Study On Prevalence, Identification And Common Control Practices Of Major Ixodid Ticks Of Cattle In Dera District, South Gondar Zone, Ethiopia

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Abstract: A cross-sectional study was conducted in Dera district, South Gondar zone, from December, 2016 to April, 2017 to estimate prevalence and identify the major genera of ixodid ticks of cattle and to explore common control practices against ticks. From the total of 384 cattle examined, 171(44.5%) were found to be infested with one or more genera of ticks. A total of 434 adult ticks were collected from half body part of each infested cattle. Four genera of ticks such as *Amblyomma* (38.0%), *Hyalomma* (20.7%), *Rhipicephalus* (24.9%), and *Rhipicephalus (Boophilus)* (16.4%) were identified. The lower parts of the body (belly, perineum, scrotum and udder) were highly infested by all genera of ticks, but majority from ears and legs were *Rhipicephalus* and *Hyalomma* respectively. Body condition and management systems showed a statistical significant difference ($p<0.05$) for the prevalence of ticks. Poor body conditioned cattle were highly tick infested (55.1%) than medium (40.7%) and good (35.7%) body conditioned. Cattle managed extensively were very highly tick infested than those semi-intensively managed that had the prevalence of 53.8% and 29.2% respectively. Other variables like sex, age and breed did not show a statistical significant difference ($p>0.05$) in the present study. Questionnaire survey was employed concerning control practices. In the survey, the entire respondents observed tick infestation. They practiced one or more measurement (s) to control ticks, but most of the livestock owners (65.7%) removed ticks manually (de-ticking). Modern acaricides and medicinal plants were also used. In conclusion, the prevalent ticks could be responsible in inducing direct and indirect impacts in the study area. Therefore, addressing the veterinary services, studying on seasonal dynamics of ticks and evaluating the traditional remedies should be implemented and encouraged. [Gebremeskel Moges, Basaznew Bogale, Mengestie Abebaw, Robel Abebaw, Anteneh Shewaye and Daniel Workneh. **Study On Prevalence, Identification And Common Control Practices Of Major Ixodid Ticks Of Cattle In Dera District, South Gondar Zone, Ethiopia.** *Rep Opinion* 2017;9(8):80-87]. ISSN 1553-9873 (print); ISSN 2375-7205 (online). http://www.sciencepub.net/report. 8. doi:10.7537/marsroj090817.08.

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1. Introduction

Ethiopia is an agrarian country with that has an extremely diverse topography, a wide range of climatic features and multitudes of agro-ecological zones which makes the country suitable for different agricultural production system. This in turn has contributed to the existence of large diversity of farm animal genetic resources with the proportion of total population in agricultural sector is 82.4 % (Annon, 2004).

The country has the largest number of livestock population in Africa, approximately 53.99 million cattle, 25.5 million sheep, 24.06 million goats, 1.91 million horses, 6.75 million donkeys, 0.35 million mules, 0.92 million camels, 50.38 million poultry and 5.21 million bee hives (CSA, 2012/13). Among livestock, cattle play a significant role in the socio-economic life of the people. In addition to the products of meat and milk cattle provide draught power for cultivation of the agricultural lands of many peasants. Skins and hides are also important components of the livestock sector in generating foreign export earnings. But their contribution to food production, rural income and export earnings are far below the expected potential (Morka *et al*., 2014).

Currently, parasitic diseases are a global problem and considered as major obstacles in the health and product performance of animals. In Ethiopia external parasites 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 (Tiki and Addis, 2011). They also affect the condition of host species by the inflammation and the infection they inflict on the skin (Taylor *et al.,* 2007), and by their effect on the physiology of the animals as well as through transmission of diseases (Wall and Shearer, 2001; Bekele *et al.,* 2011).

Among external parasites, ticks are very important and harmful blood sucking external

parasites of mammals, birds and reptiles throughout the world (Wall and Shearer, 2008). They belong to the phylum Arthropoda and make up the largest collection of species in the order Acarina and are divided into two groups as soft bodied (Argasidae) and hard bodied (Ixodidae) ticks (Liyanaarachchi *et al.,* 2013). They have four stages in their life cycle; egg, larva, nymph and adults and transition to each new life stage is by moulting, following a blood feed. Their body is divided into the prosoma (cephalothorax) and the opisthosoma (abdomen). There are 899 tick species that parasitize the vertebrates (Barker and Murrell, 2004). In Ethiopia, there are 47 species of ticks found on livestock and most of them have importance as vectors for disease causing agents and also have damaging effect on skin and hide production (Bayu, 2005).

Ticks are economically the most important pests of cattle and other domestic species in tropical and subtropical countries. More than 80% of the world cattle population is infested with ticks (FAO, 1998), which cause harm to animals through blood loss, general stress and irritation, depression of immune function, damages to hides and skins (Radostitis *et al.,* 2007). They have the ability to transmit protozoan, rickettsial and viral diseases of livestock, which are of great economic importance worldwide (Lefevre *et al.,* 2010).

A complex of problems related to ticks and tick-borne diseases of cattle created a demand for methods to control ticks and reduce losses of cattle production and productivity (George *et al.,* 2004). But this remains a challenge for the cattle industry in tropical and subtropical areas of the world. Tick control is a priority for many countries in tropical and subtropical regions (Lodos *et al.,* 2000).

A number of researchers reported about the distribution and abundance of ticks in different areas of Ethiopia, but there was no any documented information about tick prevalence and their control practices in the study area. Therefore, the objectives of the present study were the following.

General objective:

- To study the prevalence of ixodid ticks on cattle and their control practices in Dera district.

Specific objectives:

- To estimate the prevalence of ixodid ticks infesting cattle and their identification.
- To assess the association of various risk factors with the prevalence of ticks.
- To explore the control practices against ticks in the study area.

2. Materials And Methods

2.1. Description of the study area

The study was conducted in Dera district, South Gondar zone, Amhara region, Ethiopia from December, 2016 to April, 2017. Dera is bordered on the south by the Abbay River, on the west by Lake Tana, on the north by Fogera and on the east by Este. It is located at 11° 43' 0" North and 37° 38' 0" East. The altitude of the area is midland with 2077 meters above sea level. It has 1300 mm3 mean annual rain fall and 26°C mean annual temperature. According to DDRDAPO (2014), the livestock population of Dera district was 182,829 cattle, 120,700 sheep, 76,530 goats, 978 horses, 14,366 donkeys, 1274 mules and 185,356 poultry. In the district, six specific sites (Huletuwegedame, Gelawudewos, Hamusit and Gedamgeregera peasant associations and, Anbessame and Aribgebeya veterinary clinics) were selected.

2.2. Study animals

The study was carried out on both local and cross breed of cattle (384 heads in total). The study animals included both sexes (221 males and 163 females) and were managed extensively and semi-intensively. Cattle were categorized in to three age groups, 1-2 years as young, 3-8 years as adult and >8 years as old, as well as three body condition scores as poor, medium and good (Ferguson, 2011). From the total cattle examined 98, 150 and 136 were good, medium and poor body conditioned respectively.

2.3. Study design and sampling method

A cross-sectional study was conducted from December, 2016 to May, 2017 in Dera district to identify the major hard ticks infesting cattle, to estimate the prevalence of them and to explore control practices against ticks. Simple random sampling technique was employed to select study animals.

2.4. Sample size determination

The required sample size for the study was determined using the formula described in Thrusfield (2005) with 95 % level of confidence and at 5 % desired absolute precision. Accordingly, $n=1.962^2 \times Pexp\ (1-Pexp)/d^2$, where n=required sample size, Pexp= expected prevalence and d=desired absolute precision. By rule of thumb where there is no documented information for the prevalence of tick infestation in the study area, it was expected as 50 %. So a total of 384 cattle were examined for tick infestation based on the result computed by the formula.

2.4.1. Questionnaire survey

Questionnaire was prepared to collect information about the ticks' impact on cattle and the major practices to control tick infestation in the area. The required information were interviewed and compiled. The data were collected through interview with 70 livestock owners in sites where the ticks were collected for identification.

2.4.2. Tick collection and identification

Data like age, sex, body condition and other important parameters were recorded before detailed examination of cattle for the presence of ticks on different regions of the body (head, ear, dewlap, belly, perineum, scrotum, udder, tail and leg). The animals were restrained properly to conduct general physical examination and collection of adult ticks from their half body part. As adult ticks were appreciated, they were collected by using plastic sampling bottle containing 70% alcohol. Ticks were removed using forceps by gentle traction through rotating the head of ticks not to be damaged to avoid confusion and for subsequent identification. The sampling bottles were labeled with serial numbers while other data (date, address, breed, age, sex and body condition of the animal) were written on register format prepared for this particular purpose. Totally, 434 adult ticks were collected from half body regions of all infested cattle. After collection, the samples were taken to vector and vector borne diseases diagnostic laboratory room of Bahir Dar Animal Health, Investigation and Diagnostic Laboratory. Ticks were identified using stereomicroscope to the genera level according to the morphological characteristics described by Walker *et al*. (2003).

2.5. Data management and analysis

All the data collected from the work were recorded on A4 paper and then entered in to Microsoft excel sheet. All data were analyzed using SPSS version 20 statistical software. Descriptive statistics was used to express prevalence and compare the association of tick prevalence with sex, age, breed, body condition and management system. A $p<0.05$ was considered as it showed statistical significant difference.

3. Results

3.1. Prevalence of ticks

During the study period a total of 384 cattle (local and cross) were examined for the prevalence of tick infestation and 171 (44.5%) of them were infested by one or more than one genera of ticks. *Amblyomma, Rhipicephalus (Boophilus), Hyalomma and Rhipicephalus* were identified during the study period (Table 1).

Table 1: Tick genera identified during the study period in the study area

Tick genera	Number of ticks	Prevalence
Amblyomma	165	38.0%
Rhipicephalus (Boophilus)	71	16.4%
Hyalomma	90	20.7%
Rhipicephalus	108	24.9%
Total	434	100%

The prevalence of tick infestation was different in various risk factors. Cross breed and local breed cattle were infested with ticks that accounted 38.5% and 45.0% respectively. About 55.1%, 40.7% and 35.7% of poor, medium and good body conditioned animals were infested by tick respectively. Cattle managed extensively were more severely tick infested than those managed semi-intensively. Both body condition of the cattle and management system showed statistical significant difference ($p<0.05$) (Table 2).

Table 2: prevalence of tick infestation in different variables and result of the statistical analysis

Risk factors	Category	Animals examined	Animal positive	Prevalence	p-value	X^2
Breed	Local	358	161	45%	0.519	0.4
	Cross	26	10	38.5%		
Sex	Female	163	71	43.6%	0.742	0.1
	Male	221	100	45.2%		
Age	Young	139	56	40.3%		
	Adult	214	102	47.7%	0.378	1.95
	Old	31	13	41.9%		
Body condition	Good	98	35	35.7%		
	Medium	150	61	40.7%	0.006	10.2
	Poor	136	75	55.1%		
Management	Extensive	240	129	53.8%	0.000	22
	Semi-intensive	144	42	29.2%		

3.2. Tick predilection site

Ticks were widely distributed in different parts of the cattle body such as head, ear, dewlap, belly, perineum, scrotum, udder, tail and leg. Based on the study, the perineum, belly, udder, scrotum and dewlap were most infested parts of animal body (Table 3).

Table 3: Proportion of distribution of ticks based on body sites on cattle

Body region	Tick genera			
	Amblyomma	*Rhipicephalus (Boophilus)*	*Hyalomma*	*Rhipicephalus*
Head	4	4	2	7
Ear	3	5	1	12
Dewlap	20	12	14	7
Belly	31	17	19	31
Perineum	52	12	24	35
Scrotum	23	13	11	5
Udder	30	7	7	8
Tail	-	1	6	3
Leg	2	-	6	-

3.3. Respondents' demographic characteristics

The total numbers of respondents were 70 livestock owners, 58 of them were males, and the rest were females. The respondents' age ranges from 26 to 69 years. About 41 (58.8%) of them were not educated and of the total, 13 (18.6%) of the total respondent were single and divorced. Most of them managed the cattle extensively and had six or more number of cattle. From 70 respondents, 91.4% (64) of them check the presence of tick infestation in the herd regularly and of the total, 40 (57.1%) respondents recognized that the ticks can be found freely in the environment. According to the survey, 23(32.9%) of the respondents have gained advice from animal health professionals about control of ticks and other external parasites.

3.4. Effects of tick infestation according to the questionnaire survey

In the district, tick was prevalent in all sites where data were collected. Loss of body condition, wound and lameness were the most commonly effects of tick infestation on the animal according to the questionnaire survey (Table 4).

3.5. Tick control practices by the livestock owners of the study area

From the total 70 respondents interviewed, 64(91.4%) of them practice different ways of control measures. Manual removal of the ticks was the most commonly used tick control practice conducted in the study area. Those cattle owners used modern acaricides replied that spraying (60.9%) and injection (39.1%) were the methods of application of the acaricides. Washing with soap when associated with other external parasites, cutting with sharp materials like scissors, piercing with needle, burning with hot iron, application of used grease on ticks and using herbs to treat ticks were also used by the community in the study area (Table 5).

Table 4: Effects of ticks recognized majorly by the respondents

Effects	Respondents result	
	Number of respondents	Percent
Loss of body condition	36/70	51.4%
Wound	23/70	32.9%
Mastitis and teat damage	13/70	18.6%
Itching and alopecia	8/70	11.4%
Skin damage	21/70	30.0%
Lameness	17/70	24.3%
Other	15/70	21.4%

Table 5: Control and treatment practices by cattle owners in the study area

Control and treatment practices	Respondents result	
	Number	**Percent**
Use of modern acaricides	23/70	32.9%
Manual removal of ticks	46/70	65.7%
Washing with soap and other chemicals	16/70	22.9%
Application of used grease on ticks	9/70	12.9%
Piercing with needle	7/70	10%
Cutting with sharp materials	8/70	11.4%
Use of herbs	13/70	18.6%
Burning with hot iron	4/70	5.7%
Doing nothing	6/70	8.6%

Discussion

The overall prevalence of ixodid tick infestation of cattle in the present study area was 44.5%. Accordingly, this finding was lower than the previous reports of Nigatu and Teshome (2012) and Meaza, *et al*. (2014) who reported a prevalence of 89.4% and 74.0% from Western Amhara region and in Bahir Dar, Ethiopia respectively. In contrast, the present study result was higher than the finding of Tikit and Addis (2011) with the prevalence of 25.64% in and around Holeta town, Ethiopia. These variations might be due to the difference in control measures practiced against ticks, in agro-ecology of study sites and in management systems of the cattle in different areas. Agro-ecology influences on the prevalence of ticks since their activity is influenced by rainfall, altitude and atmospheric relative humidity (Pegram *et al*., 1981).

In the present study, *Ambyomma, Rhipicephalus, Hyalomma* and *Rhipicephalus (Boophilus)* were identified with the prevalence of 38.0%, 24.9%, 20.7% and 16.4%, respectively. This was in agreement with the finding of Frans (2000) who stated that the most economically important ixodid ticks of livestock in tropical regions belong to the genera of *Ambyomma, Rhipicephalus, Hyalomma* and *Rhipicephalus (Boophilus)*.

The prevalence of *Amblyomma* was found to be 38.0%. This was in agreement with the report of Bemrew *et al.* (2015) and Jejalu *et al.* (2016) with prevalence of 37.5% and 34.9% respectively. *Amblyomma* species is the most widely distributed cattle tick in Ethiopia due to suitable wooded or grassy environments (Morel, 1989). *Rhipicephalus* tick was found to be the second most prevalent ixodid tick in the present study. A lower result of *Rhipicephalus* tick was recorded (6.6%) in Western Amhara region (Nigatu and Teshome, 2012) than the present study result (24.9%), but higher prevalence (48.1%) was found in Bahir Dar (Gedilu *et al*., 2014). This tick does not show apparent preference for any particular altitude, rainfall, or season (Pegram *et al*., 1981). The prevalence of *Hyalomma* species (20.7%) in this study was in agreement with Getachew *et al*. (2014) with a prevalence of 20.34% in Northwest Ethiopia and lower than the study conducted in and around Asella town with prevalence of 60.1% (Tamiru and Abebaw, 2010). Higher prevalence of *Rhipicephalus (Boophilus)* was reported by Bossena and Abdu (2012) and Bemrew *et al*. (2015) with 45% and 25% respectively than the present study result (16.4%). The difference in proportion of each genera in different findings might be due to the difference in number of samples (ticks) collected to be identified.

Different risk factors like breed, age, sex, body condition and management systems were found to be involved in the variations of the prevalence of ixodid ticks in the study area with/without statistical significance ($p<0.05/p>0.05$).

Body condition of the cattle showed a statistical significant ($p<0.05$) difference for tick prevalence. Poor body conditioned cattle were highly tick infested (55.1%) than medium (40.7%) and good (35.7%) body conditioned ones. According to the result stated by Bossena and Abdu (2012), poor body conditioned cattle were more infested than good body conditioned ones with statistical significant ($p<0.05$) difference. Poor body conditioned animals were least resistant to tick infestation and lack enough body potential to build resistance, but over conditioned animals showed reasonable combat to the tick infestation (Manan *et al*., 2007). Alternatively, the pre-infestation of the cattle with ticks might make them poor in body condition. The poor conditioned animals by which they were more tick infested groups might be infected by other diseases formerly and became weak and lost the body condition. This in turn could allow the animals immuno-compromised.

The cattle managed extensively and semi-intensively showed statistical significant different ($p<0.05$) with the prevalence of 53.8% and 29.2% respectively. Many researchers (for example; Getachew *et al*. (2014), Meaza *et al*. (2014), Bemrew *et al*. (2015)) agreed that management system plays a great role in the status of tick infestation. But this study weighed it in detail and found with a higher difference in prevalence of ticks between the two commonly practiced management systems in the study area. This could be due to the reason that extensively managed cattle were kept in communal grazing and there might be mixing of herds without restriction. But semi-intensively managed cattle were mostly kept separately without being mixed with other herds in the area with indoor system unless brought to the outside for feeding, watering and free exercise.

Local and cross breed cattle were infested with tick with the prevalence of 45% and 38.5% respectively with no statistical significant difference ($p>0.05$) between breeds. According to Meaza *et al*. (2014) and Kassa and Yalew (2012) local breed cattle were very highly infested with ticks than cross breeds with a statistical significant difference ($p<0.05$). The present result was disagreed with the report of Tamiru and Abebaw (2010) who stated that the prevalence of tick infestation was higher in the cross breeds than local breeds. The result of the current study could be due to the currently existing modified animal husbandry practice where cross breed or high yielding cattle are kept most of the time indoor with semi-intensive care, whereas local breed cattle are kept under extensive farming system. The situation could be hypothesized that regular washing of barn and

animal, regular treatment of animals with acaricides could reduce the susceptibility of tick infestation in semi-intensively managed animals.

There had not been statistically significant difference ($p>0.05$) between sex of cattle for the prevalence of ticks which accounted 45.2% and 43.6% in male and female cattle respectively. This result disagreed with the result reported by Kassa and Yalew (2012) and Tesfahewet and Simeon (2013) who stated that females were more affected than male cattle without a statistical significant difference. From these results it can be concluded that almost both sex categories of cattle have no significant different in chance of exposure for tick infestation.

In this study, the relative prevalence of tick infestation in adult, old and young age groups was computed as 47.7%, 41.9% and 40.3% respectively that did not show statistical significance difference ($p>0.05$). This finding is in agreement with the findings of Feseha (1997) and Surafel and Amsalu (2012) in Eastern Harerghe and in Haramaya district respectively with slightly higher proportion in adult cattle, but also with no statistical difference ($p>0.05$). However, Bossena and Abdu (2012) and Gedilu *et al*. (2014) stated that statistical significance difference was existed among age groups for tick prevalence. This difference in prevalence among age groups might be due to proportion of the sampled groups and management system difference.

In the present study, the predilection sites from which most ticks were collected included perineum, belly, scrotum and udder. The preference of the predilection sites of ticks could be due to a variety of factors such as host density, interaction between tick species, time and season and inaccessibility for grooming (Solomon *et al*., 2001). The most favorable site for *Amblyomma* was dewlap, belly, perineum, scrotum and udder. *Rhipicephalus* had affinity for belly, perineum and ear while *Hyalomma* was mostly found on dewlap, scrotum perineum and belly and leg, and tail region was most infested by it. Short hypostome ticks like *Rhipicephalus* usually preferred upper body parts including nape of the neck, margin of anus and under tail, while long hypostome ticks like *Amblyomma* attached to lower parts of animal body (Stachurski, 2000).

The present questionnaire survey result revealed that the entire respondents had information about the ticks' infestation with their different harmful effects. Loss of body condition was the most mentioned one from the effects detected by the livestock owners (51.4%) followed by wound, skin damage, lameness, mastitis and teat damage, and itching. Other impacts of the tick infestation were also presented by the livestock owners (blood loss and transmit diseases). According to Jejalu *et al*. (2016), 35% of the total respondents had information on the ticks' impact in transmitting diseases in which their knowledge was better than the community of the present study area. This difference might be due to the difference in provision of veterinary extension services.

Most of the respondents used different ways of control practices that an individual could take one or more measures. According to the respondents, manual removal of ticks, application of used grease, piercing with needle, cutting with sharp materials and burning with hot iron were the mechanical techniques used by the livestock owners for control of ticks. Use of modern acaricides was not as such commonly practiced in the area. From the report of Achenef (2013) in North Gondar zone, use of modern acaricides was the leading practice. This difference could be due to accessibility to veterinary services and level of knowledge of community about modern drugs. Although they practiced those ways to control ticks, some of the practices may not be as such effective. Manual removal of ticks might not be implemented well in large herd size and in aggressive animals. It also causes damage to the skin and predisposes the animal to different secondary infections. While removal of ticks, mouth part of the ticks may be left and causes allergic reaction to the animal's body.

Different herbal materials were mentioned by respondents employed for treatment of tick infestations such as fruit of cucumis *(Cucumis prophetarum)* locally (Yemidir Embuay), leaf of natal labrnum *(Calpurnia aurea)* locally (Zikita), seed or leaf of African soapberry *(Phytolacca dodecandra)* locally (Endod) and sap of cactus *(Euphorbia abyssinica)* locally (Kulkual) either by washing the body of the animal or applying on ticks attached sites. Plants are the potential source of many drugs so this has to be investigated well for potent chemical to be extracted from those plants.

Conclusion Andf Recommendations

In conclusion, ticks infestation was prevalent in the study area. Four genera of ticks were identified including *Ambyomma, Rhipicephalus, Hyalomma* and *Rhipicephalus (Boophilus*) in order of their dominancy. Body condition and management systems were the risk factors associated with the occurrence of tick infestation in cattle that showed statistical significant difference. The control practices implemented by the livestock owners were mostly traditional ways using mechanical methods of removing ticks and use of medicinal plants. However, modern control methods using acaricides were not highly practiced in the area due to inaccessibility to veterinary services and low level of knowledge of the livestock owners in new veterinary technology. The

ticks still produce tremendous direct and indirect impacts in the study area.

Based on the above conclusion, the following recommendations are forwarded:

- Tick control practices using modern acaricides should be encouraged.
- Veterinary services should be addressed in the study area.
- Further detailed study on seasonal dynamics of ticks and other epidemiological aspects should be conducted to formulate strategic tick control methods.
- The traditional remedies against ticks should be assessed in detail and evaluated accordingly.

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