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Prevalence of Tick Infestation and Theileriosis in Sheep and Goats

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ABSTRACT

The present study was carried out to determine the prevalence of tick infestation and theileriosis in small ruminants maintained at National Agricultural Research Centre (NARC) Islamabad and Barani Livestock Production Research Institute (BLPRI) Kherimurat district Attock, Pakistan. A total of 662 animals (219 sheep and 443 goats) were screened for the presence of ticks. Of these, 95(43.37%) sheep and 184(41.53%) goats were found infested with different species of ticks. The difference in prevalence of ticks between two farms in sheep and goats (combined) was statistically significant ($P \leq 0.01$). Difference in the prevalence during different months of study at NARC was non significant ($\chi^2=0.95596$), whereas at BLPRI this difference was significant ($P \leq 0.01$). Ticks were identified on the basis of their morphological features. *Rhipicephalus* spp was found to be the most abundant tick infesting both in sheep and goats. Prevalence of theileriosis in sheep was 7.36% (7/95), while in goats it was 3.8% (7/184), the difference being statistically non significant ($\chi^2=0.6427$).

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INTRODUCTION

Sheep and goats maintain a valuable economic and ecological niche in Asian agriculture (Devendra, 1996). Majority of the livestock owners earn their livelihood through sale of surplus animals and their by-products. There are several factors affecting the production potential of livestock. Among these, parasitic infestations are widespread, affecting different livestock species throughout the world. These cause considerable economic losses in terms of low productivity and mortality in small ruminants.

Tick infestations not only lower the production of animals but also transmit a number of important protozoa (Gray and Potgieter, 1982). Ticks belonging to family Ixodidae transmit a wide variety of pathogens to vertebrates ranging from viruses to helminths (Fuente *et al*., 2008). These diseases are mostly confined to tropical and subtropical countries especially India, Pakistan and Bangladesh, where climatic conditions are conducive for the growth and development of many tick species (Gosh *et al*., 2007). In these countries, situation is further deteriorated due to lack of proper management practices (Perry *et al*., 2002).

Theileriosis is one of the widespread protozoan infections transmitted by ticks of family Ixodidae. It is characterized by severe morbidity and mortality and thus poses a serious risk to livestock production on worldwide basis. It is especially threatening to exotic cattle and their crosses (Gamal and El-Hussein, 2003).

The present investigation was planned to find out the prevalence of ticks and theileriosis in tick infested sheep and goats maintained at two state owned livestock farms, located in the Potohar region of Pakistan.

MATERIALS AND METHODS

This study was conducted at two different livestock farms located in the Potohar region, namely Barani Livestock Production Research Institute (BLPRI) Kherimurat, District Attock and National Agricultural Research centre (NARC), Islamabad, Pakistan. Animals at NARC were examined during the winter season (October and November, 2009), while study at BLPRI was conducted from February 2009 to July 2009. A total of 662 animals (219 sheep and 443 goats) were examined for tick infestation. Whole body of each animal was searched thoroughly for the presence of ticks. Tick samples were collected with the help of forceps without damaging their body parts and preserved in 70% alcohol.

The collected specimens were rinsed in distilled water to make them free from the preservative and boiled in 10% potassium hydroxide (KOH) solution for 30

minutes to remove excess of chitin. Cleared specimens were treated with 10% glacial acetic acid for 5 minutes to remove the traces of KOH, washed with distilled water and stained with 10% acid fuchsine for 2 minutes. Then these were again washed to remove excessive stain. Stained specimens were dehydrated through different percentages of ethyl alcohol i.e. 30, 50, 70, 80, 90% and absolute alcohol. Specimen were cleared in clove oil and mounted in Canada balsam on glass slide. Ticks were morphologically examined under the stereomicroscope and identified following Soulsby (1982).

Blood samples from 279 animals infested with ticks (95 sheep and 184 goats) were collected directly from jugular vein in sterile tubes containing ethylenediamide tetra acetic acid (EDTA) from November, 2008 to July, 2009. Thin blood smears were prepared, air dried, fixed in absolute methanol for 10 minutes and stained with Giemsa stain. These slides were examined under light microscope for presence of theileria organism. The Chi-square method was used to determine magnitude of differences in different variables among different groups.

RESULTS AND DISCUSSION

In the present study, the overall prevalence of ticks was recorded as 43.37 and 41.53% in sheep and goats, respectively (Table 1). At NARC, 10.03% sheep (5/50) and 8.6% (5/58) goats were found infested with different species of ticks. The respective values were 53.25% (90/169) and 46.49% (179/385) at BLPRI, Kherimurat (Table 1). When compared within two farms by combining sheep and goats at both the farms, the results showed significant difference (P≤ 0.01) in prevalence between the two farms. This difference in prevalence at both farms may be due to the fact that animals at NARC were examined during the winter season (October and November, 2009), while study at BLPRI was conducted from February 2009 to July 2009. Hot and humid season favors the propagation and multiplication of ticks (Soulsby, 1982).

Prevalence of ticks was higher during the summer season (May-July, 2009) at BLPRI (Table 2). When compared between different months of study period, the difference in prevalence in sheep at NARC was non significant, whereas it was statistically significant (P≤0.01) in goats. No difference in prevalence in sheep may be due to small number of animals examined during only two months. At BLPRI, difference in prevalence during different months of study in sheep and goat was significant (P≤0.01). These results are in agreement with the findings of Sayin *et al.* (2003), who reported that tick infestation started in spring and reached its highest peak level in July. The variation in tick prevalence in different areas can be attributed to a variety of factors like geo-climatic conditions, association and life style of different species of animals, awareness/ education of the farmers and farm managemental practices (Khan *et al*., 1993). The high prevalence rate during the hot months (May-July) at BLPRI may be attributed to hot and humid season prevalent during these months as ticks infestation is influenced by temperature, rainfall and relative humidity (Gosh *et al*., 2007).

Table 1: Prevalence of ticks in small ruminants of NARC Islamabad and BLPRI Kherimurat district Attock, Pakistan

Station	No. of sheep		No. of goats		Total No. of sheep and goats	
	Examined	Infested (%)	Examined	Infested (%)	Examined	Infested (%)
NARC	50	5 (10.03)	58	5 (8.6)	108	10 (9.26)
BLPRI, Kherimurat	169	90 (53.25)	385	179 (46.49)	554	269 (48.56)
Total	219	95 (43.37)	443	184 (41.53)	662	279 (42.15)

The difference in prevalence of ticks between two farms in sheep and goats (combined) was significant (P<0.01).

Table 2: Seasonal prevalence of ticks in sheep and goats maintained at NARC, Islamabad and BLPRI Kherimurat district Attock, Pakistan

Months	NARC, Islamabad				BLPRI Kherimurat district Attock			
	No. of Sheep		No. of Goats		No. of Sheep		No. of Goats	
	Examined	Infested (%)	Examined	Infested (%)	Examined	Infested (%)	Examined	Infested (%)
October	-	-	30	2 (6.66)	-	-	-	-
November	10	2 (20.00)	28	3 (10.71)	-	-	-	-
January	40	3 (7.5)	-	-	-	-	-	-
February	-	-	-	-	-	-	66	8 (12.12)
March	-	-	-	-	-	-	58	17 (29.31)
April	-	-	-	-	-	-	90	24 (26.66)
May	-	-	-	-	-	-	75	49 (65.33)
June	-	-	-	-	59	23 (38.98)	68	56 (82.35)
July	-	-	-	-	110	67 (60.90)	28	25 (89.28)
Total	50	5 (10.00)	58	5 (8.62)	169	90 (53.25)	385	179 (46.49)

Prevalence of ticks during different months of study at NARC was non significant (χ^2=0.95596), whereas at BLPRI this difference was significant (P≤0.01).

Ticks collected from experimental sheep and goats belonged to four genera. In goats, these were *Rhipicephalus spp* (73.36%), *Haemaphysalis* spp (23.36%), *Ixodes spp* (2.17%) and *Ambylomma* spp (1.08%; Table 3). In case of sheep, two genera were recorded; *Rhipicephalus* spp (73.68%) and *Haemaphysalis* spp (26.31%; Table 3). Sajid *et al.* (2008) reported prevalence of *Hyalomma anatolicum* to be 42.7% and that of *Rhipicephalus* spp. to be 37.6% in goats. Khan *et al*. (1993) also recorded the highest prevalence of *Hyalomma anatolicum* (15%), followed by *Rhipicephalus sanguineous* (4%) and *Boophilus microplus* (3.3%) in sheep in Faisalabad. The respective values in goats were 8.3, 2.7 and 5.4%. This difference in prevalence rate might be due to variation in the climatic conditions and temperature between Faisalabad division and Potohar region.

Table 3: Percentage of different tick species collected from sheep and goat maintained at NARC Islamabad and BLPRI Kherimurat

Ticks species identified	No. of animals infested	
	Sheep	Goat
Rhipicephalus spp	70(73.68%)	135(73.36%)
Heamaphysalis spp	25(26.31%)	43(23.36%)
Ixodes spp	-	4(2.17%)
Ambylomma spp	-	2(1.08%)
Total	95	184

Maximum number of ticks were seen in ears (78.50%), followed by the underside of the tail (13.98%) of their hosts, while least number of ticks were found on the hind legs (4.65%) and udder (2.87%) of the animals. It showed that ticks have a common preferred site of attachment on their host animals that might be due to easiness for ticks to acquire blood for nourishment. Rehman *et al*. (2004) also reported that ticks preferred to reside and feed on ears rather than other parts of the body of the host. This might be attributed to the fact that the attachment of tick is dependent on the temperature and the thickness of the skin of the animal (Feldman and Borut, 1983).

A total of 14 blood smears (7 in sheep and 7 in goats) had *Theileria piroplasms*. Prevalence in sheep was 7.36% (7/95), while in goats it was 3.8% (7/184). The difference in prevalence in both the species was statistically non significant (χ^2=0.6427). Razmi *et al*. (2006) reported 11.90% prevalence of theileriosis in sheep in Iran. Altay *et al*. (2007) reported 18.29% sheep and 2.88% goats to be infested with theileriosis in Turkey. Climatic conditions dictate the dynamics of tick borne diseases by affecting the distribution of ticks and their seasonal occurrence (Ahmed *et al*., 2007). Low prevalence of theileriosis in the present study might be due to geo-climatic conditions prevailing during the study period at these places. However, microscopic examination alone is not a fully reliable method of its diagnosis. It may be coupled with other sero and molecular diagnostic assays. Further studies are suggested to determine the exact magnitude of the problem in large population of small ruminants in Pakistan.

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