

Full Length Research Paper

Identification of tick species and their preferred site on cattle's body in and around Mizan Teferi, Southwestern Ethiopia

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A cross-sectional study was conducted to identify tick species and their preferred sites on cattle's body in and around Mizan Teferi, Southwestern Ethiopia. Three hundred seventy five cows were brought to Mizan Teferi Gacheb veterinary clinic during the study period from areas where mixed crop-livestock farming is the dominant production system. Out the total number of the animals brought to clinic, 272 animals which had ticks comprising three genera and five species were studied and a total number of 3,974 ticks were collected and identified. The genera recorded were *Amblyomma* and *Rhipicephalus* with relative infestation rate of 88.8, 53.3 and 12.3% respectively. Four tick species identified of the three genera were *Amblyomma cohaerens*, *Amblyomma variegatum*, *Amblyomma gemma*, and *Rhipicephalus evertsi*. *A. cohaerens* were the most abundant tick species with a relative abundance of 62.4%. The average male to female sex ratio was 1.3:1, which could be explained by the reproductive behaviour of the female tick. The study also found that most infested body part of the cattle was udder-scrotum (32.4%) followed by annovulva (21.9%), perineum (18.77%), dewlap (16.7%) and brisket (3.1%). The infestation level of ticks had a statistical significance difference ($P < 0.05$) between cattle of poor body condition and good body condition, which is higher in the later one. Hence, during hand spraying of cattle special attention should be given to the udder-scrotum and other preferred sites of attachment. Appropriate tick control strategy and technique need to be applied to which the identified tick species are sensitive.

Key words: Cattle, predilection site, tick.

INTRODUCTION

Vector and vector born diseases are major constraints to the development of viable livestock industries wherever they occur (Mekuria, 1987). Among these tick and tick born diseases are widely distributed throughout the world particularly in tropical and sub tropical countries, which cause a tremendous economic importance in livestock production (Kettle, 1995). In most parts of Africa, including Ethiopia, ticks and tick born diseases, together with tsetse and trypanosomes are economically important diseases (Solomon et al., 2001).

In Ethiopia, tick occupy the first place amongst the

external parasites by the economic loss it incurred when they infest livestock particularly cattle (Feseha, 1983). Ticks are important vectors for diseases like Babesiosis, Anaplasmosis and Ehrlichiosis in domestic ruminants. They are known to exacerbate non specific disease symptoms like anemia, toxicosis and paralysis (Morel, 1980). In Ethiopia, ticks are common in all agro ecological zones of the country (Morel, 1980; Pegram et al., 1981). In addition, studying ticks on livestock under their natural conditions without any control measure is also useful for understanding the host-parasite relations and the seasonal variations of tick population (Aleka, 1998).

In Ethiopia, extensive surveys have been carried out on the distribution of tick on livestock in different region of

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Table 1. Relative infestation rate of tick species on cattle sampled.

Variable	<i>A. cohaerens</i>	<i>A. variegatum</i>	<i>R. evertsi</i>	<i>A. gemma</i>
Positive animals	234	68	46	31
Negative animals	141	307	329	344
Prevalence	62.4%	18.1%	12.3%	8.3%

the country (Decastro, 1994; Morel, 1980; Pegram et al., 1981) like Gamogofa (Jewaro, 1986), in Gonder (Eshetu, 1988), in Bale (Dejenu, 1988), the highland area of Harer and Diredawa (Manuri and Tilahun, 1991 and in Jeff, Wellega and Ilubabor (DeCastro, 1994). *A. variegatum* is the most widely distributed tick species in Ethiopia (Morel, 1980; Pegram et al., 1981; Decastro, 1994). Other tick species such as *R. evertsi*, *Hyalomma marginatum rufipes*, *Hyalomma truncatum*, *A. cohaerens*, *A. gemma*, *Amblyomma lepidum*, *Rhipicephalus pulchellus* are also frequently reported in many tick survey carried out in the country (Solomon et al., 2001). However, to get full picture of tick species distribution in the country, study has to be done in the south western part of the country.

Furthermore, relevant data on the population dynamics and specific predilection site identification of ticks is essential for the development of effective control strategy of tick and tick born disease control strategies. Therefore, this study was formulated with the objectives of identifying tick species and their predilection sites in and around Mizan Teferi, South-western part of Ethiopia.

MATERIALS AND METHODS

Study area and population

The study was conducted from November 2009 to February 2010 in and around Mizan Teferi, Bench Maji Zone of South nation and nationalities people of Ethiopia. The districts receives an annual rainfall of 400 to 2000 mm with an annual mean of temperature 15°C (min) and 27°C (max) and have wet savanna grassland type of vegetation. Mixed crop-livestock mixed farming system is the dominant production system. A number of livestock species including cattle, sheep and goat are reared in this area and are managed extensively. Three hundred and seventy five cattle brought to Mizan Teferi Gacheb veterinary clinic during the study period from the nearby districts were the study population.

Study design

A cross-sectional study was conducted to study the types of tick species, favorable preferred site and the relative tick burden. The animals investigated were categorized in to age, sex and body condition score groups according to Nicholson and Butterworth (1986). The desired sample for the study was calculated using the prevalence of previous research (75%) of similar agro ecology which was conducted by Seid (2004). The study used a systemic random sampling of every other appropriate head of cattle which came to the clinic. Each sample animal was subjected to a thorough physical and clinical examination where history, acaricide treatment, any concurrent disease and signs including restlessness,

rubbing of the body against fixed object, loss of appetite were recorded. Ethyl alcohol (70%) was used to facilitate the removal of the ticks from cattle's body and used as a preservative. The universal bottles were properly labeled with date and body sites after collections were made and then transported to the laboratory where ticks were identified. The 1 to 5 body condition scoring (BCS) was adopted from Nicholson and Butterworth (1986) and for convenience of this study body conditions are categorized as poor (BSC 1 and 2), medium (BCS 3) and good (BCS 4 and 5), and dentition based age determination from De-Lahunta and Habel (1986). The half body tick counts were doubled to obtain whole body tick burden according to Keiser (1987). Identification was carried out on the stage of stereoscopic dissecting microscope based on tick identification keys by Kaiser (1987).

Data analysis

Statistical package for social sciences (SPSS, 2009) was used to expresses the significant variation and descriptive statistics on tick infestation among cattle having different body condition, sex and age to assess the difference among tick species in total count.

RESULTS

A total of 272 study animals were having a tick comprising three genera and five species. The genera recorded were *Amblyomma* and *Rhipicephalus* with relative infestation rate of 88.8, 53.3 and 12.3% respectively. Among the five tick species identified three species (*A. cohaerens*, *A. variegatum* and *A. gemma*) were from the genus *Amblyomma*, one species and one species (*R. evertsi*) from the genus *Rhipicephalus* (Table 1).

In this present study, the relative infestation rate of tick species on cattle sampled showed that *A. cohaerens* was the most abundant tick species found with a relative abundance of (62.4%). The examined animal carried significantly more tick of this species than others. The male to female sex ratio was 2.64:1. The male to female sex ratio of *A. variegatum* was 3.3:1. *R. evertsi* and *A. gemma* were the fourth and fifth most abundant ticks with a relatively low number (12.3 and 8.3% respectively) and their male to female sex ratio were 1.96:1 and 1.34:1 respectively (Table 2).

About 72.5% of the examined animals were found to be infested by ticks. The infestation level of ticks had a statistical significance difference ($P < 0.05$) between cattle of poor body condition and good body condition. The prevalence was higher in poor body condition than in good body condition. The infestation level on sex is

Table 2. Distribution and sex ratio of adult tick species.

Tick species	Male	Female	M: F	Total	Percentage distribution
<i>A. cohaerense</i>	1521	576	2.64:1	2097	52.8
<i>A. variegatum</i>	275	83	3.3:1	358	9
<i>R. evertsi</i>	94	48	1.96:1	142	3.6
<i>A. gemma</i>	71	53	1.34:1	124	3.1
Total	2293	1681	1.3:1	3971	100

Table 3. Tick burden within age, sex and body condition.

Parameter	Age			Sex		BCS		
	<1yrs	1 to 3yrs	>3yrs	Male	Female	Poor	Med	Good
No of animal examined	62	112	201	123	262	101	194	89
Total tick	204	1085	2684	1178	2795	2085	1509	379
Mean tick burden	3.3	9.69	13.4	9.65	10.67	20.6	7.78	4.26

insignificant ($P>0.05$) Table 3. Each species of tick tend to prefer a site for attachment on the animal body as shown in Table 4.

DISCUSSION

In this study *A. cohaerens* was found to be the most abundant tick species in the area (62.4%). Likewise other researches (Yitbarek, 2004) indicated *A. choherense* to be the most abundant tick infesting cattle in West Ethiopia. It has also been reported as prevalent in many other parts of the country such as Rift valley (Solomon and Kasaa, 1996; Pegram et al., 1981) and in high land areas of Harar and Diredawa district (Manueri and Tilahun, 1991). The result of this study disagrees with the finding of Alekaw (1998) at Metekel Ranch of Ethiopia showing the prevalence of 5.7%. This could be due to the preference of the tick to prefer wetter highlands and sub highlands receiving >800 mm rainfall annually (Pegram et al., 1981). *A. variegatum* is the third abundant tick species (18.1%) in this study. The result of this study incomparable with tick survey conducted in Western Shoa at Bako district by Husen (2009) that indicated the distribution of this tick species as the first most abundant species in that area with a prevalence of 54.3%. Husen (2009) also indicated that this prevalence was similar to that of Bahir Dar (Mesele, 1989), Tigray (Surafel, 1996), South Wollo (Daniel, 1994). *R. evertsi* is the fourth abundant tick species (12.3%) in this study. This tick species was reported to be prevalent by other authors such as Mesele in Bahir dar (1989), Behailu, 2004 and Tamiru, (2008) in Assela: Morel, (1980) mentioned that the native distribution of *R. evertsi* in Ethiopia seems to be connected with middle highland, dry savannas and steppes in association with zebra and ruminant. This tick

shows no apparent preference for any particular altitude rainfall or season (Pegram et al., 1981). *A. gemma* was the least abundant tick species collected and represent (8.3%) of the total collection. This tick species was collected from restricted area of arid, semi arid and rift valley restricted to semi arid plain and bush land receiving 100 to 800 mm rainfall annually (Morel, 1980). Morel (1980) stated that *A. gemma* widely distributed in woodland, bush land, wooded and grassland in arid and semiarid area between altitude 500 to 1750 m above sea level and receiving 350 to 750 mm annual rain fall.

The male to female sex ratio in *A. choherense*, *A. variegatum*, *A. gemma* and *R. evertsi* shows that male is greater than female. This is due to fully engorged female tick drop off to the ground to lay eggs while male tend to remain permanently attached to the host up to several months later to continue feeding and mating with other females on the host before dropping off and hence males normally remains on the host longer than female (Solomon et al., 2001). This study also shows that the infestations were higher in those cattle of poor body condition than in good body conditioned cattle. This result comparable with previous reports at Bako district (Husen, 2009). The effect of age on the burden of tick is also statistically significant ($P<0.05$) and the result is incomparable with recent research at Asela (Tamiru, 2008) and Bako district (Husen, 2009).

In this study the most infested region of the animal were udder-scrotum (32.4%), anno-vulva (21.9%), perineum (18.77%) dewlap (16.7%) and brisket (3.1%). The predilection site mentioned in the result of this study was similar to with those reported by other authors (Okello-Onen, 1999). Several factors such as density (Kettle et al., 1995), time and season (Seyoum, 2005), in accessibility for grooming (Chandler and Read, 1994) have also been reported to determine the attachment site

Table 4. Percentage distribution of different tick species in different body parts of animal.

Site of attachment	Tick species				
	N=2097	N=358	N= 142	N=124	
Anno-vulva	521	93	17	17	24.8
Udder/scr.	712	118	35	39	33.95
Perineum	350	61	36	21	18.77
Dewlap	381	57	21	32	16.7
Brisket	53	11	18	20	3.1
Abdomen	25	7	-	-	2.6
Neck	14	5	-	2	0.53
Ear	18	2	-	-	1.6
Tail	3	4	9	3	0.8
Thigh	7	-	-	-	0.4
Foot	8	-	4	-	0.63
Hump	3	-	-	-	0.07
Back	-	-	1	-	0.35
Head	2	-	-	-	0.15
Mandible	-	-	-	-	0.05
Eyelid	-	-	-	-	0.07

* *A. cohaeren*; *A. variegatum*; *R. evertsi*.

of ticks. Information on predilection sites of ticks is helpful in spraying individual animals since it gives a clue as to which part of the body requires more attention (Pegram et al., 1981).

In conclusion, this study showed that the most abundant species of ticks in the study area includes *A. choherense*, *A. variegatum*, *R. evertsi* and *A. gemma*. Furthermore, predilection sites are identified that helps in designing control methods and which parts of the cattle's body to be covered while using ectoparasiticide chemicals. Hence, population dynamics and during hand spraying of cattle special attention should be given to the udder-scrutum and other preferable sites of attachment. Therefore, appropriate tick control strategy and technique need to be applied to which the identified tick species are sensitive.

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