

## Prevalence of ixodid ticks on cattle in Mazandaran province, Iran

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**Abstract:** A survey was carried out to investigate the prevalence of hard tick species (Acari: Ixodidae) on cattle in Mazandaran province, Iran. A total of 953 ticks were collected from 86 infested cattle during activating seasons of ticks during 2004-2005. Nine species were identified: *Boophilus annulatus* (51.3%), *Rhipicephalus bursa* (16.8%), *Haemaphysalis punctata* (6.3%), *Ixodes ricinus* (6.8%), *Hyalomma marginatum* (12.5%), *Hyalomma anatolicum excavatum* (5.2%), *Hyalomma asiaticum* (0.6%), *Hyalomma detritum* (0.2 %), and *Dermacentor* spp. (0.1%). The results show that *Boophilus annulatus*, *Rhipicephalus bursa*, and *Hyalomma* species are dominant tick species in the surveyed area.

**Key words:** *Boophilus*, *Rhipicephalus*, *Hyalomma*, *Ixodes*, *Dermacenter*, prevalence, ixodid tick, cattle, Mazandaran province, Iran

Ticks are hematophagous arthropods belonging to the Class Arachnids. Once they attach to a host for a blood meal, they can cause skin irritation and anemia. Ticks are also one of the major vectors of pathogens, such as *Babesia*, *Theileria*, and *Anaplasma* spp., to animals in the world (Soulsby, 1982; Morel, 1989). It is important to know the prevalence of the tick species involved on the transmission as well as their geographical distribution for the control of tick and tick-borne diseases (TBDs). Among the provinces of Iran, Mazandaran province has a special climate, with its abundant superficial water resources, which it is favorable to agriculture and animal husbandry. Many of cattle graze in the pastures and forests, and the probability for them to be exposed to tick infestation is increasing. However, so far, only a few studies were done about the tick fauna in different hosts in Iran

(Abbasian, 1961; Mazlum, 1971; Rahbari, 1995; Razavi and Seifi, 2006; Nabian et al., 2007), and little information is available about the frequency of ixodid tick species in cattle in Mazandaran province. The aim of this study is to determine the frequency of tick infestation in cattle of Mazandaran province, Iran. In addition, special attention was given to the effect of climate condition on the distribution of different tick species in eastern and western areas of this Province.

Mazandaran province is with an area of about 460,456 km<sup>2</sup>, at the proximity of the Caspian Sea on the north and Alborz Mountain on the south (Fig. 1). The province enjoys a moderate, semitropical climate with an average temperature of 25°C in summer and about 8°C in winter. The province also enjoys a quasi-Mediterranean climate, and the annual rainfall averages 650 mm in the eastern part of Mazandaran province and more than 1,300 mm in the western part. For its abundant superficial water resources, it is favorable for agriculture and animal husbandry. A

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Fig. 1. Locality where the fields work was carried out (Mazandaran province).

considerable area of this province is used for rice culture. Once the rice is harvested, many of the fields are used for raising sheep, cattle, and buffaloes. Permanent open pastures and forests are used independently by owners to feed their animals. Official estimates for the year 2002 listed 2,106,300 sheep, 232,700 goats, 7,500 buffaloes, 21,800 horses, and 886,800 cattle, the latter including 69.7% of the domestic race (a special breed typical of Mazandaran), 25.2% mixed breeds, and 5% Holstein (Iranian Veterinary Organization, unpublished data).

During the spring and summer of 2004-2005, the tick samples were collected from infested cattle that grazed in the eastern and western areas in Mazandaran province. After collection, tick samples were separately stored in 70% ethanol, labeled with the date and the name of the field until the species determination. Adult ticks were identified under a stereomicroscope, according to general identification keys (Hoogstraal, 1956; Walker et al., 2003; Estrada-Pena et al., 2004).

A total of 873 ticks were collected from the 86 heads of cattle. The tick fauna was composed of 7 species (Table 1). The most frequent and abundant tick species in western parts of Mazandaran province were *Boophilus annulatus*, *Rhipicephalus bursa*, and

Table 1. The prevalence of tick species in dairy cattle of Mazandaran province, Iran

Tick species	Male	Female	Nymph	Total	%
<i>Boophilus annulatus</i>	33	313	102	448	51.3
<i>Rhipicephalus bursa</i>	85	62	-	147	16.8
<i>Haemaphysalis punctata</i>	15	40	-	55	6.3
<i>Ixodes ricinus</i>	8	52	-	60	6.8
<i>Hyalomma marginatum</i>	51	58	-	109	12.5
<i>Hyalomma anatolicum excavatum</i>	20	26	-	46	5.2
<i>Hyalomma asiaticum</i>	2	3	-	5	0.6
<i>Hyalomma detritum</i>	1	1	-	2	0.2
<i>Dermacentor</i> spp.	0	1	-	1	0.1
Total	215	556	102	873	100

Table 2. Comparison of the prevalence of different ixodid tick species in the western and eastern parts of Mazandaran province, Iran

Tick species	Western part		Eastern part	
	No. collected	%	No. collected	%
<i>Boophilus annulatus</i>	445	64.7	3	1.6
<i>Rhipicephalus bursa</i>	143	20.8	4	2.1
<i>Haemaphysalis punctata</i>	55	8	0	0
<i>Ixodes ricinus</i>	27	3.9	33	17.7
<i>Hyalomma marginatum</i>	14	2	95	51
<i>Hyalomma anatolicum excavatum</i>	0	0	46	24.7
<i>Hyalomma asiaticum</i>	0	0	5	2.6
<i>Hyalomma detritum</i>	2	0.2	0	0
<i>Dermacentor</i> spp.	1	0.14	0	0
Total	687	100	186	100

*Haemaphysalis punctata*, whereas in eastern parts were *Hyalomma marginatum*, *Hyalomma anatolicum excavatum*, and *Ixodes ricinus* (Table 2).

In the present study, the highest prevalence of *B. annulatus* was observed in the western area of Mazandaran province. This finding is in agreement with the observation made by Razavi and Seifi (2006). Also, Nabian et al. (2007) reported the highest prevalence of *B. annulatus* in Giluan province near regions to the western area of Mazandaran province. The variation in the prevalence of western and eastern areas may be due to climatic factors, since the western areas are more forest regions and the annual rainfall aver-

ages more than the eastern areas. The prevalence of *R. bursa* (16.8%) in the present study is along with the results of the study by Razavi and Seifi (2006). Contrary to our finding, Nabian et al. (2007) found only *Rhipicephalus sanguineus* with a high prevalence in the sheep of Mazandaran province. Mazlum (1971) showed that *R. bursa* is the dominant tick in the north areas of Iran and *R. sanguineus* in the south west of Iran. Three reasons may account for this discrepancy. First, cattle in contrast to sheep are an unsuitable host for *R. sanguineus*. Second, the origin of the collected ticks in sheep by Nabian et al. (2007) may be from neighboring province, such as Khorasan province with a high prevalence of *R. sanguineus* in sheep and goats (Razmi et al., 2002, 2003). Third, climatic changes that occurred after a long time may have resulted to modify the distribution and abundance of ticks and caused a heavy spread of tick species with strong adaptability, such as *R. sanguineus*.

*Ixodes ricinus* is one of the species found only in regions of Caspian Sea zone (Mazlum, 1971). The prevalence of *I. ricinus* was similar to the finding of Razvi and Seifi (2006) and was higher than the results of Nabian et al. (2007). So far, several *Haemaphysalis* species were collected from different hosts in Mazandaran province (Mazlum, 1971; Rahbahri et al., 2007), but we observed only *H. punctata* in cattle. In a recent study, the prevalence of this species was higher than other species in Caspian Sea zone (Rahbari et al., 2007). Among the 4 *Hyalomma* tick species found in this study, *H. marginatum* and *H. anatolicum excavatum* were those abundant in the eastern and western areas, respectively. Mazlum (1971) reported all of these *Hyalomma* species, excluding *H. asiaticum*, in Mazandaran province. It seems that *H. asiaticum* was observed for the first time in cattle of this area. Nabian et al. (2007) observed only *H. anatolicum* and *H. detritum* with low prevalences in Mazandaran province. Two species of *Dermacentor*, i.e., *D. marginatus* and *D. daghestanicus*, were reported from this province in the last time (Mazlum, 1971). However, only one female tick was collected in the present study, and we could not identify the species. Based on the results, it is concluded that *B. annulatus*, *R. bursa*, and *H. marginatum*

are dominant tick species in dairy cattle of Mazandaran province, and should be done more studies about the role of these species in transmission of blood parasites.

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