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Research Article

Distribution of the cattle ticks from mid hills to plains of Nepal

Bigya Dhital[1*], Sulav Shrestha[2], Krishna Kaphle[3] and Rameshwor Pudasaini[4]

[1]Student (B. V. Sc. and A. H.), Purbanchal University, Nepal
[2]Assistant Professor, Purbanchal University, Nepal
[3]Associate Professor, Tribhuvan University, Nepal
[4]Assistant Professor, Tribhuvan University, Nepal
*Correspondence: nepalvetbigya@gmail.com,
ORCID: https://orcid.org/0000-0003-1479-7172

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ABSTRACT

Ticks cause serious economic losses in livestock production worldwide. A study was conducted in 2017/18 to determine the abundance of tick population on different geographical regions and body parts of cattle. Three study sites were taken from mid hill, inner terai and terai region of Nepal. A total of 45 dairy cattle (15 from each region) were included randomly for the study. Regarding the distribution of ticks 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 ticks on an average) cattle followed by Dang (9.13 ticks on an average) and least in Lamjung (5.73 ticks on an average) 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 tick were recorded in cattle keeping with poor animal husbandry practices.

Keywords: Tick, Cattle, Distribution, Region

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INTRODUCTION

The livestock sector is an important component of the Nepalese economy. Agriculture accounts for 35 percent of the gross domestic product (GDP) and the livestock subsector of agriculture contributes 25.68% of the agricultural GDP (ADS, 2012; MoAD, 2014). Total population of cattle and buffalo in 2071/072 was 72,41,743 and 51,67,737, respectively, which increased to 73,02,808 and 51,68,809 in 2072/073, respectively (MoAD, 2074). Similarly, total milk production was 17,24,823 Mt in 2071/072 and 18,54,247 Mt in 2072/073 (MoAD, 2074).

Ecto-parasite, transmitted several pathogens and zoonotic diseases, is serious problems in livestock industry (Titus and Ribeiro, 1988; Jones *et al*., 1992; Cupp and Cupp, 1997). Among the different ecto-parasites, tick causes serious losses in livestock production in worldwide (Balashov, 1972; Sonenshine, 1991; Gray, 1985). It is reported that about 80% of the world cattle population is infested with ticks (Bowman *et al.,* 1996). Additionally, tick borne diseases are very serious problems in livestock at global level (Jongejan and Uilenberg, 2004). Tick transmitted the several pathogens causing diseases like hemorrhagic fever, ehrlichiosis, anaplasmosis, theileriosis, and babesiosis in animals (Rajput et al., 2006). The global losses due to hard tick infestation is estimated to be US $ 7.0 billion annually (Harrow *et al.,* 1991). Ecto-parasites in ruminant cause serious economic losses through decreased production, weight losses, reducing the milk yield, lowering the quality of skin and hide (Regasa, 2015; Dhital, 2018). Tick infestation diminishes quality of animal skin/hide up to 20-30% (Gharbi *et al*., 2006). Nepal is no different to global scenario when it comes to tick problem in dairy cattle. There is very few study regarding to the ticks distribution in different climatic areas in Nepalese context. Bohara and Shrestha (2016) conducted a study about the tick distribution in western part of Nepal. In a farmer survey of tick problem in different parts of Nepal it is reported tick as a serious problem in livestock production (Dhital, 2018). However, there was no 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 METHOD

Study Site

Three study sites were taken for the study as Sundarbazzar municipality, Lamjung; Bharatpur Metropolitan city, 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 masl. The climatic condition included from tropical to subtropical type.

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Collection of Ticks

To study the tick distribution in cattle body parts an experiment was carried out in Randomized Complete Block Design (RCBD) with ten replications and six treatments. 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 (Fritsche, 2003; Garcia, 2007).

Identification of Ticks

Collected ticks were identified according to the guidelines of Walker *et al*. (2003) and MAFF (1986).

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 0.01 percent level of significance (Gomez & Gomez, 1984).

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.

Table 1. Average number of ticks and mean comparison by DMRT in different body part of cattle in Lamjung, Chitwan and Dang, Nepal, 2017/018*

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
F test		***	***	***
Grand Mean		1.33	3.29	2.04
LSD(0.05)		0.93	1.26	0.92
CV%		46.77	29.99	29.99
EMS		0.38	0.70	0.37

* Means followed by the same letter in each column are not significantly different by DMRT at < 0.01 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%).

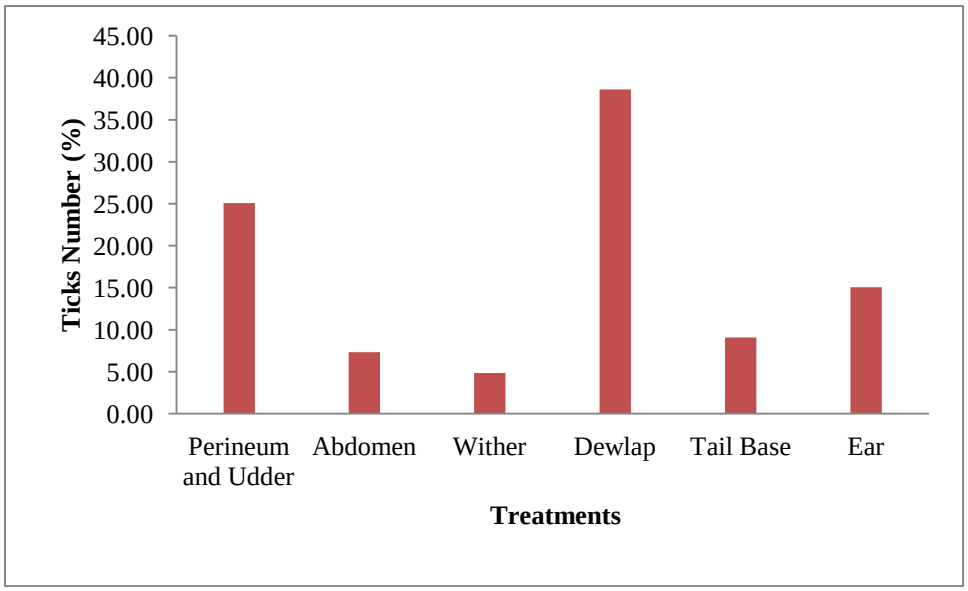

Figure 1. Average number of tick in different body part of cattle in Lamjung, Chitwan and Dang, Nepal, 2017/018

3.2 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.

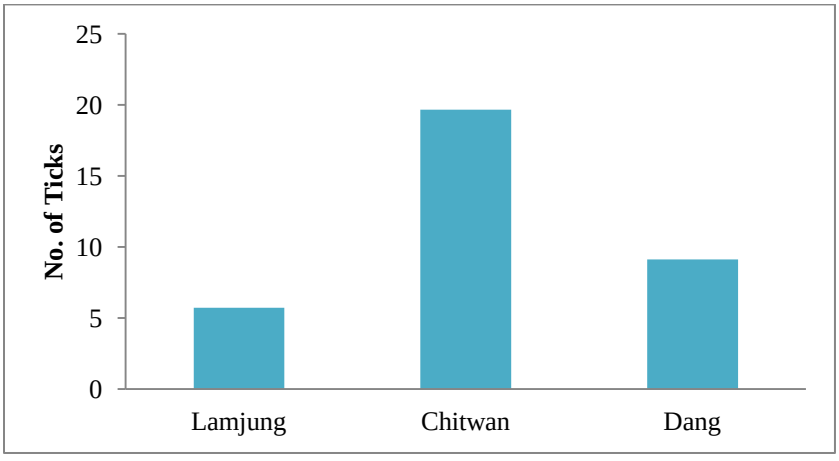

Figure 2. Average number of ticks in Lamjung, Chitwan and Dang, Nepal, 2017/018

3.3 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.

Table 2. Abundance of tick species in Lamjung, Chitwan and Dang, Nepal, 2017/018

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

DISCUSSION

Present finding on higher number of tick population on dewlap was supported by several previous reports. Bohara and Shrestha (2016) 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%). Atif *et al*. (2012) 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%) (Hasson, 2012). 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 (Spickett *et al*., 1989; Muchenje *et al*., 2008). 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 (Muchenje *et al*., 2008).

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. David (2005) 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. Deken *et al*. (2014) 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 (Muhammad *et al*., 2008). Hassan (2003) 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 the Muhammad et al. (2008) 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 (Kovats *et al*., 2001). This means that the temperature has strong correlation with tick activities by initiation and termination of host-seeking by individual tick (Hagras and Khali, 1988; Doube and Kemp, 1979). 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 (2003). 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 and Shrestha (2016) as in present finding in western parts of Nepal. Similarly, *Rhipicephalus* (*Boophilus*) *microplus* was the main tick species in cattle population in Nigeria (Eyo *et al*., 2014). Hasson and Al-Zubaidi (2014) also reported as the more population of *Rhipicephalus* followed by *Hyalomma* and least *Boophilusin* in cattle. In present study *Rhipicephalus* was also recorded as the most abundant tick specie.

CONCLUSION

These results indicate higher tick infestation was in warm, moist, hidden sites with good vascular supply and thin skin. 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. These information are important for management of ticks in cattle.

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Author Contributions

Dr. Krishna Kaphle and Rameshwor Pudasaini designed and performed experiments, and wrote the paper; Dr. Sulav Shrestha wrote the paper.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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