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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 and 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 in 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 rozas locales y 11.6 % y 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.

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, Hayalomma 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 Ambylomma 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^{o} 30 north and 39^{o} 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 $^{\circ}$C and 12 $^{\circ}$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 in to 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 1. Prevalence of ticks in different sexes of cattle in and around Mekelle

	Total sample	**Prevalence (%)**				**P-value**	**Chi square**
		Amblyomma	Hayalomma	Boophilus	Rhipicephalus		
Female	225	3 (1.3)	8(3.6)	21(9.3)	86(38.2)	0.000	70.5
Male	145	12(8.3)	12(8.3)	24(16.6)	86(59.3)		

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).

Table 2. Prevalence of ticks in different breeds of cattle

Breed	Total sample	Prevalence (%)				P-value	Chi square
		Amblyomma	Hayalomma	Boophilus	Rhipicephalus		
Local	217	14(6.5)	14(6.5)	44(20.3)	129(59.4)	0.000	154.795
Exotic	153	1(7)	6(3.9)	1(7)	43(28.1)		

In addition, the prevalence of these parasites among the different age groups were also recorded with the highest prevalence in adult than the young cattle for the ticks Boophilus and Rhipicephalus and it was higher in the young than adults for the genus Amblyomma and Hayalomma (Table 3)

Table 3. Prevalence of ticks in different age of cattle

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

The prevalence of the different genus of these ticks was also different in the different body condition of the animals where poor body condition animals were more affected than the animals having moderate and good body condition (Table4).

Table 4. Prevalence of tick in different body condition of cattle

Body condition	Total sample	Prevalence (%)				P-value	Chi square
		Amblyomma	Hayalomma	Boophilus	Rhipicephalus		
Poor	69	9(13.0)	2(2.9)	13(18.8)	41(59.4)	0.000	155.361
Moderate	152	3(2.0)	13(8.6)	24(15.8)	97(63.8)		
Good	149	3(2.0)	5(3.4)	8(5.4)	34(22.8)		

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

Production system	Total sample	Prevalence in %				P-value	Chi square
		Amblyomma	Hayalomma	Boophilus	Rhipicephalus	0.000	153.454
Extensive	235	15(6.4)	16(6.8)	45(19.1)	136(57.9)		
Intensive	135	95(70.4)	4(3.0)	0 (0)	36(26.7)		

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 Ambylomma 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.

Similarly, Mekonnen *et al*., (2001) reported the presence of hyalomma at Kembata-Alaba-Timbaro, Gurage and North west shoa of central Ethiopia.

The least genera that were identified during the study period were Amblyomma which account the rate of 4.1%. This prevalence was lower than that of the reports of Endale (2004), and Ataklty (2007) with the rates of 14% and 23.9% in Ambo and Mekelle, respectively, but higher than that of Yitbarek (2004), with the rate of 0.9% in Jimma. Similarly, Sebsibe (1988) and Behailu (2004), reported prevalence of 41.05% and 37.4%, in Southern Sidamo, Eastern Hararge and Asella, respectively ,which was higher than that of the current study . In addition, the current prevalence was also lower than that of the reports of Wallaga (1997), with the prevalence of the same genera having the rates of 35.95% in and around Debre Zeit.

Generally, this result showed the prevalence of tick genera in the study site was significantly higher in local breeds as compared to cross, in female as compared to male. In addition, the higher prevalence in cattle kept under extensive production system compared to the intensive production systems merits great attention as tick are one of the main vectors for different bacterial, viral and protozoan parasitic diseases so that the participation of stakeholders with the government are essential in controlling the infestation rate of this external parasites.

CONCLUSION AND RECOMMENDATIONS

The finding of this study showed that the prevalence of different tick genera in the study site. According to the present finding, the genera of Boophilus, Rhipicephalus, Hayalomma and Amblyomma were identified with the major abundant tick genera being Rhipicephalus and the least was Ambylomma. The current study also revealed that the prevalence of these different genera were recorded with higher prevalence in female than male, local than exotic breeds and extensive production systems than intensive production systems. This indicates the importance of the existence of these ectoparasites particularly in animals grazing extensively which needs great attention to control the ectoparasites as it affects the health, productivity of cattle and downgrades the quality of hides and skin.

Based on the above conclusion, the following points are recommended:

- Further investigation on the frequency, distribution and seasonality of ticks and diseases they transmit should be conducted in order to undertake and design efficient and cost effective control and preventive measures.

- 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

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