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Prevalence of Hard Tick Infestation at Sodo District of Gurage Zone, Southern Ethiopia

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Abstract

A cross-sectional study was conducted from May 2021 to September 2021with the objective of identifying and estimating the prevalence of tick genera in Sodo district, SNNPR. Random sampling technique was employed to select the animal. The distribution and abundance of cattle species in sodo district, guragae zone, was studied over period ofMay2021 to September2021.Adult ticks were collected from seven main body regions of 384 cattle which were out of total 384 cattle examine 283(61%) were found to be infested by one or more tick genera. Ticks were collected from animal body part and identified to genera level. Three tick's genera (Amblyomma, Ripicephalus andBoophilus) were identified. The relative prevalence of each genus was Amblyoma 43.46%, Ripicephalus 30.83%, and Boophilus 25.91%. The prevalence of tick infection in medium body conditions 78%, poor body conditions 67%, and good body conditions 57% among the three groups of body conditions the prevalence of tick infection. Exotic breeds (100%) then cross (80%), local breeds (58%).The results identified, the predilection sites for Amblyomma were ventral body perineum. Ripicephalus had predilection site for perineum, dewlap, udder/scrotum and belly. Boophilus found at dewlap, udder/ scrotum, belly, leg, tail, head and perineum.

Keywords: Attachment site, Cattle, District, tick,Ixodidae, Tick, Prevalence.

Introduction

Cattle play a significant role in the socio-economic life of the people of Ethiopia. In addition to the products of meat and milk cattle provide drought 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 Although only relatively few of more than 889 species of tick in the world are important to man and domestic animals. They must be controlled to meet world needs for animal's protein. (Drummond,2007) reported over 79 different species in Eastern Africa but many of these appear to be little or no economic importance (Cumming,1999). Ticks,besides being important vectors for disease like theileriosis, anaplasmosis, babesiosis and reickettsiosis (heart water) indomestic animals; they also cause nonspecific symptoms like anemia, dermatosis, toxicossis and paralysis (Solomon Gebreet al.,2001). In Ethiopia, ticks are common in all agro ecological zones of the country (Pegramet al., 1981).

Amblyomma tick one of the most abundant ticks general and has been reported in many parts of the country such as Hawassa (Mehane, 2004) and Jimma (Yitbarek, 2004) with highest prevalence rate. Although Amblyomma and Rhipicphalus ticks are predominating in many parts of the country, Boophilus and Hyalomma ticks also have a significant role. The population changes of ticks are influence by climatic changes, which affect the rate of tick population on the ground host resistance and natural enemies (Solomon Gebreet al., 2001).

In Ethiopia livestock raising an important economic activity from which food, milk and meat and non-food commodities (manure, traction, hides and skin) and cash income are derived. Livestock plays a key role in the daily life particularly the peasant who own over 95% of the countries livestock (Mesfin, 1972, Sintayehu.et at 1989). There are above million cattle population (CSA, 2017), also there are already more than 0.45 million improved cattle bread in the country (EASE, 2003).Because at this huge potential, Ethiopia is capable of supplying 16-18 million of hides and skin per year for the tanneries with in the country. According to FAO (2004), the total annual meat production comes from cattle (63%), sheep (25%) and goats (12%). Ethiopia has the largest cattle population in Africa, unfortunately, the contribution on this huge resource to human nutrition and export earnings are dis-proportionally low. Livestock production is hungered by several constraints including malnutrition, tradition and disease (Gracy, 1992). Parasitic diseases are among the major factors responsible for the low production of livestock in Ethiopia (Abera. 1995; Jobre et al., 1996). Cattle are serving as a principal host for ticks (Aberaet a1., 2010). Ticks are obligate ectoparasites and are well known as important vector transmitting pathogen to animal and human in many part of the world.

Ticks are important parasite because of their disease or their disease transmission blood feeding habits and skin damage on most of the livestock population (CSA, 2017) Losses forum ticks damage to hides and skins are claimed to be about one million Ethiopian birr per annual but are likely to be much higher (Sileshi, l992). The exportation of hides and skin are the largest foreign exchange earners in the country. However this sector of trade and the country as whole lost revenue due to a decline in equal it) and fall in export prices (Pittards, 1999) lip to 65% of these defects occurs in the pre slaughter stage of production while animals are still alive. Objective of the Study;the specific objectives of this study include;

To assess the major factors that lead to tick infestation of the cattle, to indicate the identification of ticks and tick infestation on the cattle and to reduce the economic loss due to tick infestation.

Materials and Methods

Description of the Study Area

The study was conducted in Sodo district, one of the sites of improving productivity and Market success, in this study area Sodo district is located between 38-^{0}37N, 13^{0}16 north Longitude and 38^{0}44N, 39021South east latitude, the study area nestled in the SNNPRS (south nation nationality and people of regional state) is possessed with compact shape and are of 88,553 km² (SWARDO, 2021). Sodo district share borders with Oromia national regional state in the east North and west Meskan is 103 km far from the capital country and 187 km from the capital of regional state. In the district,there are thirty seven (37) rural kebeles and four (4) urban centers. The topography elevation range from 3600 (m,a,s,l,) to 1600 m,a,s,l. The mean annual rain fall of the district range between 801 mm and 1200mm. Temperature range between 100c to 240c (SWARDO, 2021).About 67,110 male and 67,527 female live in the district and around 120,919 people live in the rural area (CSA, 2017) and their livelihood is mainly based on agriculture activity and the rest 13.715 live in the urban area.

Study population

According SWARDO(2021), the livestock of Sodo district was cattle (118018), sheep (43798), goats (56030), equine (10869), and poultry (146827). The study populations were constituted in all breeds but the mostly populated breed in the area was indigenous or local breeds kept under traditional management system.

Sampling design

A cross sectional study was conducted from May 2021 to September 2021 to determine the prevalence of ticks, and identification of genus of ticks collected and labeled according to their predilection site.

Sampling technique

All the animals selected as sampling unit were checked for any tick infestation based upon the numbers of ticks found on the animal and the study record period. Ticks were collected from ears, heads, dewlaps, belly/flunk, udder/scrotum, perineum and legs/tails in the separated sample bottles with 70%

ethanol. In addition to the attachment site of tick in different body regions, the burden of ticks based on age, sex, body condition, and breeds of animals were determined.

Sampling methods and determination of sampling size

The cattle to be examined were selected by simple random sampling method, was used to determine appropriate sample size. The sample size was determined by using the formula given in Thrustifield (1995). The expected prevalence of Ixodidae ticks of cattle in Sodo district was assumed as 50%. The parameters used were 95% confidence interval and 5% desired level of precision. By substituting these values in the formula, the sample size taken was n = 384

$$n = \frac{1.962\ Pexp\ (1 - Pexp)}{d2}$$

Where n = sample size;
Pexp = expected prevalence;

d2 = expected precision which is usually 5% (0.05).

Study methods

Adult ticks were collected from seven body reign of cattle from the surrounding kebele. The enter body of the cattle was thoroughly examined for the presence of tick. The collected ticks were put in to universal sampling bottle which containing 70% ethanol. Ticks were carefully removed from the host for identification using quality steel forceps. Collected adult tick from each body reign was kept separately for identification in separate sampling bottle. The following morphology characteristics were taken in to consideration for further identification of ixodid ticks feature on the ventral and dorsal sides during the study period.

Data analysis

The overall prevalence of tick was determined by dividing the number of Positive animals by total sample size, and was expressed as percentage. Chi-square (x^2) test was used to assess if there was a statistically significant association in tick infestation between ages, sex, breeds and body conditions.

Results

Prevalence of ticks on cattle in Sodo distinct

In this server a total of 384 animal were local n= 332, cross (n=41) and exotic (n=11) breeds of cattle were examined then the overall prevalence was calculated by dividing the numbers of positive sample by the total sample size and multiple by 100 out the 384 animal examined. Tick were found on 238 animal yielding an overall prevalence of 61.98% the distribution genera were identified and located in table (1).

Table 1: The cattle population in study area and Grazing land or range land in selected six kebeles

Kebleles	Breed Local(number) %	Cross	Exotic(number) %	Total	Hectare
Firshi	1350 (88.7)	6	29(1.89)	1531	8.5
Bueezuria	1326 (90.9)	7.75	45(3.08)	1458	6
Negesa	823(86.8)	4.5	58(6.11)	948	7.75
Anati	629(76.77)	5	69(8.43)	819	4.5
Genbela	1112(92.3)	6.3	63(5.23)	1204	5
Sutenzuria	563(95.4)	**38.05**	9(1.52)	590	6.3
Total	**5803**	**475**	**273**	**6550**	**38.05**

Table 2: Distribution of tick genera of cattle in study area

	Tick genera					
Kebele	Ambyloma		Rhipicephalus		Boophilus	Total
	No	(%)	No	(%)	No (%)	No (%)
Firshi	239	(54.07)	98	(22.17)	105 (23.78)	442 (18.12)
Bueezuria	242	(28.98)	103	(20.85)	149 (30.16)	494 (20.25)
Negesa	114	(25.11)	266	(58.59)	74 (16.29)	454 (18.69)
Anati	180	(35.87)	155	(30.81)	168 (33.39)	503 (20.70)
Genbela	73	(34.43)	79	(34.26)	60 (28.30)	212 (8.69)
Sutenzuria	212 (63.47)		46(13.77)		76 (22.75) k	334 (13.75)
Total	**1060 (43.46)**		**747 (30.63)**		**632 (25.91)**	**2439 (100)**

The statically analysis was done for the prevalence of tick infestation with hypothesized risk factor (age, sex, breed and body conditions)

Table 3: The prevalence of tick in relation to body condition and breeds of animal

Parameter	Body condition			Breed		
	Good	Medium	Poor	Local	Cross	Exotic
Noof animal	239	89	56	332	41	11
Infested animal	129	71	38	194	33	11
Prevalence%	**58.3**	**79.78**	**67.86**	**58.43**	**80.49**	**100**

Higher tick infestation rate was seen on both medium body condition and exotic breed, there were associated with sex, and age of animal (table 3) with the identification of tick genus and their abundance. Of the total 2439 lxodid ticks collected from seven body region of 384 cattle's , three different genus identified were Amblyomma(43.46%), Rhipicephalus(30.63) and Boophilus was the least abundant (25.91%).

Table 4: Prevalence of tick in relation to sex and age of animal

Parameter	Sex		Age	
	Male	Female	<5 young	> Adult
No of animal	213	171	144	240
Infested animal	134	104	87	151
Prevalence %	**62.91**	**60.82**	**60.42**	**62.92**

Predilection siteof identified tick

The observed proportion of tick genus attachment site during this study was summarized and show in table 4. *Ambyloma* identified during the study preferred under/scrotum dewlap/brisket perineum belly back legs/tail and head regions. The *boophilus* preferred the attachment site such as dewlap /brisket, belly, back, legs, tail, udder /scrotum, heads, ears and perineum regions in decreasing order. The *rhipicephalus* were countered mainly in the perineum dewlap udder /scrotum, ears, belly, back and head regions.

Table 4: The number of tick, genus identified in body region of a cattle.

Ticks gineus	Head	Ear	Dewlap	Legs/tails	Udder/scrotum	Perineum	Belly
Amblyomma	14	-	365	9	551	88	39
Ripicephalus	24	17	450	74	66	16	100
Boophilus	2	31	112		55	425	7
Total	**40**	**48**	**927**	**83**	**672**	**529**	**146**

Discussion

The distribution and abundance of the most common tick genus infesting cattle in Ethiopia vary greatly from one area to another. In this study ambylomma was found to be most abundant tick genus inSodo district (46.46%) and similar results have been reported by Tesfansh (1993) in north omo, Mahane (2004) in Hawasaa and Behailu (2004) in Asella. Morel (1980) and pegrametal.,(1981) indicated amblyomma is the most widely distributed cattle tick in Ethiopia and has a great economic importance, because it is an efficient vector of cowdriaruminatum, the organism causing cowdrosis or heart water in cattle. Rhipicephalus was second abundant (30.63%) and widely distributed ticks genera in this study. This ticks genera were also reported to be prevalence in HawassaMehari (2004) and Assella, Behailu (2004). Moral (1980) affirmed that the native distribution of Rhipicephalus in Ethiopia seems be connected with middle height dry savannas and steppes in association with zebera and ruminant and it is widely distributed through Ethiopia. This tick's genus shows no apparent preference for particular altitude, rainfall zones or season's (Pegram et al., 1981).Boophilus, the third abundant tick's genera (25.91%) and has also been reported in many parts of Ethiopia, especially 27.3% by(Tesfahiwot et al., 2012). Contrary to this result, the high prevalence of ticks in cattle in this study was due to poor management and epidemiological factors.

Because ticks requires moisture and warm environment for survival, activity of most ticks commence during spring and dry season (Sileshi et al; 1992). Moral (1980) stated that, Boophilus is often collected tick in Ethiopia and does not seem really abundant anywhere. This tick genus is abundant in wetter highlands and sub-high lands receiving more than 800mm rain fall annually (pegram et al., 1981) and has similar distribution to Amblyomma. In this study, different animal related risk factors were studied to determine whether there is a significant variation in tick infestation between and among different groups of animals with suspected risk factors. The proportion of tick infestation was higher in adult animals as compared to young animals. And the higher proportion may be due to outdoor management and long distant movement of adult animals to search for food and water compared to younger animals, so the chance of exposure is higher. This finding is also in agreement with the finding of Feseha (1997), Tessema, Gashaw (2010), Belew and Mekonnen (2011) who stated a higher proportion in adult cattle. In the infestation rate among different sex groups, where higher infestation was recorded in male animals compared to their counter parts. This variation may be associated with female animals which were kept properly in the house with good management system for dairy purpose whereas male animals grazing on field all day may be exposed to tick infestation. This result also agreed with the previous work done by other author (Hussen, 2009) in Bako. The proportion of tick infestation was higher in medium body conditioned (79.78%) as compared to poor body conditioned (67.86%) and good body conditioned animals (58%). This was due to the fact that medium body scored animals have reduced resistance and are exposed to any kind of disease when grazing on the field, and poor body conditioned animals were kept at home due to their inability to walk long distant areas, so they become less infested than medium sized animals but the well fed animals were very resistant to any kind of diseases when they grazed in the field or are kept at home.

The fact that more tick burden was recorded in both exotic and cross breeds compared to local cattle would help in planning for tick control before the introduction of different improved breeds. In the past, attempts to introduce cattle of exotic inheritance into tropics have not had expected success. One reason for the failure could be because of the high susceptibility to ticks and TBDs of exotic and cross breeds. However, the fear of introducing susceptible cattle can be solved by introducing certain degree of resistance in these cattle by means of prophylactic treatment before introducing into enzootic areas (Solomon et al., 2001). This result is in agreement with Tessema and Gashaw (2010). In contrast, the report by Belew and Mekonnen (2011) revealed that the presence of tick infestation in local breeds were very high with the prevalence of 44.96% (n = 223), while in cross breeds and Jersey, the prevalence were 15.83% (n = 57), and 8.50% (n = 30), respectively. The significant variation in tick infestation of cattle of different breeds in their research might be attributed to different management system, lack of supplementary feeding for local breeds, or lack of control measures against tick on local breeds. Furthermore, it can be assumed that it might be due to lack of interest of farmers for local breeds as well as taking more care to cross and exotic breeds than local breeds.

Conclusion

The study indicated that there was moderate burden of ticks in the area. However, the attention given to control the infestation had not been sufficient. Acaridae application is the main method of tick control in the region. Because of no single method that would guarantee complete control of ticks and ticks borne disease, combination of available methods of ticks borne disease, combination of available methods of ticks control is necessary. This encompasses that of tick resistance cattle, acaridae treatment, appropriate livestock management, evaluation and incorporation of traditional practices or remedies that appear to be valuein light of the above conclusion the following recommendations are forwarded:

More attention should be given to the selection of resistant cattle breeds and types, and good performance with regards to production of local breeds, tick control program (application of acaricides) should be continued with an increasing frequency of application in wet months and awareness should be created to the community to control the tick and tick infestation problems.

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