Epizootological monitoring studies on the spread of nematodirosis of cattle in the territory of Poltava region

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Abstract

The most common helminthiasis of cattle is strongyloidosis of the digestive organs. This group of animal helminthiasis is widespread in Ukraine and is caused by nematodes of the Strongylida suborder, among which nematodirosis occupies a leading place. Invasion leads to a decrease in productivity, the quality of the obtained products, barrenness of the broodstock, and deterioration of the growth and development of the young. Invasion of definitive hosts occurs mostly passively; by alimentary means, the invasive is the larva of the third stage. The work aimed to conduct monitoring studies of the epizootic situation regarding the spread of nematodirosis of cattle in the territory of Poltava region based on the results of the analysis of statistical data of the reporting documents of the Main Department of the State Production and Consumer Service in Poltava region for 2018–2022. It was established that the extent of nematodirosis infestation in cattle ranged from 0.81 % (in 2020) to 5.30 % (2022), with the average extensiveness of the invasion for the studied period at 1.36 %. At the same time, the share of nematodirosis among other nematode diseases of cattle was 18.37 %. Among other nematodes, neoascarosis, bunostomosis, esophagostomosis, dictyocaulosis, and trichuriosis were diagnosed in the territory of the studied region, the share of which ranged from 1.51 to 51.51 %. Among the invasive diseases of cattle registered on the territory of the Poltava region, the share of trematodes (fasciolosis, dicroceliosis, paramphistomatosis) in the general parasitic pathology is 85.51 %, protozoans (eimeriosis, babesiosis) and nematodes – 8.67 and 5.78 %, respectively, for cestodoses (moniasis) – 0.04 %. The obtained data from monitoring studies indicate the relevance of a more in-depth study of the spread of nematodirosis infestation among cattle in farms of the Poltava region, taking into account the nematode fauna, the characteristics of the infestation of animals of different age groups, in different seasons of the year, and as part of mixed infestations with other parasites.

Keywords: parasitology; epizootology; nematodirosis; cattle; monitoring studies.

1. Introduction

Cattle nematodes are widespread in different natural and climatic zones of the world. Among them, strongyloidosis of the digestive organs is one of the most common (Vercruysse & Clae rebout, 2001; Morgan et al., 2006; Khan et al., 2010; Hatam-Nahavandi et al., 2023). Invasion leads to a decrease in productivity, the quality of the obtained products, barrenness of the broodstock, and deterioration of the growth and development of the young. Animal deaths are often recorded (Mabuso on et al., 2004; Swarnakar et al., 2015).

Scientists testify to the significant spread of nematodirosis among strongyloidosis of the digestive organs, where in most territories, the species Nematodirus abnormalis, N. filicollis, N. spathiger, N. helvetianus are diagnosed in cattle (Jacobs, 1987; Louw, 1989; Hollands, 1991; Oliver et al., 2016).

According to data on geolocation records in the world on the platform of the GBIF information system, 62 cases of detection of nematodirus of the species N. abnormalis (Fig. 1), 120 cases of N. filicollis (Fig. 2), 211 cases of N. spathiger among ruminants were registered in the world (Fig. 3), 142 cases – N. helvetianus (Fig. 4).

For example, scientists report that among ruminants on the territory of New Zealand, 100 % (50/50) of the studied population of nematode nematodes of the species N. spathiger were isolated, and 76 % (38/50) of the animals were N. filicollis (Oliver et al., 2014). At the same time, in Canada, the infestation of calves by causative agents of nematodirosis was at the level of 1.7 % (Jelinski et al., 2017).

Therefore, a significant number of nematodirus species are registered in most countries of the world, and the lack of information in the scientific space regarding their epizootological features determines the relevance of this research direction.
Fig. 1. Data on worldwide geolocation records on request for Nematodirus abnormalis on the GBIF Information System platform
(Nematodirus abnormalis May 1920 in GBIF Secretariat, 2023)

Fig. 2. Data on geolocation records in the world on request of Nematodirus filicollis on the GBIF information system platform
(Nematodirus filicollis (Rudolphi, 1802) Ransom, 1907 in GBIF Secretariat, 2023)

Fig. 3. Data on geolocation records in the world on request of Nematodirus spathiger on the GBIF information system platform
(Nematodirus spathiger (Railliet, 1896) Railliet & Henry, 1909 in GBIF Secretariat, 2023)
The work aimed to conduct monitoring studies on the spread of nematodirosis in cattle in the Poltava region.

2. Materials and methods

Monitoring studies on the spread of nematodirosis among cattle in the territory of Poltava region were conducted 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.

The following were determined for the studied period: average indicators of the extensiveness of nematodirous infestation (EI, %) according to the results of coproovoscopic studies by year; the specific weight of protozoa, nematodes, trematodes, and cestodoses in the general parasitic pathology of cattle; percentage ratio of detected nematodes diseases; the specific gravity of nematode invasion among nematodes during the studied period in the territory of the Poltava region.

3. Results and discussion

3.1. Results

Analyzing the reporting documentation, it was established that the most significant percentage among invasive cattle diseases in the Poltava region territory was trematodose – 85.51 %. Protozoa and nematodes were less frequently diagnosed – 8.67 and 5.78 %, respectively. Cestodoses accounted for only 0.04 % of the total parasitic pathology of animals (Fig. 5).

Among the protozoans, eimeriosis and babesiosis were found. Dicroceliosis, fasciolosis, and paramphistomatosis were diagnosed among trematodes. Moniesia parasitism has been established as the causative agent of cestodes. At the same time, nematodes were the most diverse group of diseases, with the most significant share being neoascariasis – 51.51 % (Fig. 6).
Nematodirosis was in second place in distribution, where its share among all detected nematodes was 18.37%. Bunostomosis (13.55%), dictyokaulosis (8.13%), trichurosis (6.93%), and esophagostomosis (1.51%) accounted for a smaller share.

Over the years, the percentage of animals infested with nematodes gradually increased from 0.92% (in 2018) to 5.30% (in 2022) (Fig. 7).

Thus, in 2018, cattle's degree of nematode infestation was at 0.92%. 2019 this indicator was slightly cut to 1.31%, and in 2020, it decreased again to 0.81%. Later, during 2021–2022, the indicators of the extensiveness of the invasion increased to 2.41 and 5.30%, respectively.

3.2. Discussion

Scientists prove that among helminthiasis of the gastrointestinal tract in ruminants, the most common group is strongylidosis of digestive organs (Morgan et al., 2006; Khan et al., 2010; Hatam-Nahavandi et al., 2023). Among them, nematodirosis occupies one of the leading places where the nematode fauna and indicators of animal infestation, according to the authors, differ (Oliver et al., 2016; Jelinski et al., 2017; Liu et al., 2022). The available literature data shows that most scientists have studied the distribution of nematodirosis among sheep and wild ruminants (Larrieu et al., 1982; Petrigh & Fugassa, 2014). Therefore, it is urgent to conduct monitoring studies of the epizootic situation regarding nematodirosis of cattle in Ukraine.

According to the results of the analysis of the statistical data of the reporting documentation of the Main Department of the State Production and Consumer Service in Poltava region for 2018–2022, it was found that the extent of nematodirosis infestation in cattle ranged from 0.81% to 5.30%, with the average extent of infestation for the studied period being 1.36%. At the same time, the share of nematodirosis among other nematodes diseases of cattle was 18.37%.

The spread of nematodirosis among sheep is evidenced by domestic scientists, where in the Poltava region parasitism of two species of nematodes, N. spathiger and N. abnormalis, was established, and the EI was 44.09 and 3.17%, respectively (Yevstafieva et al., 2020a; Yevstafieva et al., 2020b; Melnychuk et al., 2021).

The obtained data from monitoring studies indicate the relevance of a more in-depth study of the spread of nematodirosis infestation among cattle in farms of the Poltava region, taking into account the nematode fauna, the characteristics of the infestation of animals of different age groups, in different seasons of the year, and as part of mixed infestations with other parasites.

4. Conclusions

The results of monitoring studies of the epizootic situation regarding nematodirosis of cattle during 2018–2022 in
the territory of Poltava region established that the average extensiveness of the invasion was 1.36 % with fluctuations from 0.81 to 5.30 %. The share of nematodiosis among other nematodes diseases of cattle was 18.37 %. Among other nematodes, neoascarosis, bunostomosis, esophagostomosis, dictyokaulosis, and trichurosis were diagnosed in the territory of the studied region, the share of which ranged from 1.51 to 51.51 %.

Conflict of interest
The author claims no conflict of interest.

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