Prevalencia e identificación de garrapatas en el ganado alrededor de Mekelle

Prevalence and identification of ticks in cattle in and around Mekelle

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RESUMEN

En el periodo comprendido de Octubre, 2009 a junio de 2010 se llevó a cabo un estudio con el objetivo de conocer los géneros de garrapatas que afectan al ganado en los alrededores de Mekelle. Se examinó un total de 370 animales y 1480 garrapatas fueron colectadas para identificar su género. Los principales géneros identificados fueron: Rhipicephalus, Boophilus, Hayalomma y Amblyomma con la prevalencia de 46.5 %, 12.2 %, 5.4 % y 4.1 % respectivamente. Se determinó la prevalencia atendiendo de los diferentes géneros atendiendo a la edad y sexo de los animales, resultando que el 8.1 % resultó estar infestado por Rhipicephalus y el 0.8 % por Amblyomma en los animales jóvenes and 38.4 % y 3.2 % en adultos respectivamente, siendo estadísticamente significativos con relación al sexo (p<0.005), pero no con relación a la edad( p>0.005). De manera similar, la prevalencia de Rhipicephalus en machos y hembras fue de 23.2 % y 0.8 % en machos y hembras respectivamente. Respecto a la prevalencia de un mismo género, tanto en el sistema de producción, intensivo como extensivo, ésta resultó ser más alta en el sistema extensivo, 36.8 % y 4.1 % y 9.7 % y 0 % para Rhipicephalus and Amblyomma respectivamente. Estos resultados fueron estadísticamente significativos (P<0.05) para ambos grupos. Similar comportamiento manifestó la presencia de garrapatas en animales locales y exóticos, para Rhipicephalus y Amblyomma la prevalencia fue de 34.9 % y 3.8 % para las razas locales y 11.6 % y 3.3 % en las razas exóticas. También hubo diferencia significativa en estos resultados (p<0.05).
Los animales con buena y pobre condición corporal, no fueron muy afectados comparados con los de moderada condición corporal con prevalencia de 26.2 % y 0.8 %, para Rhipicephalus y Amblyomma, respectivamente.

**Palabras claves:** Garrapatas, identificación, prevalencia, riesgo, factores, ganado, Mekelle, Ethiopia.

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**ABSTRACT**

This study was conducted from October, 2009 to June 2010 with the aim of identifying tick’s genera on cattle in and around Mekelle. In the current study, a total of 370 cattle were examined and a total of 1480 ticks were collected for identifying its genera. The major tick genera identified from the survey were Rhipicephalus, Boophilus, Hyaalomma and Amblyomma with the prevalence of 46.5%, 12.2%, 5.4% and 4.1%, respectively. Age and sex specific prevalence of the different genera of this ticks showed it was 8.1 % for Rhipicephalus and 0.8% for Amblyomma in young cattle and 38.4% and 3.2% in adult, respectively where statistical significance was observed in sex (p<0.05) but not in age (p>0.05). Similarly, the prevalence of Rhipicephalus in male and female animals was 23.2% but the prevalence of Amblyomma was 3.2% and, 0.8% in male and female, respectively. In addition, the prevalence of the same genera in extensive and intensive production systems also showed that it was higher in extensive than intensive production systems with the prevalence of 36.8% and 4.1% and 9.7% and 0% for Rhipicephalus and Amblyomma, respectively. This showed statistically significant difference (p<0.05) between the two production systems. Similarly, the presence of the ticks in local and exotic breeds for Rhipicephalus and Amblyomma was 34.9% and 3.8% in local breeds and 11.6% and 3% in exotic breeds. This result also showed significant difference (p<0.05). In addition, animals having good and poor body condition were not much affected compared to moderate body conditioned animals with the prevalence of 26.2% and 0.8%, for Rhipicephalus and Amblyomma, respectively. The result of the present study showed the existence of these ticks in the study area as a result the participation of the stakeholders with the government was mandatory to reduce the infestation rates of the different tick genera.

**Key words:** Ticks, identification, prevalence, risk factors, cattle, Mekelle, Ethiopia.
INTRODUCTION

Ethiopia has approximately 47.57 million cattle, 26.1 million sheep, 21.7 million horses, 5.57 million donkeys, 380 thousand mules, 1 million camels, 39.6 million chicken and 4.7 million beehives (CSA, 2008). Cattle provide meat and milk, and contribute to the economic welfare of the people by providing hide power, and traction for agricultural purpose and fertilizer for increasing the productivity of small holdings (Minjauw and Mcleod, 2003).

In addition cattle are the major sources of foreign exchange. However, poor health and productivity of animals due to diseases is considered as the major stumbling block to the potential of the cattle industry (Ayele et al., 2003).

Even though live stock provide such major importance for different people they are affected by different parasitic, bacterial, viral and fungal diseases which affects the skin which is one of the major causes of considerable economic loss from defective skin and hide export; 65% of cattle with skin diseases are detected before slaughter and are therefore rejected because of poor quality (Kassa et al., 1998; Wondwossen, 2000).

Of the different ectoparasites which affect the skin of animals ticks are the most prevalent among which Ixodid ticks the most common and harmful blood sucking ectoparasites of cattle worldwide. They are responsible for a wide range of livestock health problems in several countries of the world. They reduce cattle productivity, such as milk yield, skin and hide quality and increase susceptibility to other diseases. Approximately 80% of cattle population of the world are at risk of tick infestation and tick born diseases. In addition to such large volume blood sucking of these ticks, they also inject pathogens such as viruses, bacteria, protozoa and toxins in to their hosts (FAO, 2004).

In Ethiopia, of the major parasitic diseases ticks and tick-borne diseases rank third after trypanomosis and endoparasitisim in causing economic losses (Bekele, 2002). The successful implementation of rational and sustainable tick control programs in grazing animals is dependent up on a sound knowledge of the epidemiology of the parasite due to interaction with the host in the specific climate, management and production environments. In some countries, substantial ecological and epidemiological knowledge bases have been established through extensive studies and field trials. On the contrary, developing countries including Ethiopia lack such information due to insufficient human, economic and infrastructural resources (FAO, 2004). The objectives this study were:To identify the tick genera of cattle in
and around Mekellen and to determine the prevalence and assess associated risk factors

MATERIALS AND METHODS

Study area

The study was carried out in Mekelle town from October 2009 to June 2010. It is 783 kilometers north of Addis Ababa; located at 13° 30 north and 39° 29 east of the equator, its altitude is about 2070 meter above sea level. The mean annual rainfall is 39.1 milliliters. The long and short rainfalls occur mainly between June and September followed by long dry season from October to May. The mean maximum and minimum daily temperatures ranges from 27 °C and 12 °C, respectively (TLDAP, 1997).

Study design and study animal

A cross sectional study was carried out on 370 heads of cattle having different age, sex, breed and production systems. These animals were those coming to Mekelle Veterinary clinic, Mekelle University Veterinary clinic, animals belonging to Mekelle University and kelamino dairy farm and animals in the field. Collections of ticks were conducted following proper restraining of animals in the crash of the clinics and farms. Ticks were removed carefully and gently in horizontal pull to the body surface by hand and were preserved in properly labeled plastic containers containing 70% ethanol. The collection bottles were labeled with serial numbers while other data were written of special field register format prepared for this particular purpose (date, address, and age, sex of the animal, breed and production system). The collected ticks were identified to their genus level at Mekelle University Parasitology laboratory using tick identification keys (Walker, 2003).

Sample size determination

For sample size determination, win episcope 2.0 which is improved epidemiological data software for Veterinary Medicine (Thrusfield, 1995) was used. To calculate the sample size, the following information was used:

✓ Expected prevalence of 50%
✓ Absolute precision of 5% and
✓ Levels of confidence of 95% with following formula:
\[ n = \frac{1.96^2 \times p_{exp} (1-p_{exp})}{d^2} \]

Where, 
- \( n \) = required sample
- \( p_{exp} \) = expected prevalence
- \( d \) = absolute precision

Hence, the sample size was 384.

**Data management and analysis**

Data was entered into Microsoft excel spread sheet and coded appropriately. For the data analysis, SPSS version 15 was used and to determine prevalence and the associated risk factors, chi-square statistics was used. Significance level was determined at p-value less than 0.05 and confidence level of 95%.

**RESULTS**

Out of the total 1480 adult Ixodida ticks collected, four different tick genera were identified. The abundant tick genera were Rhipicephalus with the prevalence of (46.5%), Boophilus (12.2%), Amblyomma (4.1%) and Hayalomma (5.4%), respectively.

The prevalence of ticks in Mekelle between the different sexes showed that it was higher in male than female cattle (Table 1).

<table>
<thead>
<tr>
<th>Total sample</th>
<th>Prevalence (%)</th>
<th>P-value</th>
<th>Chi square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amblyomma</td>
<td>Hayalomma</td>
<td>Boophilus</td>
</tr>
<tr>
<td>Female</td>
<td>3 (1.3)</td>
<td>8(3.6)</td>
<td>21(9.3)</td>
</tr>
<tr>
<td>Male</td>
<td>12(8.3)</td>
<td>12(8.3)</td>
<td>24(16.6)</td>
</tr>
</tbody>
</table>

Similarly, the prevalence of these different genuses of ticks between the different breeds were also recorded where the highest prevalence was observed in local cattle compared to exotic ones (Table 2).
Prevalencia e identificación de garrapatas en el ganado alrededor de Mekelle

**Table 2. Prevalencia de piojos en diferentes razas de ganado**

<table>
<thead>
<tr>
<th>Breeda</th>
<th>Total sample</th>
<th>Prevalence (%)</th>
<th>P-value</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>217</td>
<td>Amblyomma 14(6.5) Hayalomma 14(6.5) Boophilus 44(20.3) Rhipicephalus 129(59.4)</td>
<td>0.000</td>
<td>154.795</td>
</tr>
<tr>
<td>Exotic</td>
<td>153</td>
<td>1(7) 6(3.9) 1(7) 43(28.1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Además, la prevalencia de estas parásitos entre los diferentes grupos de edad fue también registrada con la mayor prevalencia en el adulto que en los jóvenes en el caso de los piojos Boophilus y Rhipicephalus y fue mayor en los jóvenes que en los adultos en el género Amblyomma y Hayalomma (Table 3).

**Table 3. Prevalencia de piojos en diferentes grupos de edad de ganado**

<table>
<thead>
<tr>
<th>Age</th>
<th>Total sample</th>
<th>Prevalence (%)</th>
<th>P-value</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>young</td>
<td>73</td>
<td>Amblyomma 3(4.1) Hayalomma 5(6.8) Boophilus 7(9.6) Rhipicephalus 30(41.1)</td>
<td>0.626</td>
<td>2.607</td>
</tr>
<tr>
<td>Adult</td>
<td>297</td>
<td>12(4.0) 15(5.1) 38(12.8) 142(47.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

La prevalencia de los diferentes géneros de estos piojos también fue diferente en los diferentes estados de condición corporal de los animales donde los animales con estado corporal pobre fueron más afectados que los animales con estado corporal moderado y bueno (Table 4).

**Table 4. Prevalencia de piojo en diferentes estados corporales de ganado**

<table>
<thead>
<tr>
<th>Body condition</th>
<th>Total sample</th>
<th>Prevalence (%)</th>
<th>P-value</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>69</td>
<td>Amblyomma 9(13.0) Hayalomma 2(2.9) Boophilus 13(18.8) Rhipicephalus 41(59.4)</td>
<td>0.000</td>
<td>155.361</td>
</tr>
<tr>
<td>Moderate</td>
<td>152</td>
<td>3(2.0) 13(8.6) 24(15.8) 97(63.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>149</td>
<td>3(2.0) 5(3.4) 8(5.4) 34(22.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the production system of animals the prevalence of the different genera of ticks was identified with the highest prevalence of these ticks in extensive compared to intensive cattle production systems (Table 5).

**Table 5. Prevalence of ticks in different production system of cattle**

<table>
<thead>
<tr>
<th>Production System</th>
<th>Total Sample</th>
<th>Prevalence in %</th>
<th>P-value</th>
<th>Chi Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensive</td>
<td>235</td>
<td>Amblyomma 15(6.4)</td>
<td>Boophilus 45(19.1)</td>
<td>Rhipicephalus 136(57.9)</td>
</tr>
<tr>
<td>Intensive</td>
<td>135</td>
<td>Hayalomma 16(6.8)</td>
<td>0 (0)</td>
<td>36(26.7)</td>
</tr>
</tbody>
</table>

**DISCUSSION**

In the present study, a total of 370 cattle were examined for the presence of ticks and identified to genus level and out of the 1480 collected ticks, the prevalence for Rhipicephalus, Boophilus, Hayalomma and Amblyomma was 46.5%, 12.2%, 5.4% and 4.1%, respectively, where Rhipicephalus was the more predominant and the least was Amblyomma. The current prevalence was higher for Rhipicephalus genus only but lower for the rest of the genus as compared to the study conducted by Ataklty (2007) with the prevalence of 22.5%, 53.9%, and 23.9% for the genus Rhipicephalus, Boophilus and Amblyomma in Mekelle, respectively. This might be due to seasonal variation and time of collection. Endale (2006) reported that the prevalence of the genus Rhipicephalus, Boophilus, Hayalomma and Amblyomma was 31.14%, 54.5%, 0.14% and 14.22% in Ambo area where the genus Boophilus was more prevalent than the other as compared to the current study.

The prevalence of ticks was significantly higher (P<0.05) in local breed animals compared to the exotic ones. This prevalence was in agreement with the study conducted by Ataklty (2007) with 88.5% in local breeds than the exotic breeds. However, the current prevalence was lower than the study indicated by Ataklty in Mekelle with the rate of 58.6%. Similarly, Mulualem (2009) reported that the prevalence of ticks in local animals was higher than that of exotic breeds.

The prevalence of the different tick genera in the two production systems indicated that it was higher in the extensive production system compared to the intensive production system where there was significant difference.
between the two production systems (P<0.05). This could be due to management problem in extensive production system where the housing, feeding and control measure and poor application of acaricides in extensive production system than intensive production systems. This result was in agreement with the work of Ataklty (2007) where the prevalence of these ticks in the extensive production systems were higher than that of intensive production systems with the prevalence of 76% and 23.7%, respectively. This may be due to the fact that animals which were grazed extensively were more prone to the ticks than those kept under the intensive production systems which might be due to exposure to get tick from their surrounding compared to intensive production system having good management.

In the present survey, Rhipicephalus is the most abundant tick genera of cattle. But it was reported that the prevalence of these ticks in the different parts of Ethiopia as the works of Ataklty (2007) in and around Mekelle and Endale (2004) in ambo area, indicated that the predominant genera was Boophilus and Amblyomma with the rates of 53.6% and 23.9% which was higher than the current finding. However, their finding to that of Rhipicephalus having the rate of 22.5% and 31.14% in Mekelle and ambo area by the two researchers was lower than that of the current study. Similarly, Surafel (1996), Mehri (2004) in Hawassa, reported that the prevalence of these ticks in the different parts of the country. In addition, the works of Shiferaw and Abebe (2006), Gebre et al., (2003) and Solomon et al., (2007) indicated that the prevalence of Rhipicephalus was higher. Another researcher namely Behailu (2004), Yitbarek (2004), Sebsibe (1998) and Mulualem (2009) reported the prevalence of Rhipicephalus with the rates of 33%, 6.9%, 56.71% and 34.1% conducted in different parts of Ethiopia.

The second abundant tick genera was Boophilus which account 12.2% which was lower than that of the reports of Ataklty (2007), Endale (2006) and Mulualem (2009) with the prevalence of 54.5%, 53.9% and 40.9% in and around Mekelle, Ambo, and Debre Zeit, respectively. Similarly, Sebsibe (1998), reported prevalence of 0.57% of Boophilus genera in Southern Sidamo. This prevalence was lower than that of the current study. In addition, Behailu (2004) and Yitbarek (2004) reported that the prevalence of the same genera in Asella, Central Ethiopia and Jimma with the rates of 21% and 9%, respectively which was higher than that of the current study.

The prevalence of the other tick genera namely Hayalomma ranks as the third prevalent tick genera of cattle constituting 5.4%. This prevalence was higher than that of the study reported by sebsibe (1988), with the rates of 2.66%. Bergon and Balis (1974), Morel and Rodhain (1972) also reported the presence of the same genus in different localities of Southern Ethiopia.

Los géneros menos identificados durante el período de estudio fueron *Amblyomma* con una tasa de 4.1%. Esta prevalencia fue inferior a la de los informes de Endale (2004) y Ataklty (2007) con las tasas de 14% y 23.9% en Ambo y Mekelle, respectivamente, pero superior a la del informe de Yitbarek (2004), con una tasa de 0.9% en Jimma. Similarmente, Sebsibe (1988) y Behailu (2004), reportaron una prevalencia de 41.05% y 37.4%, en Southern Sidamo, Eastern Hararge y Asella, respectivamente, lo que es superior a la del estudio actual. Además, la prevalencia actual fue inferior a los informes de Wallaga (1997) con las tasas de 35.95% en y alrededor de Debre Zeit.

Generalmente, este resultado mostró que la prevalencia de los géneros de pulgas en el sitio de estudio fue significativamente mayor en razas locales comparado con cruzadas, en hembra comparado con macho. Además, la alta prevalencia en ganado en sistema de producción extensivo comparado con el sistema de producción intensivo merece gran atención ya que las pulgas son uno de los vectores principales para diferentes enfermedades bacterianas, virales y protozoarias parasitarias de los animales, lo que requiere la participación de los interesados con el gobierno en la controlación de la infestación de estas parásitos externos.

**CONCLUSIÓN Y RECOMENDACIONES**

El hallazgo de este estudio mostró que la prevalencia de diferentes géneros de pulgas en el sitio de estudio. De acuerdo con el hallazgo presente, los géneros de *Boophilus*, *Rhipicephalus*, *Hyalomma* y *Amblyomma* fueron identificados con la mayor abundancia de los géneros de pulgas siendo *Rhipicephalus* el menos y *Amblyomma* el mayor. El estudio actual también reveló que la prevalencia de estos diferentes géneros se registraron con alta prevalencia en hembra, en las razas locales en comparación con las razas exóticas y en los sistemas de producción extensivos en comparación con los sistemas de producción intensivos. Esto indica la importancia de la existencia de estos ectoparasitos, particularmente en los animales que pastan de manera extensiva, que requiere gran atención para controlar los ectoparasitos ya que afecta la salud, la productividad del ganado y desciende la calidad de los cueros y piel.

Basado en lo anterior, se recomienda lo siguiente:

- Investigaciones adicionales sobre la frecuencia, distribución y estacionalidad de pulgas y las enfermedades que transmiten se deben llevar a cabo para diseñar medidas de control y prevención eficientes y costo-efectivas.
• There should be creation of awareness of the livestock owners as to the impact of ticks and other ectoparasites on the health and productivity of their animals through extension program.

• Improvement of management of animals might help in reduction of the rate of infestation of these ticks is essential

REFERENCES


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