Study of the Prevalence of Ixodid Ticks in Tashkent Region

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Abstract. The article presents information about the important role of animal husbandry-one of the main branches of agriculture-in ensuring the food security of our country and meeting the population's needs for milk and dairy products, meat and meat products. It also emphasizes that breeding highly productive cattle breeds is one of the priority directions in the development of the livestock sector. In connection with the rapid development of animal husbandry, the article provides information on measures aimed at ensuring rural employment, preventing unemployment, reducing poverty, and increasing the income of the population. Furthermore, numerous data indicate that ixodid ticks are the main carriers and reservoirs of piroplasmosis infection in nature and cause significant economic damage to the livestock industry. They also pose a threat to humans as vectors of transmissible diseases. When attacking cattle, ixodid ticks inject toxic substances into the organism, leading to pathological conditions such as a decrease in body temperature, weakness, anemia, depression, lack of response to external stimuli, thickening of damaged skin areas, occasional formation of purulent wounds, and heart failure.

Keywords: Tick, larva, nymph, imago, livestock, piroplasmosis, ectoparasite, infection, reservoir, transmissible

1 Introduction

Animal husbandry, as a major branch of agriculture, plays a leading role in meeting the population's needs and ensuring food security in our country. One of the key issues in the sector is the increase in the number of highly productive cows, the production of ecologically clean milk and dairy products, as well as meat and meat products. In various farms across the Republic, there are more than 14 million heads of cattle.
Extensive work is being carried out to accelerate the development of livestock

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production, to provide the population with high-quality meat, milk, and other food products, to increase employment among rural residents, prevent unemployment, reduce poverty, and raise incomes. However, the implementation of these tasks is affected by factors such as the decline in livestock productivity, the reduction in milk yield of dairy cows, the disruption of technological processes, and the increase in production costs.

The development of dairy and meat cattle breeding is hindered by various infectious, invasive, and parasitic diseases. In this regard, the prevention and control of these diseases, as well as the study of the biology, ecology, distribution, and species composition of ixodid ticks—the main vectors of infections in the Tashkent region—are considered among the main priorities and objectives of current research.

2 Materials and methods

In nature, ixodid ticks serve as the main carriers and reservoirs of the pathogens causing piroplasmosis infections, resulting in significant economic losses in the field of livestock farming [2].

In addition, ticks, as vectors of transmissible diseases, pose a serious threat to humans, transmitting viral, rickettsial, bacterial, and other infections [6]. When ixodid ticks infest cattle, toxins enter the animal's body, causing clinical symptoms such as decreased body temperature, weakness, anemia, depression, lack of response to external stimuli, thickening of the affected skin areas, sometimes purulent inflammation, and weakened heartbeat, among others [3,5].

The number of arthropods on a single animal can reach several thousand or even more individuals, and these ectoparasites mainly attack young livestock.

In the Tashkent region, ectoparasites are widespread in humid areas, along riverbanks, in foothills, as well as in semi-desert, rainfed, and irrigated zones, where more than 33 species of ticks are known to inhabit [5]. The density of ixodid ticks in this region is extremely high, with approximately 500 to 1,500 individuals found on a single head of cattle.

As a result, there is a sharp decline in milk and meat productivity, as well as deterioration in the commercial quality of raw hides [1]. Studies on the distribution and species composition of ixodid ticks in Uzbekistan have identified more than 40 species and subspecies of ixodid ticks parasitizing cattle [5,4].

3 Results

In this regard, special attention should be paid to the fauna, ecology, biology, development, and distribution of ticks. Such research allows for forecasting and implementing a comprehensive set of measures aimed at preventing infectious, invasive, and parasitic diseases.

The affected areas of ixodid tick infestation on cattle bodies in the foothill zones of the Tashkent region have been determined based on the author's research conducted during 2023–2024.

Table 1. Sites of Ixodid Tick Detection and Species Composition of Tick Vectors1

Sites of Tick Detection	**Species composition of tick vectors**			
	B. calcaratus	*H. anatolicum*	*H.detritum*	*H. marginatum* Koch, 1844
Forelimb region	N	L	+	+
Perineal and lateral regions	L	+	+	L
Chest and ventral areas	N	L	+	L+
Tail	N	+	L+	+
Subcaudal region	+	+	+	+

Note: N – nymph stage; L – larva stage; "+" indicates the presence of the species.

Optimal Sites of Ixodid Tick Localization (Imago, Larvae, and Nymphs) on Animal Bodies The optimal sites for the localization of ixodid ticks (imago, larvae, and nymphs) on the animal body were the forelimb region, perineal and lateral areas, chest and ventral regions, as well as the tail and subcaudal areas.

According to the conducted research, tick larvae and nymphs attached themselves to the anterior part of the cattle's body—from the head to the shoulders—while the adult stage (imago) was mainly localized on the forelimb areas.

Considering that many factors of the epizootic process in bovine piroplasmosis are closely related to the vectors of the disease, it was deemed necessary to study certain aspects of the parasitism of ixodid ticks (*H. anatolicum*, *H. detritum*, *H. marginatum*, and *B. calcaratus*), which are known carriers of piroplasmosis and were predominantly recorded in the examined animals.

The study of age-related dynamics of cattle infestation with ixodid ticks revealed that animals of all age groups were affected. However, the degree of infestation varied significantly among different age groups. It was noted that young animals were more heavily infested than adult cows.

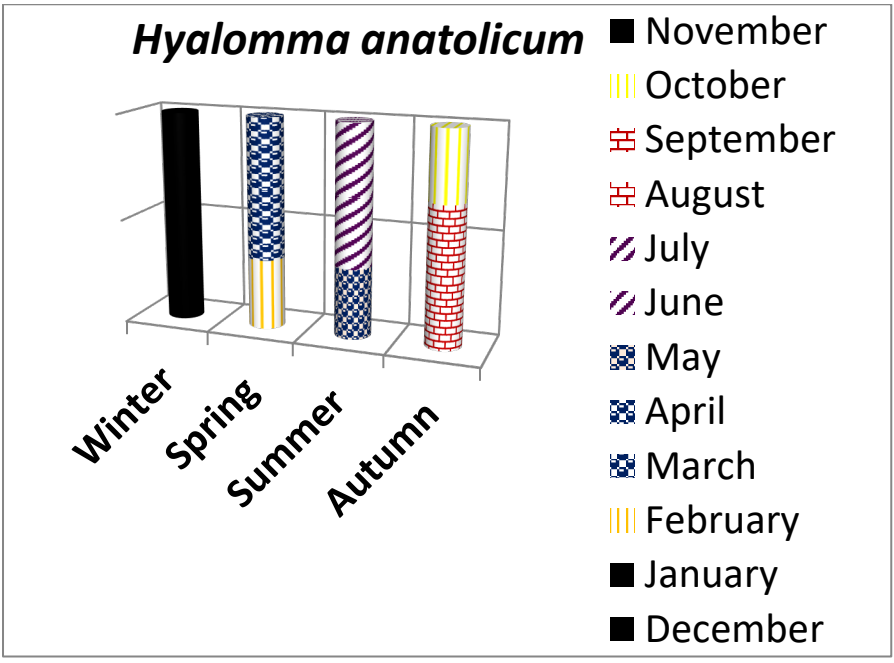
Thus, the highest infestation rate by ixodid ticks was observed in cattle aged 1–3 years. It was also found that as the animals aged, the degree of infestation decreased, which is

presumably due to the development of age-related resistance and the thickening of the skin in older animals, reducing the ticks' ability to feed.

Based on monthly examinations of 120–140 head of cattle, it was established that animals were infested with ixodid ticks throughout the year. The high population density of ixodid ticks on cattle was associated with the mass infestation of adult ticks (imago) during favorable climatic conditions. During July and August, with the onset of hot weather, the number of ticks decreased, but starting from late August their numbers rose again, peaking in October. In the following months, the infestation rate significantly declined, remaining at a low level during the winter period.

An analysis of 500 cows and 116 bulls for ixodid tick infestation showed no significant difference in infestation rates among different breeds, indicating only minor variations in susceptibility among the cattle populations.

Cows kept under pasture-camp conditions were found to have the highest infestation rates. The extensiveness of infestation was 29.39%, with an intensity of 10.16 ± 0.86 specimens per animal and an abundance index of 2.98 specimens. Slightly lower infestation levels were recorded in cattle kept under pasture-stall conditions, with an extensiveness of 28.0%, an intensity of 9.12 ± 0.83 specimens per animal, and an abundance index of 2.55 specimens. The difference in infestation rates between the two management systems (pasture-camp and pasture-stall) was found to be statistically insignificant.



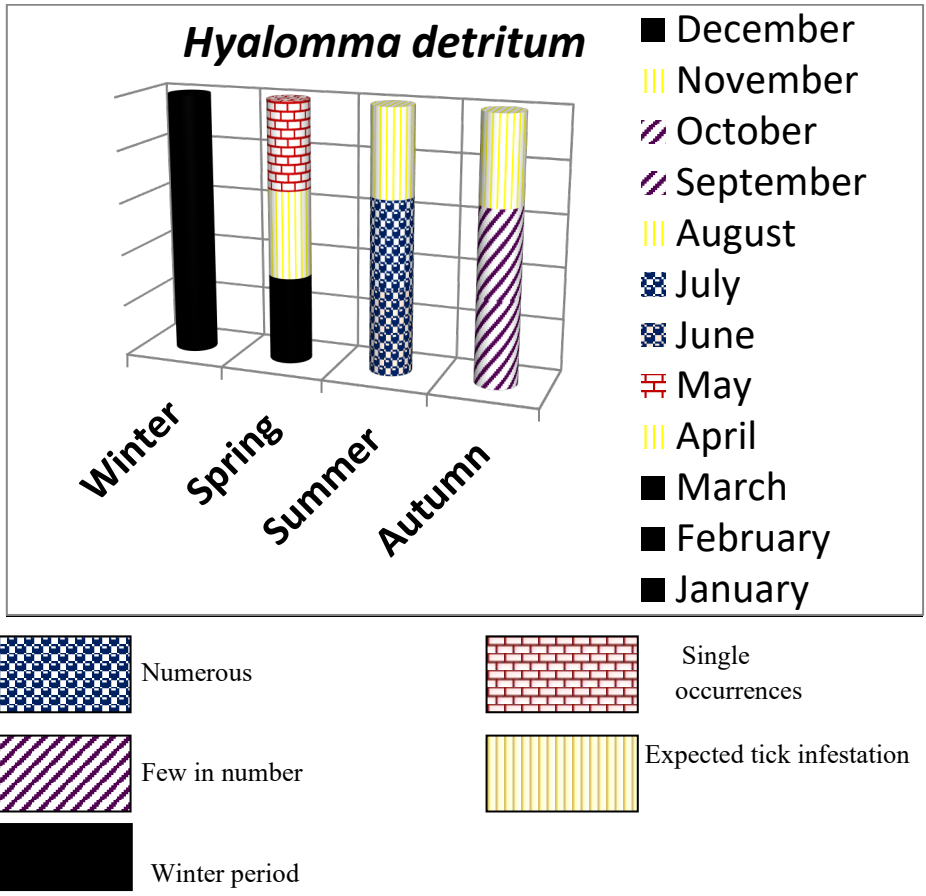


Fig 1. Periods of cattle infestation with dominant tick vectors

Cattle kept under stall conditions throughout the year were almost free from ixodid ticks, with only single specimens found in 1.65% of the examined animals. In these cases, the tick infestation intensity was 1.42 ± 0.10 specimens per animal, with an abundance index of 0.02 specimens. The infestation rates of cattle under stall management were significantly lower ($P < 0.05$), suggesting that this method of animal keeping can be recommended as an effective preventive measure against ixodid infestations.

The study revealed a significant variation in the age composition of ixodid ticks collected from cattle at different times of the year. From January to March, only adult ixodid ticks were detected, and in small numbers, affecting 2.2–6.1% of the animals. With the onset of spring, cattle infestation by adult ticks increased, reaching 28.68% in April and 65.07% in May. In June, infestation with adult ticks was 43.75%. During the hot season (July–August), infestation decreased to 23.01%, but in September—and especially in October—a secondary increase was recorded, reaching 48.48%. From November, infestation rates declined to 19.68%, and by December to 4.61%.

The periods of cattle infestation by ticks showed that the highest number of ixodid larvae on cattle was observed in May–June and October. Single larvae began to appear in April. From December to April, no larvae were found on the animals.
Ixodid tick nymphs parasitized cattle from May to December, with population peaks recorded in June–July and October–November.
We also studied the distribution of ixodid ticks and the infestation rates of cattle across various ecological zones of the Tashkent region—plain, foothill, irrigated, mountainous, and rainfed areas. Examination of 50 head of cattle revealed that ixodid ticks were found on 100% of the animals (Table 2).

Table 2. Distribution of ixodid ticks on cattle across different terrains of the Tashkent region

Relief types	Number of examined animals	Infested animals	
		heads	%
Plain	50	50	100%
Foothill	-//-	-//-	-//-
Irrigated	-//-	-//-	-//-
Rainfed	-//-	-//-	-//-
Mountainous	-//-	-//-	-//-

4 Conclusion

By studying the fauna of ixodid ticks in cattle from several farms in the above-mentioned zones of the Tashkent region, a high level of infestation was revealed, with some animals being almost completely covered with ticks. Up to 525 imaginal specimens of *Hyalomma anatolicum* Koch, 1844 were found on a single animal. According to the data obtained in 2024, a total of 12 species of ticks belonging to the family *Ixodidae* and 6 genera were identified: *Boophilus* (*B. calcaratus*), *Dermacentor* (*D. marginatus* Sulzer, 1776), *Hyalomma* (*H. marginatum* Koch, 1844; *H. anatolicum* Koch, 1844; *H. scupense* Schulze, 1918), *Rhipicephalus* (*Rh. rossicus* Jakimov and Kohl-Jakimova, 1911; *Rh. bursa* Canestrini and Fanzago, 1878; *Rh. sanguineus* Latreille, 1806; *Rh. turanicus* Pomerantzev, 1940), *Ixodes* (*I. ricinus* Linnaeus, 1758), and *Haemaphysalis* (*H. punctata* Canestrini and Fanzago, 1877; *H. otophila*).

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

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