of Simeon [33] who has reported the prevalence of 10.4% in Bench Maji zone. The major lice genera in the study area were *Linognathus* and *Damalinia* which relates with the finding of the previous study in Southern Ethiopia by Bekele and Kumsa [34].

The overall prevalence of mite in present study was 0.5%. This study closely similar to the report of Tadesse *et al.* [35] in and around Kombolcha with prevalence of 0.4%. The result was lower as compared with the result obtained by Kebede [36] who reported a prevalence of 39% in and around Addis Ababa and Kebede and Fetene [37] who reported 95.9% in Western Amhara. This variation might be attributed to the difference in weather conditions, relatively adequate veterinary services and type of managements practiced in the study area. Also on contrary to present study, prevalence of mites as high as 95.5% reported from Western Ethiopia by Nigatu and Teshome [23]. This discrepancy might be due to difference in high temperature, humidity and sun light in the study areas which favors the breeding and multiplication of mite [38].

With regard to sex, the study shows no significant association which might be due to the fact that both male

and female animals were exposed to the same management system. The grazing area and the resting places were very conducive for the ectoparasites population to multiply. Crowding increases the chance of contact between animals and results in the transmission of ectoparasites between infested and susceptible animals [38].

Based on body condition of cattle, ectoparasites infestation was high in poor body condition cattle. The raise of ectoparasites infestation on poor body condition animals may be due to the less ability of resistant to ectoparasites infestation and lack enough body potential to build resistance in addition to management system (poor housing, lack of supplement feeding and lack of control measures against ectoparasites). This finding in agreement with previous study finding in Australia by Cummins and Graham [39] who reported the probable reason for this may be debilitated animals cannot groom themselves, so ectoparasites remain undisturbed for long time and also the poor body conditioned animals may have under compromised immune system. Similar finding of Aerts and Neshem [40] in Florida, indicates high infestation of ectoparasites result on poor body condition due to consumption of high amount of blood and fluid by those ectoparasites.

Based on breed, ectoparasites infestation was high in cross than local breed. In current study, poor resistance of ectoparasites infestation and higher prevalence of ectoparasites was recorded in young (40.9%) than adult (33.6%) in that statistically significant ( $p < 0.05$ ) association was observed. The difference in proportion might be the young's have soft skin that make favorable condition to easily attachment of ectoparasites. This finding disagree with previous researchers findings by Yacob *et al.* and Yalew [16, 41]. They reported that the adult cattle were more infested than young cattle, because of adult cattle were grazing freely on the field.

The study revealed that ectoparasites infestation on cattle were not significant ( $p > 0.05$ ) based on origin. This was might be the cattle share the same climatic condition and had similar veterinary services and similar management system.

## CONCLUSION AND RECOMMENDATIONS

The prevalence of ectoparasites infestation was high in and around Adama. The present study revealed that ectoparasites are significant constraint in the study area requiring serious attention and some recommendations forwarded are; Attention should be given to control of the ectoparasite in the study area in addition to further studies on tick borne disease at the area.

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