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Prevalence of cattle tick infestation in three villages of Vallabhnagar tehsil of Udaipur district (Rajasthan)

Jitendra Kumar, Hakim Manzer, Vikram Punia and Pradeep Kumar Godwal

Abstract
The present study was conducted to determine the prevalence of tick infestation in cattle from May 2018 to November 2018 in three villages (Vallabhnagar, Ranchorpura and Kikawas) of Vallabhnagar tehsil of Udaipur district in Southern Rajasthan. The prevalence of tick infestation was studied in relation to age, sex, breed, month and season. A total of 552 cattle were examined on random basis, out of which 442 cattle were found infested with ticks. The overall prevalence of tick infestation in cattle was 80.07%. The village wise highest prevalence of ticks was highly significant (P>0.05) in Kikawas (84.34%) followed by Ranchorpura (79.23%) and Vallabhnagar (78.74%) villages. The age wise prevalence of ticks was highest (p>0.05) in above 1 year (82.45%) followed by 7 month to 1 year group (78.16%) and 0 to 6 month age group (73.58%). Sex wise prevalence of tick infestation was found be highly significant (p<0.01) in female cattle (83.37%). Breed wise prevalence was significant (p<0.01) in non-descriptive breed group of cattle (82.81%) compare to exotic group of cattle (75.90%). Month wise tick infestation in cattle was significantly higher (p<0.05) during May month (93.84%) and lower during November month (54.54%). Seasonal prevalence of tick infestation in cattle was found significantly higher (p<0.05) in summer season (88.97%) followed by rainy season (82.45%) and lowest in winter season (67.14%). Identification of ticks revealed *Hyalomma anatolicum anatolicum, Rhipicephalus haemaphysaloides, Rhipicephalus* (*Boophilus*) *annulatus* and *Rhipicephalus* (*Boophilus*) *microplus* species of ticks on the basis of keys of Soulsby, (1982) [13] & Sen and Fletcher, (1962) [12].

Keywords: Ticks, cattle, prevalence

Introduction
India's livestock sector is one of the largest in the world and plays an important role in country's economy. Livestock are highly affected by ecto parasites mainly tick and tick borne diseases which directly affect the socioeconomic development of poor farmers in the area. Ticks are obligate blood feeding ecto-parasites. Ticks are among the most competent and versatile vectors of pathogens and are second to mosquitoes as vectors of a number of human pathogens, like viruses, bacteria, rickettsia, spirochetes, etc, and the most important vector of pathogens affecting cattle worldwide (Peter R. J. *et al.*, 2005) [10]. Ticks and tick borne diseases (TTBD) of cattle pose serious threats on the growth of dairy industry (FAO, 1996) [4] and cause a significant reduction in profit by severe loss in lactation (McLeod and Kristjanson, 1999) [9]. In India, almost all the cattle population suffers from tick infestations and besides adverse effects on growth and production, tick infestation causes 20-30% reduction in the cost of leather due to tick bite marks (Biswas, 2003) [2]. Tick-borne infectious diseases are growing steadily partly due to the establishment of the tick vector in urban areas/new areas and posing serious threat to the world health problem.

Material and Methods
The ticks were collected from three villages (Vallabhnagar, Ranchorpura and Kikawas) of Vallabhnagar tehsil of Udaipur, Rajasthan. The ticks were individually collected as far as possible and particular attention was paid for searching the presence of ticks in the ear, brisket, dewlap, neck, lower abdomen, in between thigh, perineal region, inguinal region, base of tail, around the anus and udder (plate1). Ticks were easily removed by grasping them between finger and thumb and then pulled out them from skin very gently. Some ticks were removed by using forceps and transferred to small boxes with a few small holes allowing air to circulate. Fully engorged adult female ticks were collected from the cattle and also from the ground around them.

Further, few male ticks were also collected from the body of the host for the preparation of permanent slides and morphological identification. Ticks were searched form their hiding places in the sheds particularly cracks and crevices.

Transportation of ticks
Ticks collected in small boxes with a few small holes allowing air to circulate were brought to the laboratory to the Department of Veterinary Parasitology, Navania, Vallabhnagar, Udaipur College.

Mounting of ticks for permanent slide
The ticks were kept in 10 per cent KOH and subsequently heated intermittently to boil for two minutes for liquefying the internal tissues of ticks. For engorged female ticks, the posterior margin of the body was punctured at 3-4 places to ensure effective penetration of KOH. Subsequently, the specimens were removed from KOH and internal liquefied tissues were removed from the body by pressing dorsal surface slowly with the help of a pin head. Dehydration of specimens was done by keeping for at least 10 minutes twice in each 30%, 50%, 70%, 90% and absolute alcohol and then were cleared in cedar wood oil at least for 24 hours and placed in xylene for 1 minute before mounting. The ticks were mounted in Canada balsam mountain on a glass slide.

Identification of ticks
The permanent mounts were examined microscopically and morphological identification of ticks according to keys of Soulsby, (1982) [13] & Sen and Fletcher, (1962) [12].

Statistical Analysis
The prevalence studies were analysed by Chi square test.

Results and Discussion
Overall prevalence of tick infestation in cattle
During 7 month of study period (May, 2018 to November, 2018) in three villages (Vallabhnagar, Ranchorpura and Kikawas) of Vallabhnagar tehsil of Udaipur district in Southern Rajasthan. A total 552 cattle were examined, 254 from Vallabhnagar village, 183 from Ranchorpura village and 115 from Kikawas village respectively. The records were maintained regularly for age (0 to 6 month, 7 month to 1 year and above 1 year of age), breed (exotic and non descriptive cattle), sex (Male and Female), month (May to November), season (summer (May to June), rainy (July to September) and winter (October to November) were observed. Out of a total of 552 cattle examined, 442 (80.07%) cattle were found positive for an overall prevalence for tick infestation. Village wise highest prevalence of ticks was showed in Kikawas (84.34%) followed by Ranchorpura (79.23%) and Vallabhnagar (78.74%) villages (Table. 1). The variability for prevalence of tick infestation in cattle was not found to be significant (P>0.05). Debbarma *et al.,* (2017) [3] observed 41.93% prevalence of hard tick infestations in cattle of West Bengal, India. Kaur *et al.,* (2017) [8] in epidemiological study of ixodid ticks infesting cattle, reared by small holder farmers, found 59.11% overall prevalence from Lucknow, U.P.

Table: 1: Overall prevalence of tick infestation in cattle

Village	Number of cattle Examined	Number of cattle Infested	Infestation percentage
Vallabhnagar	254	200	78.74
Ranchorpura	183	145	79.23
Kikawas	115	97	84.34
Total	552	442	80.07

Age wise prevalence of tick infestation in cattle
The overall highest prevalence of tick infestation was noted in age group of above 1 year 296 (82.45%), followed by 7 month to 1 year group 68 (78.16%) and with 78 (73.58%) in 0 to 6 month age group. In Vallabhnagar village highest prevalence of tick infestation was noted in age group of above 1 year (80.83%) whereas in Ranchorpura village, highest prevalence of ticks infestation was noted in age group of 7 month to 1 year (84.84%). In Kikawas village highest prevalence of tick infestation was noted in age group of above 1 year 64 (87.67%) (Table. 2).

Rony *et al.,* (2010) [11] observed epidemiology of ectoparasitic infestations in cattle at Bhawal Forest Area, Gazipur, among the various age groups. Maximum tick infestation was recorded in older cattle aged >8 years and more (71.11%) followed by adults aged >2 to 8 years (67.74%) and least in young ones aged <_2 years (47.05%). Kabir *et al.,* (2011) [7] is an epidemiological survey on investigation of tick infestation in cattle at Chittagong District, Bangladesh, reported highest age wise prevalence of tick infestation in 1.5 years of age was (46.28%) than in >1.5 years of age group (27.80%).

Table 2: Age wise prevalence of tick infestation in cattle

Village	Age	Number of cattle Examined	Number of cattle infested	Percentage of cattle infested
Vallabhnagar	0-6month	52	40	76.92
	7month-1year	35	25	71.42
	Above1year	167	135	80.83
Ranchorpura	0-6month	31	20	64.51
	7month-1year	33	28	84.84
	Above1year	119	97	81.51
Kikawas	0-6month	23	18	78.26
	7month-1year	19	15	78.94
	Above1year	73	64	87.67
Overall	0-6month	106	78	73.58
	7month-1year	87	68	78.16
	Above1year	359	296	82.45

Sex wise prevalence of tick infestation in cattle

A total of 179 male and 373 female cattle were examined. The overall prevalence of tick infestation was significantly higher (p<0.01) in female cattle (83.37%) compared to male (73.18%). In Vallabhnagar, Ranchorpura and Kikawas village 76.74%, 62.5% and 81.08% male and 79.76%, 86.61% and 85.89% female cattle were infested. The highest prevalence of tick infestation was found in female cattle (Table. 3). The results are in accordance with those of Kabir *et al.,* (2011) [7] who conducted a study on an epidemiological survey on investigation of tick infestation in cattle at Chittagong district, Bangladesh. They reported higher prevalence in females (59.37%) compared to males (35.83%). Bayou and Asegdew, (2017) [1] studied the prevalence and identification of ixodid ticks on cattle in Kimbibit district, North Shoa Zone, Ethiopia and observed higher prevalence in females (44.56%) than males (33.04%). Debbarma *et al.,* (2017) [3] observed prevalence of hard tick infestations in cattle of West Bengal, India and found higher prevalence in females (43.30%) and least in males (35.71%). Higher prevalence rate in females may be is due to hormonal effects. High levels of progesterone and prolactin hormone make the individual more prone to any infection. Female cattle bear higher stress than males due to pregnancy, lactation and production which makes them more prone to tick infestation.

Table 3: Sex wise prevalence of tick infestation in cattle

Village	Sex	Number of cattle Examined	Number of cattle infested	percentage of cattle infested
Vallabhnagar	Male	86	66	76.74
	Female	168	134	79.76
Ranchorpura	Male	56	35	62.5
	Female	127	110	86.61
Kikawas	Male	37	30	81.08
	Female	78	67	85.89
Overall	Male	179	131	73.18
	Female	373	311	83.37

Breed wise prevalence of tick infestation in cattle

Out of 552 cattle, 220 exotic and 332 non descriptive cattle were examined. Overall significantly higher (p<0.01) prevalence of tick infestation was observed in non descriptive breed group of cattle (82.81%) compare to exotic group of cattle (75.90%). In Vallabhnagar village highest prevalence of tick infestation was noted in non descriptive breeds of cattle (82.43%) and least in exotic breeds of cattle (73.58%). In Ranchorpura village highest prevalence of tick infestation was noted in non descriptive breeds of cattle (82.30%) and least in exotic breeds of cattle (74.28%). In Kikawas village highest prevalence of tick infestation was noted in non descriptive breeds of cattle (84.50%) and least in exotic breeds of cattle (84.09%) (Table. 4).

A similar results were found by Bayou and Asegdew, (2017) [1] in their study on prevalence and identification of ixodid ticks on cattle in Kimbibit District, North Shoa Zone, Ethiopia. The highest prevalence was in local breeds (72.37%) and least in exotic breeds (1.3%). Higher prevalence in non-descriptive cattle breeds may be due to differences in management systems, lack of supplementary feeding or lack of control measures against ticks.

Table 4: Breed wise prevalence of tick infestation in cattle

Village	Breed	Number of cattle Examined	Number of cattle infested	percentage of cattle infested
Vallabhnagar	Exotic	106	78	73.58
	Non discriptive	148	122	82.43
Ranchorpura	Exotic	70	52	74.28
	Non discriptive	113	93	82.30
Kikawas	Exotic	44	37	84.09
	Non discriptive	71	60	84.50
Overall	Exotic	220	167	75.90
	Non discriptive	332	275	82.81

Month wise prevalence of tick infestation in cattle

Overall tick infestation in cattle was significantly higher (p<0.05) during May month (93.84%), followed by August month (85.98%), June month (83.87%), September month (82.03%), July month (76%), October month (69.49%), and November month (54.54%) (Table. 5).

Table 5: Month wise prevalence of tick infestation in cattle

Month	Cattle		
	No. of cattle examined	No. of cattle infested	Infestation percentage
May	65	61	93.84
June	62	52	83.87
July	50	38	76.00
August	107	92	85.98
September	128	105	82.03
October	118	82	69.49
November	22	12	54.54

Seasonal prevalence of tick infestation in cattle

Highly significant (p<0.05) prevalence was observed in summer season (88.97%), followed by rainy season (82.45%) and least in winter season (67.14%) (Table. 6). The tick infestation in cattle was observed in following order, Summer > Rainy > Winter.

Haque *et al.,* (2011) [6] in their study on epidemiology and seasonal dynamics of ixodid ticks of dairy animals of Punjab state, India, found that seasonal prevalence more in summer season (23.1%), followed by monsoon season (21%) and less in winter season (6.10%). Kabir *et al.,* (2011) [7] in epidemiological survey on investigation of tick infestation in cattle at Chittagong District, Bangladesh, found prevalence of tick infestation in cattle higher in summer (41.66%) than winter season (31.5%). Fatma *et al.,* (2016) [5] found highest prevalence during summer season (40.8%) than in winter season (19.2%). The higher ticks intensity is justifiable with progressing summer season that make propagation of ticks suitable because of warm environment.

Table 6: Season wise prevalence of tick infestation in cattle

Season	No. of cattle examined	No. of cattle infested	Infestation percentage
Summer (May- June)	127	113	88.97
Rainy (July-September)	285	235	82.45
Winter (October-November)	140	94	67.14
Total	552	442	80.07

Identification of ticks

The ticks were identified on the basis of the morphological characters of gross specimens and permanent slides of the specimens as per the keys described by Sen and Fletcher, (1962) [12] and Soulsby, (1982) [13]. The ticks were identified as *Hyalomma anatolicum anatolicum*, *Rhipicephalus haemaphysaloides*, *Rhipicephalus* (*Boophilus*) *annulatus* and *Rhipicephalus* (*Boophilus*) *microplus* on the basis of these keys. *R.* (*B.*) *microplus* is a member of the family Ixodidae (hard ticks). This tick was previously known as *Boophilus microplus*; however, *Boophilus* has recently become a subgenus of the genus *Rhipicephalus.*

During the present investigation four species of ticks were found, *Hyalomma anatolicum anatolicum, Rhipicephalus haemaphysaloides, Boophilus annulatus* and *Boophilus microplus* in cattle. Singh and Rath, (2013) in epidemiology of ixodid ticks in cattle population of various agroclimatic zones of Punjab, India, recorded overall prevalence of ixodid ticks, *Boophilus microplus, Hyalomma anatolicum anatolicum* and mixed infestation. Admassu *et al.,* (2015) in prevalence and identification of major ixodid tick genera of cattle in Dangila District, Awi Zone, North West Ethiopia, found *Amblyomma, Boophilus, Rhipicephalus* and *Hyalomma* were identified and account for 37.5%, 25%, 23.1% and 14.4% respectively.

Plate 1: Cattle infested with ticks

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