

BOOK OF PROCEEDINGS



*XIV International Scientific Agriculture Symposium
"Agrosym 2023"
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TICK FAUNA OF SHEEP IN EAST SERBIA

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Abstract

The present study was conducted in 52 sheep flocks from the territory of east Serbia in the period of March to November 2017, using into consideration the seasonal occurrence and prevalence of ticks. Ticks were from sheep by means of light forceps. The tick species and sex/gender were identified by morphometric characteristics. In total, we examined 216 sheep and tick infestation was detected in 39.24% of examined animals. The most abundant species was *Ixodes ricinus* found in 41.91%, followed by *Dermacentor marginatus* (27.91%), *Rhipicephalus bursa* (10.92%), *R. sanguineus* (9.92%), *D. reticulatus* (5.51%) and *Haemaphysalis punctata* (3.97%). Of the total number of collected ticks, 57.15% were females and 42.85% were males. The population maximum for *Dermacentor marginatus*, *D. reticulatus* and *Haemaphysalis punctata* occurred in April. In May was population peak for *I. ricinus* and it was noted that this species started to decrease in abundance in June. *Rhipicephalus sanguineus* and *R. bursa* reached maxima decreasing until August, and disappearing completely in September and October. The autumn population peak in September occurred for the *I. ricinus* and *Rhipicephalus sanguineus* and in October for the *I. ricinus* and *R. bursa*.

Keywords: sheep, ticks, biodiversity, season distribution, east Serbia.

Introduction

Eastern Serbia is a mountain-basin region that stretches from the Danube and the border with Romania and Bulgaria. This part of Serbia is well known for large number of pastures suitable for growing small and larger ruminants. Breeding of small ruminants in the hilly and mountainous areas of Serbia has a long tradition and is well developed. Today, small flocks of sheep and goats play an important role in providing animal protein for diet, especially for those people who live there. Both, sheep and goats are milked and they produce the bulk milk supply, together with a large proportion of the meat that is consumed [Petrović et al.2021, Pavlovic and Ivanovic,2022].

Ticks represent one of the indispensable elements of that specific biotope. A diverse tick fauna present in this region mainly influences the health status of grazing sheep. Ticks are known as vectors for a number of diseases [Papadopoulos et al., 1996, Dimitrić,1999, Jongejan and Uilenberg, 2004, Nuttall and Labuda 2008, Sevinc et al., 2013, Nieder et al.2013, Pavlović et al.2016b]. However, in the semi-intensive breeding system, which is the most often practice in this region, is very difficult to avoid infections with different types of ticks that are contaminants of the grasslands and pastures [Becskei et al.,2015, Pavlović et al. 2018; 2019]. Tick infestations are common, especially during late spring and autumn months of the year [Harlan and Foster, 1990, Fourie and Horak, 1991; Milutinović, 1992].

The aim of the study was to examine biodiversity, relative abundance, sex ratio, and the effects of environmental factors (temperature, relative air humidity and precipitation) on tick populations in small ruminants in east part of Serbia.

Material and methods

Eastern Serbia is a mountain-basin region that stretches from the Danube and the border with Romania in the north to the Zaplanjsko-Lužnica basin and the Ruj mountain in the south, and from the border with Bulgaria in the east to the Velika valley and part of the South Morava river in the west. Eastern Serbia is characterized by a mosaic of rocks of all types and geological formations and a "chess relief" with alternating mountains and valleys. The relief is dominated by ridged mountains, separated by numerous river valleys and basins. Đerdap is the largest tunnel in Serbia and Europe (96 km). It connects the Pannonian and Wallachia-Pontic basins. It consists of a system of valleys and gorges. Eastern Serbia has a diverse climate: parochial in the valleys, moderately continental in the river valleys and mountainous on the mountains. Summers are moderately warm; winters are quite cold and windy. Kosava is the most common wind. The amount of precipitation ranges from 500 to 700 mm, and in the mountains up to 1,000 mm [Pavlovic et al.2022b). Geographical conditions in examined area favor for breeding of small ruminants because there was a large number of pastures suitable for grazing.

The present study was conducted in 52 sheep flocks from the territory of east Serbia in the period of March to November 2017, using into consideration the seasonal occurrence and prevalence of ticks. Ticks were collected by removing them from sheep with tweezers and were placed in tube with 70% ethanol. The tick species and sex/gender were identified by morphometric characteristics. The main attribute of identification of tick family is a plain dorsal sclerotised scutum or shield, which is often ornate with patterns in white or gold against a brown or grey background and which distinguishes these ticks from other families. This sclerotised plate covers the entire dorsal surface of the male, but only one third of the female's dorsal surface. Second one was the capitulum of hard ticks which just as the mouthparts and is visible from a dorsal view. The peritreme or groove is big and clearly visibly around the stigma plate. Grooves are deep, linear depressions in the body cuticle, usually on the ventral surface. Hard ticks can be easily differentiated by the shape of the basis capitulum and by the form of anal grooves [Kapustin,1955, Kolonin, 2009].

Result and discussion

In total, we examined 216 sheep and tick infestation was detected in 39.24% of examined animals. The most abundant species was *Ixodes ricinus* found in 41.91%, followed by *Dermacentor marginatus* (27.91%), *Rhipicephalus bursa* (10.92%), *R.sanguineus* (9.92%), *D.recticulatus* (5.51%) and *Haemaphysalis punctata* (3.97%).

The found species of ticks are most common in sheep in the regions of the Western Balkans including Romania, Macedonia, Mediterranean and Central Europe [Omeragić, 2011; Dumitrache et al., 2012; Mihalca et al., 2012; Dumitrache et al.,2012, Pavlović et al.,2014, 2020; 2016a,c].

In temperate habitats, feeding and generation cycles of hard ticks are closely synchronized with periods of suitable temperature and humidity conditions (Anderson and Magnarelli, 2008). The considerable interchange between spring and autumn tick populations can be attributed mainly to environmental conditions. In general, the climate in examined area is continental, with cold, relatively dry winters and warm, humid summers. Summer temperatures in the mountainous areas are notably cooler, averaging about (17°C). For these

reasons, some species occur later than in the lowland and hilly parts of Serbia. The population maximum for *Dermacentor marginatus*, *D. reticulatus* and *Haemaphysalis punctata* occurred in April. In May was population peak for *I. ricinus* and it was noted that this species started to decrease in abundance in June. *Rhipicephalus sanguineus* and *R. bursa* reached maxima decreasing until August, and disappearing completely in September and October. The autumn population peak in September occurred for the *I. ricinus* and *Rhipicephalus sanguineus* and in October for the *I. ricinus* and *R. bursa*.

Of the total number of collected ticks, 57.15% were females and 42.85% were males. The sex ratio of detected tick species showed a higher number of females in four species (*Ixodes ricinus*, *Haemaphysalis punctata*, *Rhipicephalus sanguineus* and *Dermacentor marginatus*), while higher number of males was detected in *Rhipicephalus bursa*, and an equal number of ticks of the *D. pictus*. This is in agreement with the research of the tick sex ratio that have been made around the world [Milutinović, 1992, Milutinović et al., 1997a, Anderson and Magnarelli, 2008]. The female abundance of established tick species has been in correlation with previously established population dynamics. The females of *Ixodes ricinus* species were present from March to October, with a peak population in May and June. Females of two species of the genus *Rhipicephalus* (*sanguineus* and *bursa*) have been found most often in the summer months - June and July. Findings of the females of species *Dermacentor marginatus* and *Haemaphysalis punctata* were most common in April and May, while sporadic finding of females of *Dermacentor pictus* species was attached to the spring months. This population dynamics of female ticks is characteristic for this microclimate [Belozerov, 1982, Černy et al., 1982, Hornok 2009].

Our results confirmed the results of the similarly studies carried out in northeast and south-eastern part Serbia [Milutinović et al., 1987; 1996; 1998; Mišćević et al., 1990]. This data is in correlation with the results of other examinations of the seasonal dynamics of ticks in Europe including West Balkans [Daniel, 1978, L'Hostis et al., 1995, Omeragić, 2011, Mihalca et al. 2012, Sevinc et al., 2013, Pavlović et al., 2014; 2016a,c, 2020b].

Conclusion

Based on the obtained results, it can be seen that ticks represent a significant problem of small ruminant production in east Serbia. Biodiversity of ticks of sheep holding allows permanent infections with these parasites and the climatic conditions favor their development and maintenance on grazing surfaces. Climate conditions have a great influence on the population dynamics of ticks which had two peaks at late spring and early autumn. Fauna, seasonal dynamics and sex ratio of ticks found do not differ much from the results obtained in other regions of Serbia. Likewise, the presence of ticks points to the ever-present possibility of infections zoonotic character that the ticks carry.

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