

Trichinellosis

Annual Epidemiological Report for 2020

Key facts

- In 2020, nine EU/EEA countries reported 117 confirmed cases of trichinellosis.
- Bulgaria, Italy and Poland accounted for 88% of all confirmed cases.
- The overall EU/EEA notification rate was 0.03 cases per 100 000 population, in 2020.
- Consumption of undercooked meat from pigs raised under non-controlled housing conditions, or wild boar hunted as game, constitutes the highest risk for acquiring trichinellosis in the EU/EEA.

Introduction

Trichinellosis is a zoonotic disease caused by parasitic *Trichinella* roundworms. The disease occurs worldwide. A wide range of animals can act as reservoirs of human infection, but those most frequently involved are pigs, horses and wild game such as wild boar. Infected animals harbour *Trichinella* larvae encysted in the muscle tissue. Consumption of infected raw or undercooked meat, or meat products can lead to human infection and disease. The severity of disease is related to the number of viable larvae consumed; symptoms can range from none or mild to very severe or even fatal. Trichinellosis can be treated with suitable anti-parasitic drugs.

Methods

This report is based on data for 2020 retrieved from The European Surveillance System (TESSy) on 19 January 2022. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of the methods used to produce this report, please refer to the 'Methods' chapter in the 'Introduction to the Annual Epidemiological Report' [1].

An overview of the national surveillance systems is available online [2].

A subset of the data used for this report is available through ECDC's online *Surveillance Atlas of Infectious Diseases* [3].

Twenty-seven EU/EEA countries reported trichinellosis data for 2020, 18 of which reported zero cases. Eight countries reported data according to the current EU case definition for trichinellosis as published in 2018, eight countries used the 2012 case definition, seven countries used the 2008 case definition, and one country (Luxembourg) used the 2002 case definition. The only difference between the 2018 definition and the 2012 and 2008 definitions is that the former considers laboratory confirmation as sufficient for a confirmed case when information on clinical symptoms is missing. France, Germany and Italy used another case definition.

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Twenty-six countries had a mandatory notification system for trichinellosis, while France used a voluntary system. All countries had comprehensive surveillance of trichinellosis. Belgium did not report data in 2020. Spain did not receive data from all regions due to the COVID-19 pandemic, so the case numbers might not be complete for 2020. No surveillance system for trichinellosis exists in Denmark [3]. No data for 2020 were reported by the United Kingdom (UK) due to withdrawal of the UK from the EU on 1 February 2020. Twenty countries have surveillance systems that integrate laboratory and epidemiological data from physicians or hospitals.

Epidemiology

For 2020, nine countries reported 181 cases of trichinellosis, of which 117 were confirmed and 64 were probable (Table 1, Figure 1). The EU/EEA notification rate was 0.03 cases per 100 000 population.

Bulgaria, Italy and Poland accounted for 88% of all confirmed cases reported in 2020. Bulgaria reported the highest notification rate in the EU/EEA at 0.19 cases per 100 000 population. The second-highest notification rate was reported by Italy at 0.13 cases per 100 000 population.

Eighteen countries reported zero cases in 2020, including four Member States (Cyprus, Finland, Luxembourg and Malta) that have never reported any trichinellosis cases since the beginning of EU-level surveillance in 2007.

In 2020, 101 cases (86%) of trichinellosis with known travel status and known country of infection were reported as having been acquired within the EU. One country, Austria, reported three travel-associated trichinellosis cases; two of these were acquired outside of the EU. For 16 cases (13%), travel information was not reported.

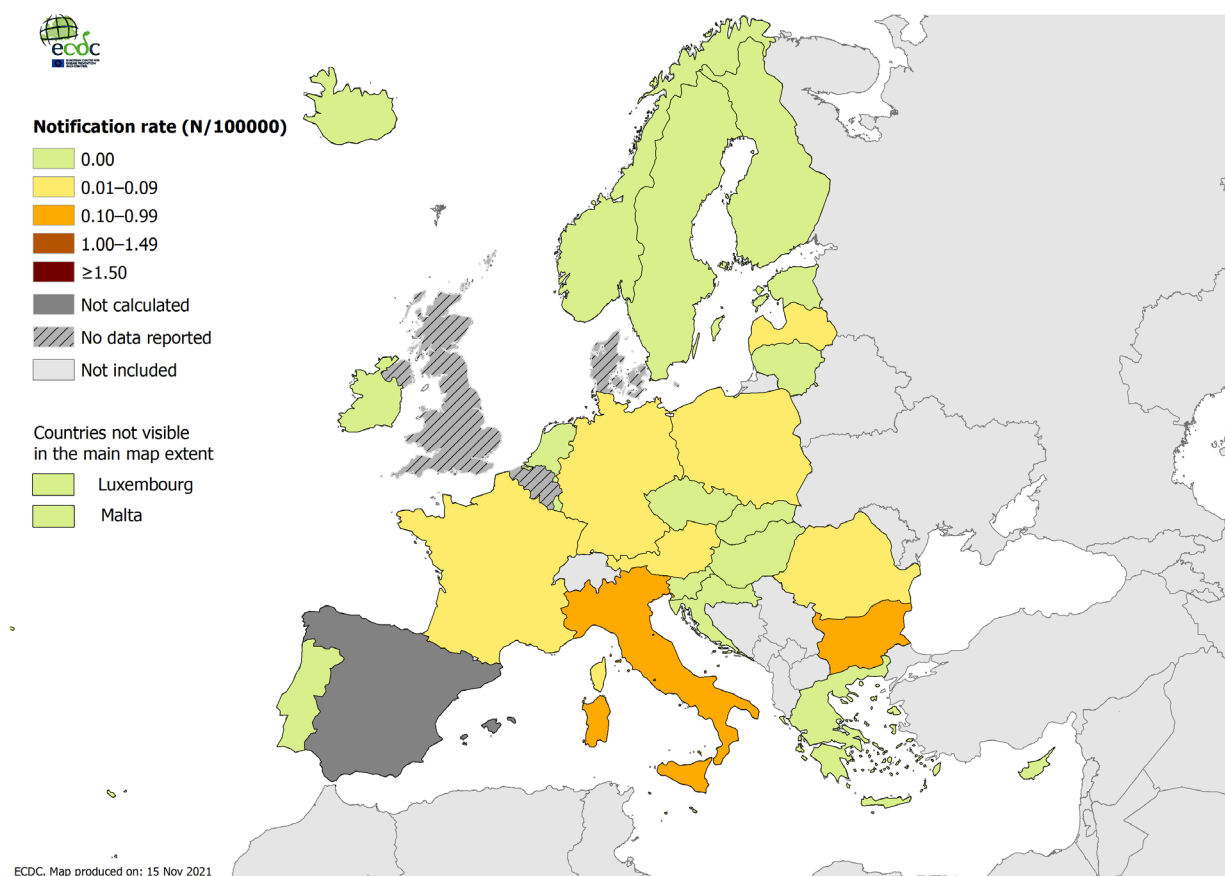
Table 1. Distribution of confirmed trichinellosis cases and rates per 100 000 population by country and year, EU/EEA, 2016–2020

Country	2016		2017		2018		2019		2020		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	2	0.02	3	0.03	2	0.02	1	0.01	6	0.07	0.06
Belgium	0	NR	0	NR	0	NR	ND	NR	ND	NR	NR
Bulgaria	35	0.49	55	0.77	45	0.64	55	0.79	13	0.19	0.18
Croatia	5	0.12	21	0.51	0	0.00	3	0.07	0	0.00	0.00
Cyprus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Czechia	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Denmark	ND	NR	ND	NR	ND	NR	ND	NR	ND	NR	NR
Estonia	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Finland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
France	3	0.00	8	0.01	0	0.00	2	0.00	1	0.00	NR
Germany	4	0.00	2	0.00	0	0.00	3	0.00	1	0.00	0.00
Greece	0	0.00	1	0.01	0	0.00	0	0.00	0	0.00	0.00
Hungary	0	0.00	0	0.00	2	0.02	0	0.00	0	0.00	0.00
Iceland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Ireland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Italy	5	0.01	4	0.01	2	0.00	10	0.02	79	0.13	0.12
Latvia	1	0.05	1	0.05	1	0.05	1	0.05	1	0.05	0.05
Liechtenstein	ND	NR	ND	NR	ND	NR	ND	NR	ND	NR	NR
Lithuania	1	0.03	9	0.32	0	0.00	0	0.00	0	0.00	0.00
Luxembourg	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Malta	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00

Country	2016		2017		2018		2019		2020		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Netherlands	0	0.00	0	0.00	0	0.00	1	0.01	0	0.00	0.00
Norway	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Poland	4	0.01	9	0.02	2	0.01	2	0.01	11	0.03	0.03
Portugal	0	0.00	1	0.01	0	0.00	1	0.01	0	0.00	0.00
Romania	26	0.13	48	0.24	10	0.05	6	0.03	4	0.02	0.02
Slovakia	1	0.02	1	0.02	0	0.00	0	0.00	0	0.00	0.00
Slovenia	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Spain	12	0.03	5	0.01	2	0.00	12	0.03	1	NR	NR
Sweden	2	0.02	0	0.00	0	0.00	0	0.00	0	0.00	0.00
United Kingdom	0	0.00	0	0.00	0	0.00	0	0.00	ND	NR	NR
EU-EEA	101	0.02	168	0.03	66	0.01	97	0.02	117	0.03	0.03

Source: Country reports
 ASR: age-standardised rate
 ND: no data reported
 NR: no rate calculated

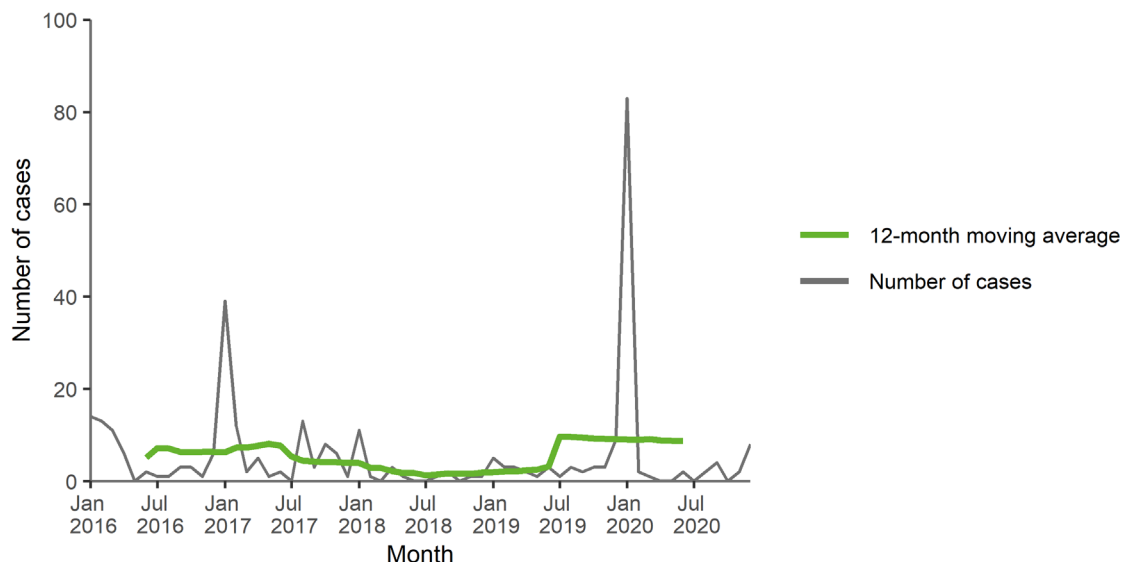
Figure 1. Distribution of confirmed trichinellosis cases per 100 000 population by country, EU/EEA, 2020



Source: Country reports from Austria, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, and Sweden.

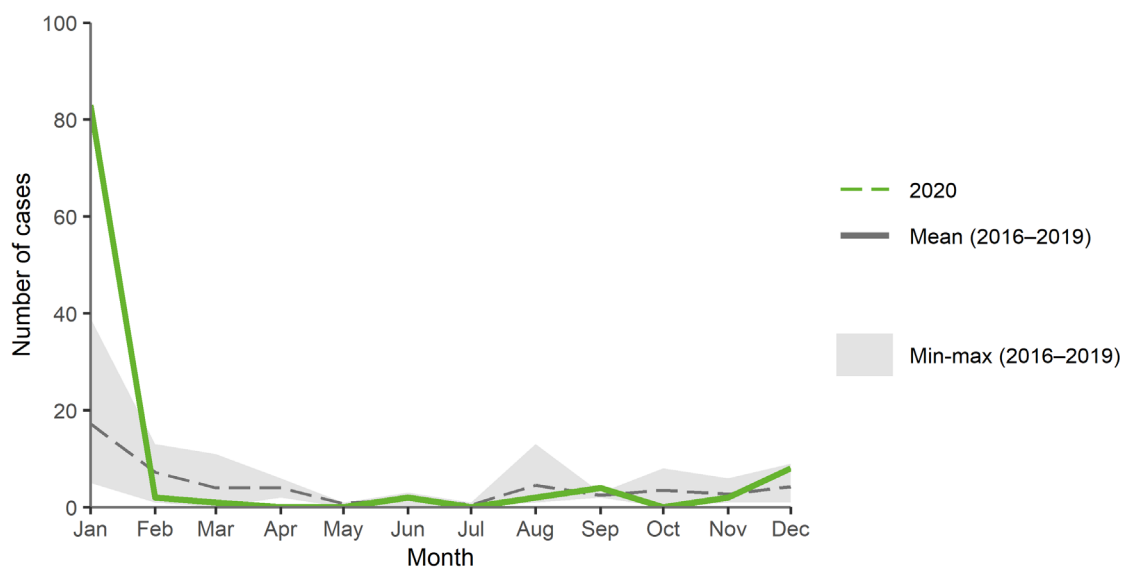
Trichinellosis in the EU/EEA follows a seasonal pattern, with case numbers typically peaking in January and February (Figures 2, 3). In 2020, a peak in January was observed; this was linked to a food-borne outbreak in Italy caused by *T. britovi* [4, 5]. The 12-month moving average case notification trend did not show evidence of a significant increase or decrease over the period, 2016–2020 [4]. During the same period, only Romania showed evidence of a significant decreasing trend, while no countries showed evidence of a significant increasing trend. Bulgaria, which had reported the majority of cases until 2019 and had the highest notification rate in the EU between 2016–2019, was not included in the EU monthly trend calculations since monthly data were not available.

Figure 2. Distribution of confirmed trichinellosis cases by month, EU/EEA, 2016–2020



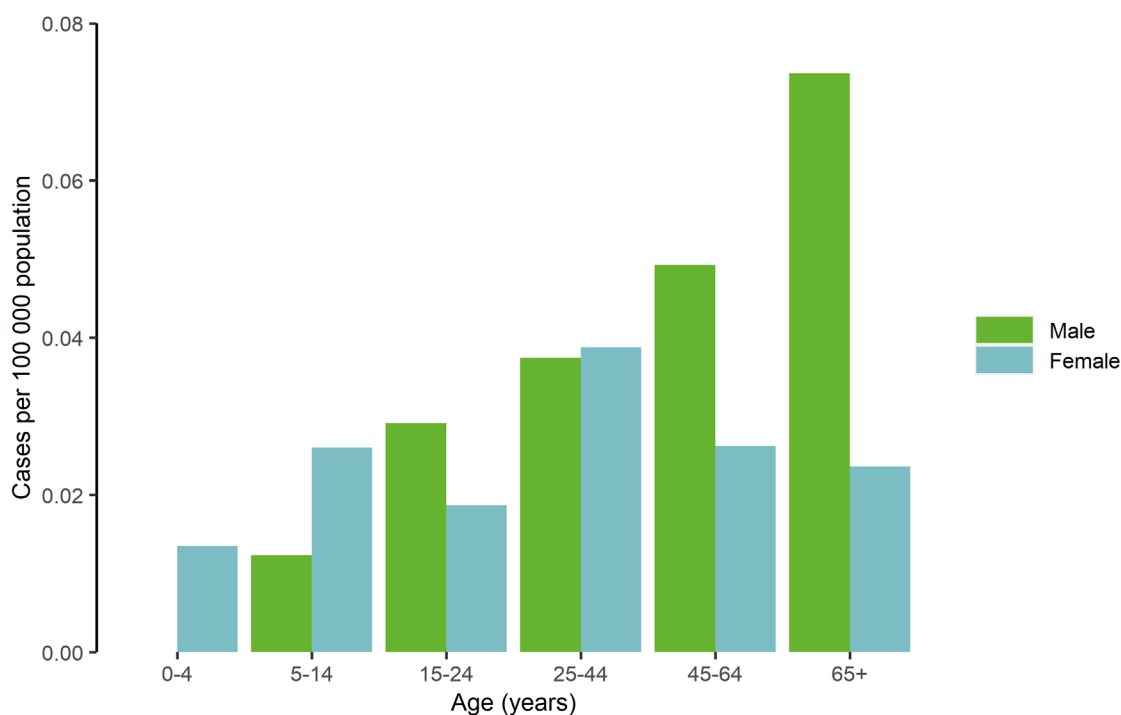
Source: Country reports from Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Figure 3. Distribution of confirmed trichinellosis cases by month, EU/EEA, 2020 and 2016–2019



Source: Country reports from Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

In 2020, the overall male-to-female ratio was 1.4:1 (Figure 4). Italy was the only country to report cases in the age group 0–4 years, of which all cases were female. The majority of cases in the age group 65+ years were males, most of which were reported by Italy. The highest notification rate in males in 2020 was in the age group 65+ years, at 0.07 cases per 100 000 population.

Figure 4. Distribution of confirmed trichinellosis cases per 100 000 population, by age and gender, EU/EEA, 2020

Discussion

The EU/EEA trichinellosis notification rate increased in 2020 compared to 2019. Despite this, 18 countries reported zero cases in 2020, including four countries (Cyprus, Finland, Luxembourg and Malta) which have never reported any trichinellosis cases since the beginning of EU-level surveillance in 2007. This highlights that while trichinellosis is a rare disease in many EU/EEA countries, it continues to pose an important public health threat in others.

In the five years between 2016 and 2020, the EU notification rate for trichinellosis was reported at or below 0.03 cases per 100 000 population. The highest notification rate (0.03) was reported in 2017 and 2020, and the lowest rate (0.01) was reported in 2018 (this was the lowest notification rate ever reported since the beginning of EU-level trichinellosis surveillance in 2007). In 2020, there was no apparent impact of the pandemic on the reported case numbers.

In 2020, the majority of trichinellosis cases were reported by Bulgaria, Italy and Poland. Among these countries, Italy reported a food-borne outbreak of *Trichinella* involving 79 cases. All of these were linked to an outbreak that was first reported in 2019, then involving nine individuals who had consumed salami made with meat from a *T. britovi*-infected wild boar [4]. The outbreak investigation indicated that the source of infection was a wild boar which was hunted in the Susa Valley in north-west Italy in November 2019 [5]. In addition to Italy, four other countries reported five food-borne outbreaks of *Trichinella* to the European Food Safety Authority in 2020: France (one outbreak, two cases), Poland (two outbreaks, 18 cases), Romania (one outbreak, nine cases) and Spain (one outbreak, 11 cases) [4]. The two food-borne outbreaks reported by Poland were caused by *T. spiralis* and were associated with the consumption of fresh raw sausages made with wild boar meat [4]. Indeed, an outbreak investigation in Poland revealed that trichinellosis was confirmed in eight patients who were family and friends of a hunter who had provided them with homemade raw sausages that were made with hunted wild boar meat [6]. The outbreak reported by France was caused by *T. britovi* and was associated with 'mixed red meat and products thereof or other'. Unspecified *Trichinella* species were reported as the causative agents of the outbreaks reported by Spain and Romania, in which two individuals from Romania required hospitalisation [4]. The food which caused this was reported as 'meat and meat products' in Spain, and 'fresh pig meat' in Romania [4].

Bulgaria continued to have the highest notification rate (0.19 cases per 100 000 population) in the EU in 2020, despite reporting their lowest number of confirmed cases since 2016 and a 76% reduction in the number of confirmed cases reported compared with 2019. It is not clear whether this was due to the impact of the COVID-19 pandemic on surveillance and reporting, or other reasons. Austria reported six cases of trichinellosis in 2020; this was a noticeable increase compared to an average of two cases per year between 2016 and 2019. Of note, half of the Austrian cases in 2020 were reported as being infected outside of the country. In 2020, Romania, which in previous years had experienced the most *Trichinella* outbreaks, reported the lowest number of human cases over

the 2016–2020 period, showing strong evidence of a significant decrease in the five-year trend from 2016–2020 [4]. The reasons for this decrease are unclear.

The withdrawal of the UK from the EU did not impact the number of trichinellosis cases reported in 2020 as there have been no human cases acquired from meat consumption in the UK for over 40 years [4]. Between 2000 and 2014, eight cases were diagnosed in the UK associated with one food-borne outbreak caused by the consumption of imported meat which was infected, while three cases were associated with travel.

In general, *Trichinella* infections are often linked to food-borne outbreaks. Consequently, the EU trend for trichinellosis has been affected by the number and size of food-borne outbreaks, with peaks frequently observed in January–February. This may reflect the consumption of various pork products during the winter/Christmas period and the wild boar hunting season [4]. *Trichinella* is commonly detected in wildlife [4] and cases related to hunting may account for the higher notification rates observed among adult males. Investigations into domestic pig *Trichinella* infections in Member States identified direct (free-range pigs) and indirect (e.g. farmers who hunted) contacts with wild animals, which are reservoirs of these zoonotic nematodes, as sources of domestic pig infections [5].

Wild boar hunted as game are an important source of trichinellosis infections in humans. Human behaviour can strongly influence the sylvatic cycles both favouring and reducing the transmission of *Trichinella* species. [4]. Carcasses of *Trichinella*-infected animals left by hunters in the field after skinning, removing and discarding the entrails, or road accidents, represent an important biomass of these parasites readily available to the wild cycle [4].

Public health implications

Products derived from pig and wild boar meat remain the most important sources of human trichinellosis in the EU/EEA. Consuming undercooked meat from pigs or wild boar hunted as game which have not been tested for *Trichinella* is a major risk factor for trichinellosis [4]. Therefore, it is important that relevant information is communicated to such consumers.

References

1. European Centre for Disease Prevention and Control. Introduction to the Annual Epidemiological Report. In: ECDC. Annual Epidemiological Report. Stockholm: ECDC. Available from: <http://ecdc.europa.eu/annual-epidemiological-reports/methods>
2. European Centre for Disease Prevention and Control. Surveillance systems overview. Stockholm: ECDC; 2021. Available from: <https://www.ecdc.europa.eu/en/publications-data/surveillance-systems-overview-2019>
3. European Centre for Disease Prevention and Control. Surveillance Atlas of Infectious Diseases. Stockholm: ECDC; 2020. Available from: <http://atlas.ecdc.europa.eu>
4. EFSA and ECDC (European Food Safety Authority and European Centre for Disease Prevention and Control), 2021. The European Union One Health 2019 Zoonoses Report. EFSA Journal 2021;19(2):6406. Available from: <https://doi.org/10.2903/j.efsa.2021.6406>
5. Stroffolini G, Rossi L, Lupia T, Faraoni S, Paltrinieri G, Lipani F, et al. *Trichinella britovi* outbreak in Piedmont, North-West Italy, 2019–2020: Clinical and epidemiological insights in the one health perspective. Travel Medicine and Infectious Disease. 2022 May–June:102308.
6. Różycki M, Korpysa-Dzirba W, Bełcik A, Pelec T, Mazurek J, Cencek T. Analysis of a Trichinellosis Outbreak in Poland after Consumption of Sausage Made of Wild Boar Meat. Journal of Clinical Medicine. 2022 Jan;11(3):485.