Comparative assessment of the species composition of *Ixodes ricinus* and *Dermacentor reticulatus* removed from dogs in the urban area of Olsztyn (years 2009–2020)

Mirosław Mariusz Michalski[1], Rajmund Sokół[1], Małgorzata Dmitryjuk[2]

[1]Department of Parasitology and Invasive Diseases, Faculty of Veterinary Medicine, University of Warmia and Mazury in Olsztyn, Oczapowskiego 13, 10-719 Olsztyn, Poland
[2]Department of Biochemistry, Faculty of Biology and Biotechnology, University of Warmia and Mazury in Olsztyn, Oczapowskiego 1A, 10-719 Olsztyn, Poland

Corresponding author: Mirosław M. Michalski; e-mail: michmm@uwm.edu.pl

Representatives of hard ticks (Ixodidae) are still an important medical problem in the epidemiological and epizootiological aspect. In Poland there are 21 species of ticks from the order Ixodida recognized as permanent elements of Polish fauna and a few species appearing occasionally. The most widespread species in the country is, *Ixodes ricinus* (syn. european castor bean tick). The less common species is meadow tick, *Dermacentor reticulatus* (syn. ornate dog tick), frequently found in the eastern belt of the country. The ticks present in urban parks and suburban areas, especially *I. ricinus*, are a potential vectors of diseases for domestic animals and zoonoses, including anaplasmosis, bartonellosis, borreliosis and rickettsiosis. Dogs and cats can be considered as an indicators of geographic and temporal (seasonal) prevalence of the ticks. Ticks present on animal's fur can spread to people and homes they`re living. One tick can be infected with several micro-organisms. The aim of our study was to assess the infestation of dogs in Olsztyn with particular tick species during the period of their greatest life activity in the long-term cycle. The choice of the city was due to the large percentage of open green areas, as Olsztyn's forests occupy 21.2% of the city, while numerous parks, squares and green recreation areas add another 6.5%.

The research material used in the study were ticks removed from dogs at selected veterinary clinics from the area of Olsztyn. Ticks were collected from May to the end of June. The research was carried out on twelve consecutive years (2009–2020). From the dogs' medical history appeared that, during their walks, they only used areas within the city. Removed arachnids were fixed and stored in 70% ethyl alcohol, and then determined in the laboratory of the Department. The species affiliation was recognized on the basis of morphometric traits using the key to determine the species of ticks. The tick development stage was also determined.

During the twelve-year study, among the collected 6408 ticks 57.90% were *Ixodes ricinus*, and 42.10% *Dermacentor reticulatus*. The per-year number of collected ticks (from May to the end of June) ranged from 337 (in 2017) to 829 (in 2016). The fewest individuals were obtained in the first three years of research (2009–2011) and in 2017. The most were collected in 2014–2016. Regarding *I. ricinus*, adult females (29.36%) predominated, comparing to 28.52% nymphs. In turn, *D. reticulatus*, nymphs prevailed (22.31%) in relation to mature females (19.79%). In conclusion, the dominant species was *I. ricinus* over *D. reticulatus* (however, with a gradual increase in prevalence of the latter) and the general environmental potential of ticks in the studied area was clearly on the rise, until 2016. Further research will show whether the sudden and marked drop in the number of ticks in 2017 will continue in the following years (Tab. 1). We will also attempt to elucidate the cause(s) of this, very much welcome, decline of these

Table. 1. Comparative assessment of two tick species composition: *Ixodes ricinus* and *Dermacentor reticulatus,* removed from dogs in the urban area of Olsztyn every year from 2009 to 2020

Year	Total	*Ixodes ricinus*		*Dermacentor reticulatus*	
		nymphs	adults (females)	nymphs	adults (females)
2009	434	78 (17.97%)	252 (58.06%)	17 (3.92%)	87 (20.05%)
2010	394	48 (12.18%)	160 (40.61%)	141 (35.79%)	45 (11.42%)
2011	428	217 (50.7%)	81 (18.92%)	83 (19.39%)	43 (10.05%)
2012	483	232 (48.03%)	95 (19.67%)	71 (14.7%)	83 (17.18%)
2013	493	198 (40.16%)	91 (18.46%)	126 (25.56%)	78 (15.82%)
2014	627	161 (25.68%)	250 (39.87%)	124 (19.78%)	92 (14.67%)
2015	512	168 (32.81%)	146 (28.51%)	136 (26.56%)	62 (12.11%)
2016	829	141 (17.01%)	208 (25.1%)	299 (36.07%)	181 (21.83%)
2017	337	64 (18.99%)	121 (35.9%)	84 (24.92%)	68 (20.18%)
2018	782	203 (25.96%)	132 (16.88%)	155 (19.82%)	292 (37.34%)
2019	594	192 (32.32%)	209 (35.18%)	77 (12.96%)	116 (19.53%)
2020	501	126 (25.15%)	137 (27.34%)	117 (23.35%)	121 (24.15%)
Total	6.408	1.828 (28.52%)	1.882 (29.36%)	1.430 (22.31%)	1.268 (19.79%)
		3.710 (57.90%)		2.698 (42.10%)	

dangerous pathogen vectors. This may be caused by the growing awareness of dog owners regarding tick prevention and the emergence of several new active substances in anti-tick products in recent years.