



## Monitoring of the epizootic situation regarding trichurosis of sheep in the Poltava region

M. Petrenko<sup>1</sup>✉, V. Kharchenko<sup>2</sup>✉

<sup>1</sup>Poltava State Agrarian University, Skovorody Str., 1/3, Poltava, 36003, Ukraine

<sup>2</sup>I. I. Schmalhausen Institute of Zoology of National Academy of Sciences of Ukraine, Bogdan Khmelnytskyi Str., 15, Kyiv 01054, Ukraine

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### Correspondence author

Maxym Petrenko

Tel.: +38-095-158-85-78

E-mail: petrenkom1@ukr.net

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### Abstract

Sheep breeding is a branch of animal husbandry that is unique in terms of the variety and specificity of products. Sheep can utilize feed resources that are almost inaccessible to other types of farm animals. One of the factors in increasing the efficiency of sheep breeding is ensuring the well-being of farms concerning invasive diseases, particularly trichurosis. Successful control of trichurosis in sheep farms is the most effective for monitoring and forecasting the development of the epizootic situation depending on the climate-geographical zone. The work aimed to monitor the epizootic situation regarding sheep trichurosis in the Poltava region. According to the analysis of the statistical data of the reporting documentation of the Main Department of the State Production and Consumer Service in the Poltava region for 2018–2022, it was established that the share of helminthiasis among diseases of infectious etiology of sheep reaches 99.6 %. At the same time, among helminthiasis, nematodes have the highest specific weight – 69.0 %, and trematodes were less common – 31.0 %. Strongyloidiasis (68.05 %) was diagnosed most frequently among helminth infections during the studied period. A smaller percentage was strongyloidosis of digestive organs (17.16 %) and trichurosis (11.24 %). Dictyocaulosis was rarely diagnosed among livestock (3.55 %). The average extent of trichurosis infestation of sheep during the investigated period in the territory of the Poltava region was 7.51 %, ranging from 5.83 to 9.26 %. Indicators of the extent of trichurosis invasion ranged from 5.45 to 33.33 % by area. According to the results of coproscopy, the highest values of sheep infestation with *Trichuris* were found in the farms of Karliv and Mashiv regions – 33.33 and 20.0 %, respectively. Less often, trichurosis was diagnosed in sheep farms of Dykanskyi (8.0 %), Reshetylivskyi (6.67 %), and Kotelevskyi (5.45 %) districts. The obtained data from monitoring studies prove the relevance of the further and more in-depth analysis of the spread of trichurosis infestation among sheep in the territory of the Poltava region, taking into account the age and seasonal dynamics of the disease, as well as the peculiarities of its course as part of mixed infestations.

**Keywords:** parasitology, trichurosis, *Trichuris*, sheep, epizootology, monitoring studies.

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### 1. Introduction

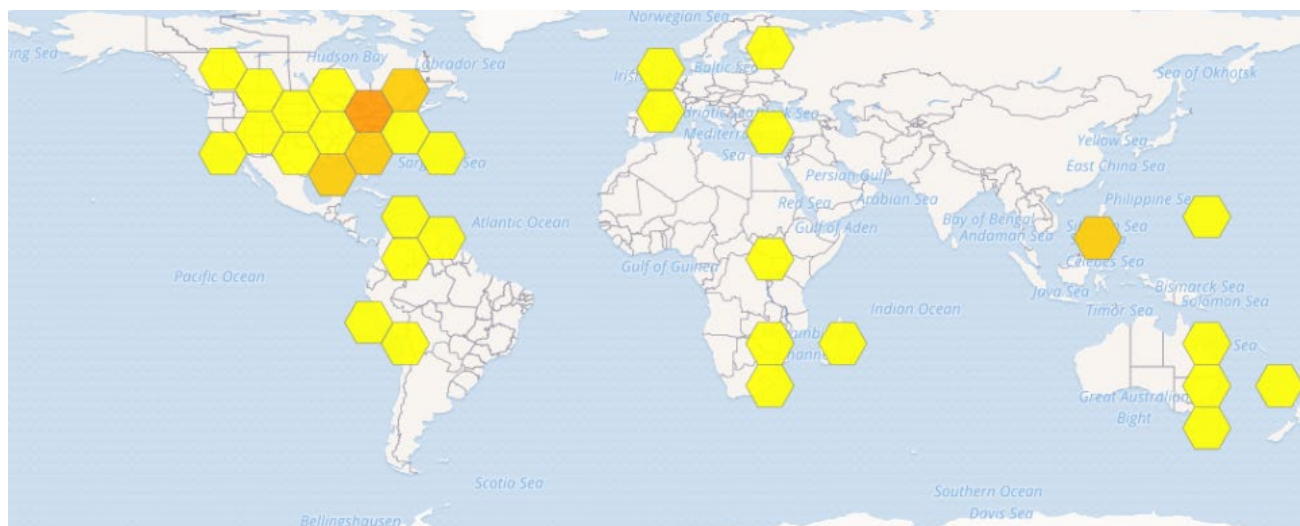
According to research by various authors, gastrointestinal nematodes of sheep are one of the most common parasitic diseases in sheep farms in many countries. Helminths of the genus are common among the causative agents of gastrointestinal nematodes in sheep *Trichuris*, which, most often, are represented by three species – *T. skrjabini*, *T. ovis* and *T. globulosa* (Melnychuk & Antipov, 2019; Melnychuk, 2019; Melnychuk et al., 2020, Melnychuk et al., 2021; Jadidoleslami et al., 2022).

Species *T. ovis* is registered in Albania, Azores, Belarus, Great Britain, Bulgaria, Russia, Cyprus, India, Estonia, USA, China, Turkey, France, United Kingdom, Germany, Hungary, Iceland, Italy, Lithuania, Poland, Spain, Canada, Philippines, Australia, Africa, Sweden, the Netherlands, Pakistan, Nigeria, South America, and Ukraine (Morales et al., 2001; Kuchai et al., 2011; de Jong et al., 2014; Jegede et al., 2015; de Jong,

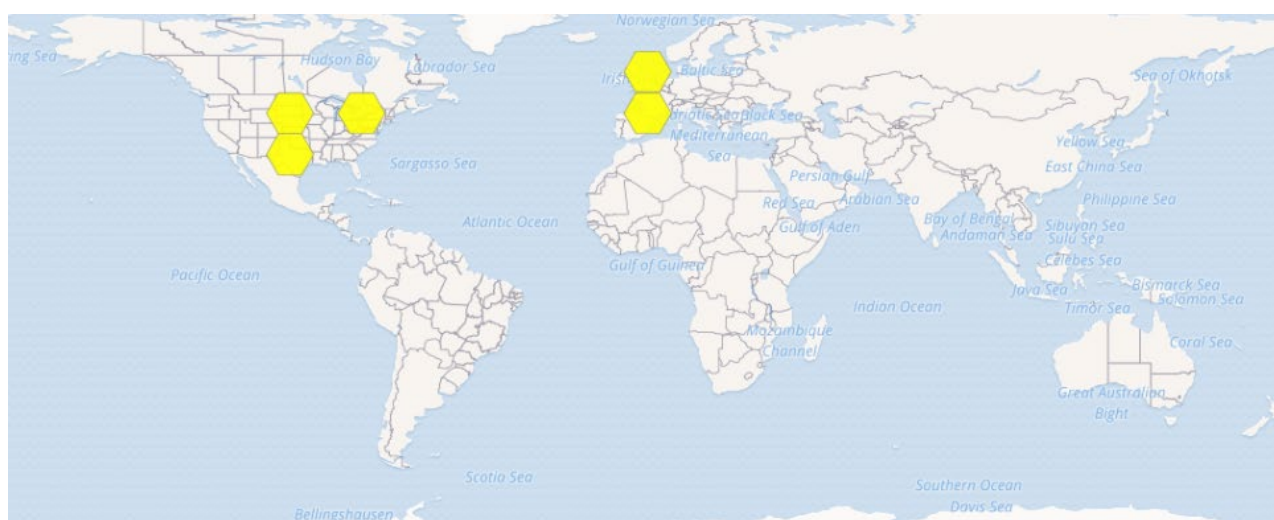
2016; Ruhoollah, Khan et al., 2021). The GBIF Information System platform has 175 georeferenced distribution records *T. ovis* in the world (Fig. 1). However, it hardly reflects the actual distribution of individual species of these nematodes, which is closely related to the spread of sheep farming.

*T. skrjabini* is registered in Albania, Belarus, Great Britain, Russia, Turkey, France, Italy, Poland, USA, China, Africa, India, Iran, United Kingdom, Spain, Brazil, and Ukraine (Hinks & Thomas, 1974; Lara et al., 1977; de Jong, 2014). The GBIF platform has 14 georeferenced records for the distribution of *T. skrjabini* in the world (Fig. 2).

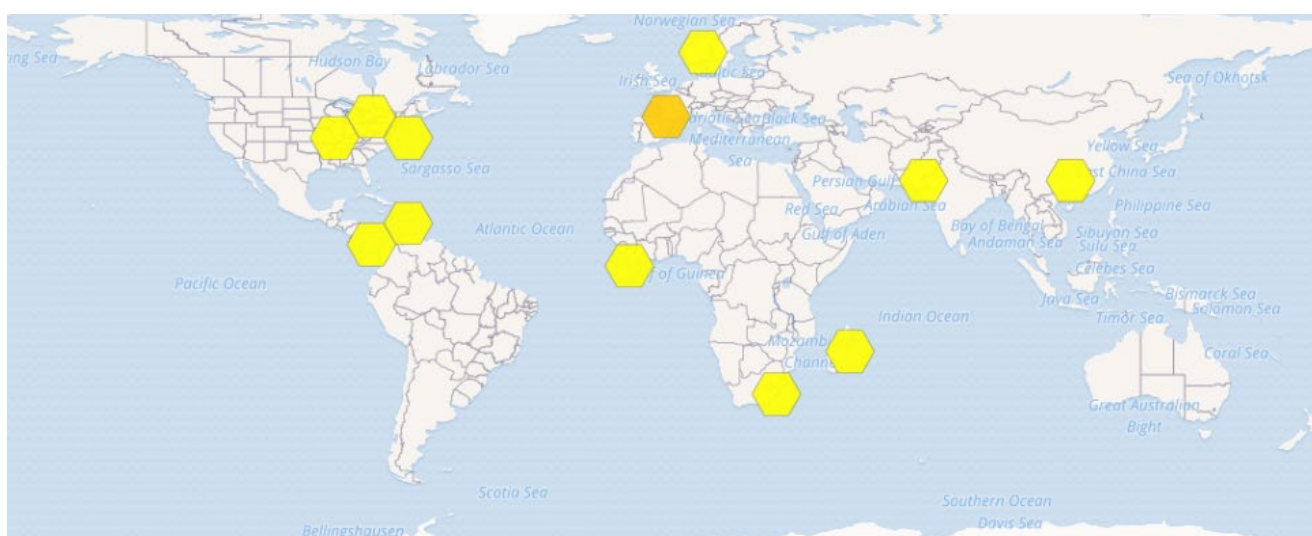
*T. globulosa* is registered in the Azores, Cyprus, India, USA, Turkey, France, Germany, Great Britain, Italy, Poland, Spain, Africa, Sweden, Iran, Finland, South America, United Arab Emirates, and Ukraine (de Jong, 2014; Bahrami et al., 2016; Yevstafieva et al., 2018). The GBIF platform has 28 georeferenced distribution records *T. globulosa* in the world (Fig. 3).



**Fig. 1.** *Trichuris ovis* worldwide geolocation record data on request on the platform of the GBIF information system (*Trichuris ovis* Abildgaard, 1795 in GBIF Secretariat, 2022)



**Fig. 2.** *Trichuris skrjabini* worldwide geolocation record data on request on the platform of the GBIF information system (*Trichuris skrjabini* Baskakov, 1924 in GBIF Secretariat, 2022)



**Fig. 3.** *Trichuris globulosa* worldwide geolocation record data on request on the platform of the GBIF information system (*Trichuris globulosa* Linstow, 1901 in GBIF Secretariat, 2022)

The rates of sheep affected by trichurosis pathogens in different countries vary significantly. In particular, the extent of trichurosis infestation in sheep in some areas of Egypt is 2.68 %, New Guinea – 1.8 %, Bangladesh – 1.9 %

(Koinari et al., 2013; Poddar et al., 2017; Hassan et al. 2019). At the same time, in some areas of India, the infestation of sheep with trichurosis can reach 59.37 %, and in Iran – up to 95 % (Talari & Arbabi, 2004; Gul & Tak, 2016).

According to scientists, such a difference in the rates of infestation of sheep by the causative agent of trichurosis in different regions depends on the climatic conditions of the territory, the observance of zoohygienic rules for feeding and keeping animals, as well as the implementation of veterinary and sanitary measures (Dafur et al., 2020; Salehi et al., 2022). Therefore, it is relevant to determine the epizootological features of trichurosis among sheep in different climatic and geographical regions of Ukraine. *The work aimed to monitor the epizootic situation regarding sheep trichurosis in the Poltava region.*

## 2. Materials and methods

Monitoring studies on the spread of trichurosis among sheep in the territory of Poltava region were carried out based on the results of the analysis of statistical data of the reporting documentation of the Main Department of the State Production and Consumer Service in Poltava region (city of Poltava) for 2018–2022.

During the research period, the average indicators of the extensiveness of trichurosis infestation (EI, %) were determined based on the results of coproovoscopic studies (the species of trichurosis was not determined) by year and region, the specific weight of helminthiasis in contagious sheep pathology, the ratio of trematodes and nematodes in sheep, the specific weight of trichurosis among detected nematodes for the studied period in the territory of Poltava region.

## 3. Results and discussion

### 3.1. Results

Based on the results of the analysis of statistical data, it was established that during the studied period, the share of helminthiasis in sheep in the Poltava region accounted for 99.6 %, and the share of infectious diseases – was only 0.4 % (Fig. 4 a). Moreover, of the helminthiasis registered in sheep, nematodes accounted for the largest share – 69.0 %. Trematodes were less frequently diagnosed – 31.0 %, of which paramphist, dicrocelium, and fasciole were identified by coproovoscopic studies (Fig. 4 b).

It was found that strongyloidiasis accounted for the largest share among nematodes – 68.05 %. Strongyloidiasis (17.16 %) and trichurosis (11.24 %) were found less frequently. Dictyocaulosis (3.55 %) was diagnosed the least among sheep in the territory of the Poltava region (Fig. 5).

It was established that the average extensiveness of trichurosis infestation of sheep during the investigated period in the territory of the Poltava region was 7.51 % with a range from 5.83 to 9.26 % (Fig. 6).

In particular, in 2018, the EI was 5.83 %; in 2019 – 9.26 %; in 2021 – 8.0 %. It should be noted that in 2020 and 2022, research on trichurosis was not conducted in sheep farms.

Indicators of the extensiveness of trichurosis invasion ranged from 5.45 to 33.33 % by district (Fig. 7).

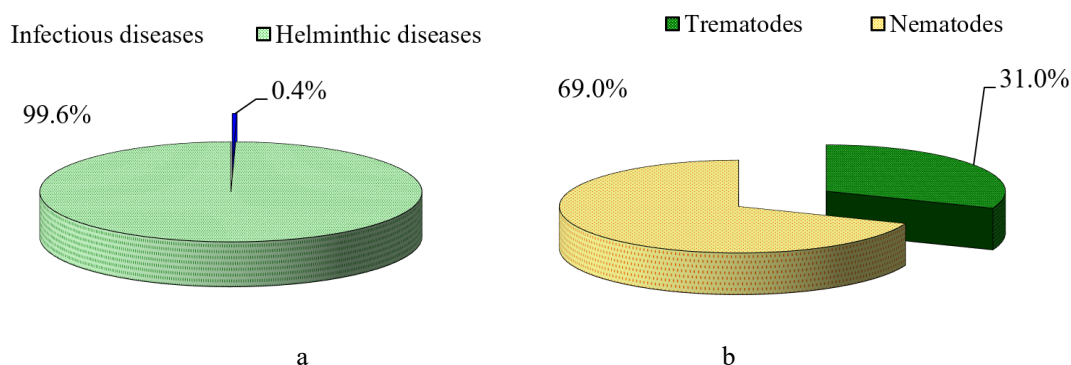


Fig. 4. The ratio of infectious and helminthic diseases (a), cestodes, and nematodes (b) in sheep in the Poltava region

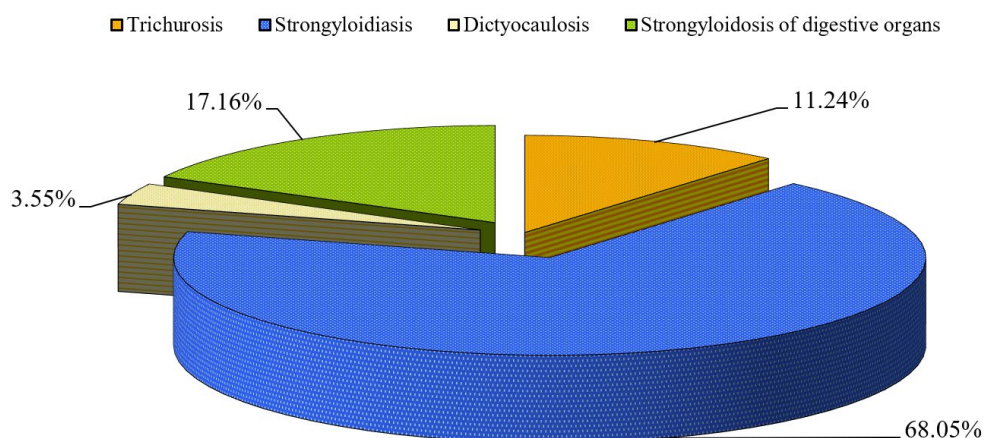
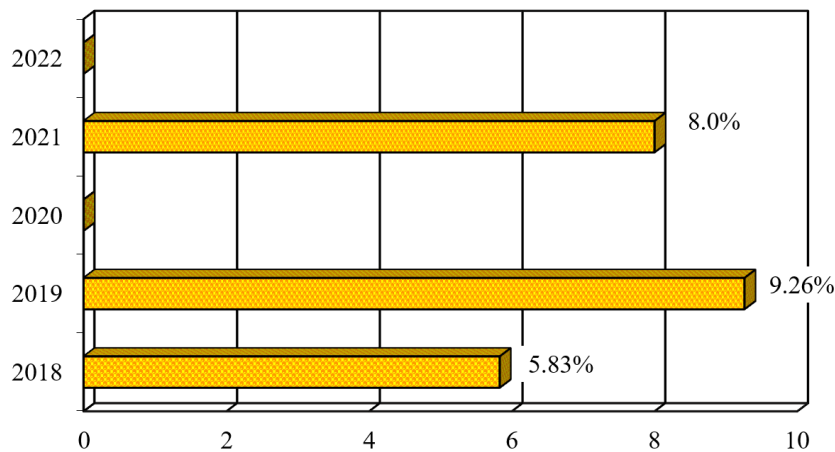
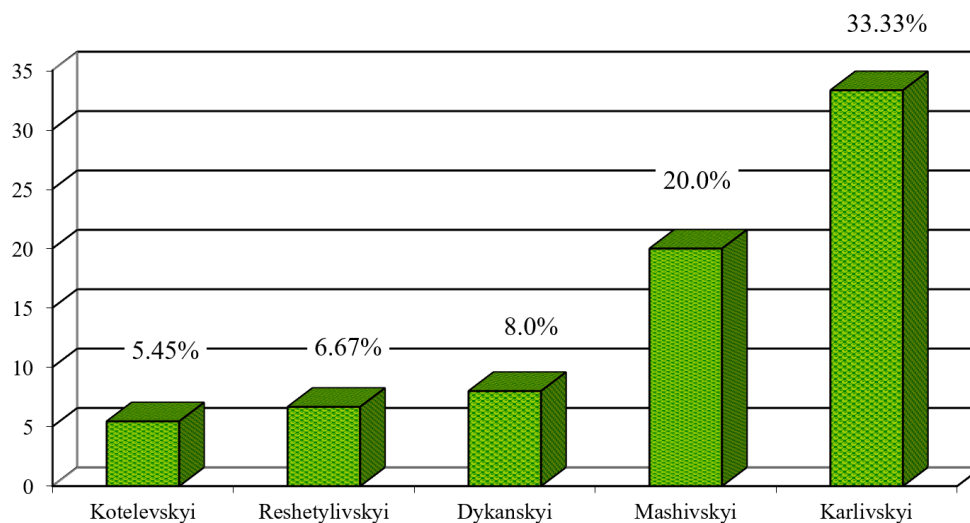


Fig. 5. The ratio of detected nematodes in sheep in the Poltava region





**Fig. 6.** Indicators of the extensiveness of trichurosis infestation of sheep in the territory of the Poltava region



**Fig. 7.** Indicators of extensiveness of trichurosis infestation of sheep in different districts of Poltava region

According to the results of coproovoscopy, the highest values of sheep infestation with *Trichuris* were found in the farms of Karliv and Mashiv regions – 33.33 and 20.0 %, respectively. Less often, trichurosis was diagnosed in sheep farms of Dykanskyi (EI – 8.0 %), Reshetylivskiyi (EI – 6.67 %), and Kotelevskiyi (EI – 5.45 %) districts.

### 3.2. Discussion

A significant number of works indicate the detection of nematodes of the genus *Trichuris* in sheep in different countries of the world, where the *trichuris* fauna is mainly represented by three species – *T. skrjabini*, *T. ovis*, and *T. globulosa* (de Jong et al., 2014; Melnychuk et al., 2020, Jadidole-slami et al., 2022). Moreover, in different natural and climatic regions, indicators of the intensity of the epizootic process differ, where the extent of sheep infestation by *trichuris* can vary from 1.9 to 95 % (Talari & Arbabi, 2004; Poddar et al., 2017; Hassan et al., 2019).

Our research has established that the prevalence of helminthiasis in sheep in the Poltava region among infectious diseases reached 99.6 %. The share of nematode parasitism among the detected causative agents of sheep helminthiasis was 69.0 %, and the specific weight of trichurosis was 11.24 %. The obtained data again confirm the relevance of epizootological monitoring of the spread of trichurosis among sheep. According to the authors, such indicators of the spread of this invasion, according to global geolocation

records, are related to the persistence of helminths in their embryonic development in the environment (Yevstafieva et al., 2020).

According to the statistical data analysis, the average extent of trichurosis infestation for 2018–2022 in sheep farms of the Poltava region is 7.51 %, ranging from 5.83 to 9.26 %. Within the region, depending on the studied area, the rates of infestation of sheep with *Trichuris* ranged from 5.45 to 33.33 %. Other researchers have found high rates of trichurosis in sheep. According to the results of a helminthological autopsy of sheep kept on farms in the Poltava region, the indicators of the extensiveness of *T. ovis*, *T. skrjabini*, and *T. globulosa* infestations were 55.04 %, 23.62 %, and 21.04 %, respectively (Melnychuk et al., 2021). The researchers found that in the Zaporizhzhya, Kyiv, and Poltava regions, the extent of sheep infestation with trichurosis was 31.32 % (Melnychuk, 2019).

The obtained data from monitoring studies prove the relevance of the further and more in-depth study of the spread of trichurosis infestation among sheep in the territory of the Poltava region, taking into account the age and seasonal dynamics of the disease, as well as the peculiarities of its course as part of mixed infestations.

## 4. Conclusions

The results of monitoring studies of the epizootic situation regarding trichuriasis of sheep during 2018–2022 in the territory of Poltava region established that the specific weight of this infestation among other nematodes was 11.24 %, and the average extensiveness of the infestation among the sheep population was 7.51 %, subject to fluctuations from 5.83 to 9.26 %. According to the results of coproovoscopy, the highest values of infestation of sheep with trichuris were found in the farms of Karliv and Mashiv districts – 33.33 and 20.0 %, with fluctuations in different regions from 5.45 to 33.33 %.

## Conflict of interest

The authors claim that there is no conflict of interest.

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