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Study on Distribution of Cattle Tick from Mid Hills to Plain of Nepal

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Abstract

Tick causes the serious economic losses in livestock production in worldwide. A study was conducted to determine the abundance of tick population on different body parts of cattle as well as in different geographical regions in 2017/018. Three study sites were taken from mid hill, inner terai and terai region of Nepal. Randomly total 45 dairy cattle (15 from each region) were included for the study. Regarding to the ticks distribution in cattle body part, higher number of ticks were recorded on dewlap (38.61%) followed by perineum and udder (25.10%), ear base (15.06%), tail base (9.07%), abdomen (7.34%) and withers (4.83%). Similarly, highest numbers of ticks were recorded in Chitwan (19.46 average number of ticks) cattle followed by Dang (9.13 average number of ticks) and least in Lamjung (5.73 average number of ticks) cattle. This result indicates that higher tick infestation was found in warm, moist, hidden sites with good vascular supply and thin skin in cattle body. Similarly, more number of tick population recorded in cattle keeping with poor animal husbandry practices.

Keywords: Tick; Cattle; Distribution; Region

Introduction

Ecto-parasite, transmitted several pathogens and zoonotic diseases, is serious problems in livestock industry [1-3]. Among the ecto-parasites, ticks cause the greatest economic losses in livestock production at global level [4-6]. It is reported that about 80% of the world cattle population is infested with ticks [7]. Moreover, tick borne diseases are the problems of cattle and other livestock in Africa, Asia and Latin America [8]. Tick transmit the viral, bacterial and protozoan pathogens causing diseases like hemorrhagic fever, ehrlichiosis, anaplasmosis, theileriosis, and babesiosis in animals [9]. The global losses due to hard tick infestation is estimated to be US$7.0 billion annually [10].

Nepal is no different to global scenario when it comes to tick problem in dairy cattle. There is very few information regarding to the ticks distribution in different climatic areas in Nepalese context [11]. Conducted a study about the tick distribution in western part of Nepal. However, there was no any study on distribution of ticks in present study sites where commercial growing of livestock is common. Therefore, this study was carried out to determine the abundance of tick population on different body parts of cattle as well as in different geographical regions.

Materials and Methodology

Study site

Three study sites were taken for the study as Sundarbazzar municipality, Lamjung; Bharatpur Metropolitan, Chitwan; Lamahi municipality, Dang; lies in mid hill, inner terai and terai region of Nepal respectively. Sundarbazzar, Lamjung lies in 28.1448°N, 84.4120°E, with 982 msal, Bharatpur, Chitwan in 27.6487°N, 84.4173°E, with 208 msal and Lamahi, Dang lies in 27.8771°N, 82.5727°E, with 250 msal. The climatic condition included from tropical to subtropical type.

Collection of ticks

Randomly 15 cattle (total 45 from three study sites) from each district were selected for the study. Then total ticks in cattle were collected and counted for the study of tick distribution in different geographical region. Similarly, ticks in six different cattle body parts viz. perineum and udder, abdomen, wither, dewlap, tail base, and ear were also counted separately. Ticks were collected and counted manually using a forcep and gloves. Similar procedure was followed in remaining of two study sites. The collected ticks were stored in a sterile container containing 70% ethanol [12,13].

Identification of ticks

Collected ticks were identified according to the guidelines of Hagras et al. [14,15].

Statistical analysis

All the information collected during study including qualitative information were coded and tabulated in Excel sheet. Statistical tools R 4.2.2 were used for the analysis. The recorded data were subjected to analysis of variance (ANOVA) and significant mean differences were separated by Duncan's Multiple Range Test (DMRT) at 0.05 percent level of significance [16].

Results

Number of ticks in different body part of cattle

Table 1 and Figure 1 presented the average number of ticks in different body parts of cattle. As presented in this table and figure

highest numbers of ticks were recorded in dewlap of cattle followed by perineum and udder whereas least in wither in all three districts.

S. N.	Animal body Region	Average number of Ticks in Lamjung	Average number of Ticks in Chitwan	Average number of Ticks in Dang
1	Perineum and Udder	2.00 ab	5.25 b	3.50 a
2	Abdomen	0.50 cd	2.00 cd	1.00 c
3	Wither	0.25 d	0.75 d	0.50 c
4	Dewlap	3.00 a	7.75 a	4.00 a
5	Tail Base	0.75 cd	1.75 cd	1.00 c
6	Ear	1.50 bc	2.25 c	2.25 b
Test of Sign		***	***	***
Grand Mean		1.33	3.29	2.04
LSD		0.93	1.26	0.92
CV		46.77	29.99	29.99
EMS		0.38	0.70	0.37

Table 1: Average number of ticks and mean comparison by DMRT in different body part of cattle in Lamjung, Chitwan and Dang. *Means followed by the same letter in each column are not significantly different by DMRT at <0.05 percent level.

Figure 1 clearly shows that average number of ticks were recorded higher on dewlap (38.61%) followed by perineum and udder (25.10%), ear base (15.06%), tail base (9.07%), abdomen (7.34%) and least in withers (4.83%).

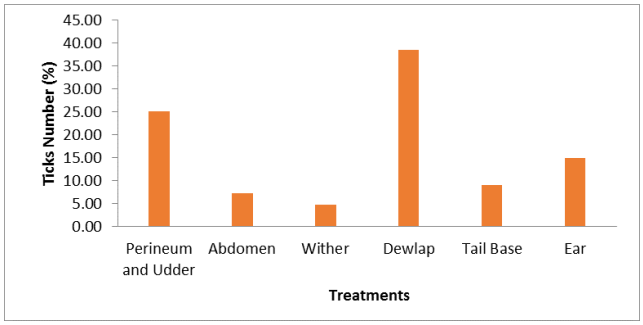

Figure 1: Average number of tick in different body part of cattle in Lamjung, Chitwan and Dang.

Distribution of ticks in different region

Average number of ticks recorded from mid hills to plan of Nepal is presented in Figure 2. As presented in the figure highest average number of ticks were recorded in Chitwan (19.46 average ticks per cattle) cattle followed by Dang (9.13 average ticks per cattle) and least in Lamjung (5.73 average ticks per cattle) cattle.

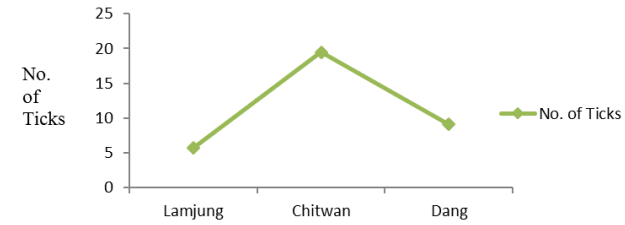

Figure 2: Average number of ticks in Lamjung, Chitwan and Dang.

Relative abundance of tick species

Abundance of different tick species is presented in Table 2. As shown in this table, *Rhipicephalus (Boophilus) microplus* were found highest relative abundance in all three study sites Lamjung (94.19%), Chitwan (95.25%) and Dang (95.62%) followed by *Haemophysalis sp.* Similarly, abundance of Ixodex sp. was also recorded in all three districts as 1.16% in Lamjung, 1.36% in Chitwan and 0.73% in Dang. *Amblyomma sp.* was not found in Lamjung whereas in Chitwan (1.02%) and Dang (0.73%) it was found least abundance as compare to previously presented three tick species.

S. N.	Ticks Species	Relative abundance in Lamjung (%)	Relative abundance in Chitwan (%)	Relative abundance in Dang (%)

1	*Rhipicephalus (Boophilus) microplus*	94.19	95.25	95.62
2	*Haemophysalis sp.*	4.65	2.37	2.92
3	*Ixodes sp.*	1.16	1.36	0.73
4	*Amblyomma sp.*	0.00	1.02	0.73

Table 2: Abundance of tick species in Lamjung, Chitwan and Dang.

Discussion

Present finding on higher number of tick population on dewlap was supported by several previous reports [11]. Garcia also reported higher number of ticks on dewlap (38.7%) followed by perineum and udder (23.87%), ears base (14.19%), tail base (9.03%), abdomen (7.09%) and withers (4.51%). Hasson [17] reported perineum, udder and external genitalia (98%) as the most tick infested sites in cattle followed by dewlap, inner thighs, neck and back, tail, ears, around eyes, flanks and legs in Pakistan. Similarly, it is reported that ticks predilection sites were more prevalent on cattle's udder (41%) [18]. Present finding on higher number of ticks on dewlap followed by perineum and udder was in line with earlier reported cases of high tick infestation in secluded sites with less hair [19,20]. Higher tick infestation on these sites could be due to tick's preference for warm, moist and hidden sites with good vascular supply and thin skin [20].

Higher numbers of ticks were found in Chitwan in present study. In Chitwan cattle were found grazed in jungle and ticks might transmit from wild animals. Kovats [21] reported that pasture spelling and rotational grazing were found effective to reduce the population of one-host ixodid tick *Boophilus microplus* on dairy farms in Australia. Ministry of Agriculture [22] also reported that the habitat modification and pasture management give efficient result for the control of ticks. It is reported that different tick species attach on vegetation and stealthily attach to the cattle passing nearby, Muchenje et al. [23], Muhammad et al. [24] reported as vegetation provides the shade and optimum humidity in during adverse situation. Similarly, sheds of study site of Chitwan was without cemented which contains many cracks and crevices. According to Muchenje et al. [23], cracks and crevices in the buildings were appropriate for the ticks to hide and breed which play important role to increase tick population. Similarly, changes in the climatic situation cause changes in the geographical distribution of ticks [25]. This means that the temperature has strong correlation with tick activities by initiation and termination of host-seeking by individual tick [26,27]. Likewise, the relative humidity, on the other hand, remains an important factor for survival of ticks by regulating the water balance and prevents dehydrations as stated by Hassan [24]. Higher temperature and optimum relative humidity also favour higher number of tick population in Chitwan. These findings supported the present finding of higher prevalence of tick population in Chitwan.

Finally, higher numbers of *Rhipicephalus* (*Boophilus*) *microplus* were also reported by Bohara et al. [11] as in present finding in western parts of Nepal. Similarly, *Rhipicephalus* (*Boophilus*) *microplus* was the main tick species in cattle population in Nigeria, Titus et al. [28], Walker et al. [29] also reported as the more population of *Rhipicephalus* followed by Hyalomma and least *Boophilus* in cattle. In present study *Rhipicephalus* was also recorded as the most abundant tick species.

Conclusion

These results indicate higher tick infestation was in warm, moist, hidden sites with good vascular supply and thin skin in cattle body parts. Similarly, good animal husbandry practices such as regular grooming, appropriate sanitary practices, stall feeding, and raising livestock in cemented stalls etc. seem effective for the management of ticks. Knowledge of these results is important for management of ticks in cattle.

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