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# The European Union One Health 2020 Zoonoses Report

European Food Safety Authority

European Centre for Disease Prevention and Control

## Abstract

This report of the European Food Safety Authority and the European Centre for Disease Prevention and Control presents the results of zoonoses monitoring activities carried out in 2020 in 27 European Union Member States (MS) and nine non-MS. Key statistics on zoonoses and zoonotic agents in humans, food, animals and feed are provided and interpreted historically. Two events impacted 2020 MS data collection and related statistics: the COVID-19 pandemic and the withdrawal of the United Kingdom from the EU. In 2020, the first and second most reported zoonoses in humans were campylobacteriosis and salmonellosis, respectively. The EU trend for confirmed human cases of these two diseases was stable (flat) from 2016 to 2020. Fourteen of the 26 MS reporting data on *Salmonella* control programmes in poultry met the reduction targets for all poultry categories. *Salmonella* results for carcases of various species performed by competent authorities were more frequently positive than own-checks conducted by food business operators. This was also the case for *Campylobacter* quantification results from broiler carcases for the MS-group that submitted data from both samplers, whereas overall at EU-level those percentages were comparable. Yersiniosis was the third most reported zoonosis in humans, with tenfold less cases reported than salmonellosis, followed by Shiga toxin-producing *Escherichia coli* (STEC) and *Listeria monocytogenes* infections. Illnesses caused by *L. monocytogenes* and West Nile virus infections were the most severe zoonotic diseases with the highest case fatality. In 2020, 27 MS reported 3,086 foodborne outbreaks (a 47.0% decrease from 2019) and 20,017 human cases (a 61.3% decrease). *Salmonella* remained the most frequently reported causative agent for foodborne outbreaks. *Salmonella* in 'eggs and egg products', norovirus in 'crustaceans, shellfish, molluscs and products containing them' and *L. monocytogenes* in 'fish and fish products' were the agent/food pairs of most concern. This report also provides updates on tuberculosis due to *Mycobacterium bovis* or *Mycobacterium caprae*, *Brucella, Trichinella, Echinococcus, Toxoplasma*, rabies, *Coxiella burnetii* (Q fever) and tularaemia.



**Keywords:** *Campylobacter*, food-borne outbreaks, *Listeria*, monitoring, parasites, *Salmonella*, zoonoses

**Requestor:** European Commission

**Question number:** EFSA-Q-2020-00787

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# Table of Contents

# Introduction

## Legal basis of European Union-coordinated zoonoses monitoring

The European Union (EU) system for the monitoring and collection of information on zoonoses is based on Zoonoses Directive 2003/99/EC[1], which obliges EU Member States (MS) to collect relevant and, when applicable, comparable data on zoonoses, zoonotic agents, antimicrobial resistance and foodborne outbreaks. In addition, MS shall assess trends and sources of these agents, as well as outbreaks in their territory, submitting an annual report each year by the end of May to the European Commission covering the data collected. The European Commission should subsequently forward these reports to the European Food Safety Authority (EFSA). EFSA is assigned the tasks of examining these data and publishing the EU Annual Summary Reports. In 2004, the European Commission entrusted EFSA with the task of setting up an electronic reporting system and database for monitoring zoonoses (EFSA Mandate No 2004-0178, continued by M-2015-0231[2]).

Data collection on human diseases from MS is conducted in accordance with Decision 1082/2013/EU[3] on serious cross-border threats to health. In October 2013, this Decision replaced Decision 2119/98/EC on setting up a network for the epidemiological surveillance and control of communicable diseases in the EU. The case definitions to be followed when reporting data on infectious diseases to the European Centre for Disease Prevention and Control (ECDC) are described in Decision 2018/945/EU[4]. ECDC has provided data on zoonotic infections in humans, as well as their analyses, for the EU Summary Reports since 2005. Since 2008, data on human cases have been received via The European Surveillance System (TESSy), maintained by ECDC.

## Reporting requirements

According to List A of Annex I of Zoonoses Directive 2003/99/EC, data on animals, food and feed must be reported on a mandatory basis for the following eight zoonotic agents: *Salmonella*, *Campylobacter*, *Listeria monocytogenes*, Shiga toxin-producing *Escherichia coli* (STEC), *Mycobacterium bovis*, *Brucella*, *Trichinella* and *Echinococcus*. In addition, and based on the epidemiological situations in the MS, data must be reported on the following agents and zoonoses (List B of Annex I of the Zoonoses Directive): (i) viral zoonoses: calicivirus, hepatitis A virus, influenza virus, rabies, viruses transmitted by arthropods; (ii) bacterial zoonoses: borreliosis and agents thereof, botulism and agents thereof, leptospirosis and agents thereof, psittacosis and agents thereof, tuberculosis due to agents other than *M. bovis*, vibriosis and agents thereof, yersiniosis and agents thereof; (iii) parasitic zoonoses: anisakiasis and agents thereof, cryptosporidiosis and agents thereof, cysticercosis and agents thereof, toxoplasmosis and agents thereof; and (iv) other zoonoses and zoonotic agents such as *Francisella* and *Sarcocystis*. Furthermore, MS provided data on certain other microbiological contaminants in foods: histamine, staphylococcal enterotoxins and *Cronobacter sakazakii*, for which food safety criteria are set down in the EU legislation.

The general rules on the monitoring of zoonoses and zoonotic agents in animals, food and feed are laid down in Article 4 of Chapter II 'Monitoring of zoonoses and zoonotic agents' of the Directive. Specific rules for coordinated monitoring programmes and for food business operators are laid down in Articles 5 and 6 of Chapter II. Specific rules for the monitoring of antimicrobial resistance are laid down in Article 7 of Chapter III 'Antimicrobial resistance', whereas rules for epidemiological investigation of foodborne outbreaks can be found in Article 8 of Chapter IV 'Foodborne outbreaks'.

According to Article 9 of Chapter V 'Exchange of information' of the Directive, MS shall assess trends and sources of zoonoses, zoonotic agents and antimicrobial resistance in their territory and each MS shall send to the European Commission every year by the end of May a report on trends and sources of zoonoses, zoonotic agents and antimicrobial resistance, covering the data collected under Articles 4,

[1] Directive 2003/99/EC of the European Parliament and of the Council of 17 November 2003 on the monitoring of zoonoses and zoonotic agents, amending Council Decision 90/424/EEC and repealing Council Directive 92/117/EEC. OJ L 325, 12.12.2003 p. 31–40.

[2] See mandate M-2015-0231 within OpenEFSA Question: https://open.efsa.europa.eu/questions/EFSA-Q-2020-00787

[3] Decision No. 1082/2013/EU of the European Parliament and of the Council of 22 October 2013 on serious cross-border threats to health and repealing Decision No 2119/98/EC. OJ L 293, 5.11.2013, p. 1–15.

[4] Commission Implementing Decision 2018/945/EU on the communicable diseases and related special health issues to be covered by epidemiological surveillance as well as relevant case definitions. OJ L 170, 6.7.2018, p. 1–74.

7 and 8 over the previous year. Reports and any summaries of these shall be made publicly available. The requirements for these MS-specific reports are described in Parts A–D of Annex IV as regards the monitoring of zoonoses, zoonotic agents and antimicrobial resistance carried out in accordance with Article 4 or 7, and in Part E of Annex IV as regards the monitoring of foodborne outbreaks carried out in accordance with Article 8.

## Terms of Reference

In accordance with Article 9 of Directive 2003/99/EC, EFSA shall examine the submitted national reports and data of the EU MS 2020 zoonoses monitoring activities as described above and publish an EU Summary Report on the trends and sources of zoonoses, zoonotic agents and antimicrobial resistance in the EU.

The 2020 data on antimicrobial resistance in zoonotic agents submitted and validated by the MS are published in a separate EU Summary Report.

## Data sources and report production

Since 2019, the annual EU Summary Reports on zoonoses, zoonotic agents and foodborne outbreaks have been renamed the 'EU One Health Zoonoses Summary Report' (EUOHZ), which is co-authored by EFSA and ECDC.

The production of the EUOHZ 2020 report was supported by the Consortium ZOE (**Z**oonoses under a **O**ne health perspective in the **E**U) Work-package 1 composed by the *Istituto Superiore di Sanità* (Rome, Italy), the *Istituto Zooprofilattico Sperimentale delle Venezie* (Padova, Italy), the French Agency for Food, Environmental and Occupational Health & Safety (Maisons-Alfort, France), the *Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise* (Teramo, Italy), the *Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna* (Brescia, Italy) under the coordination of the *Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise* (Teramo, Italy) (Consortium and Work-package 3 !Grignolleader).

The efforts made by the MS, the reporting non-MS and the European Commission in the reporting of zoonoses data and in the preparation of this report are gratefully acknowledged.

The MS, other reporting countries, the European Commission, members of EFSA's Scientific Panels on Biological Hazards (BIOHAZ) and Animal Health and Welfare (AHAW), and the relevant European Union Reference Laboratories (EURLs) were consulted while preparing the EUOHZ 2020.

The EUOHZ 2020 focuses on the most relevant information on zoonoses and foodborne outbreaks within the EU in 2020. If substantial changes compared with the previous years were observed, they have been reported.

In order to gather information about the possible impact of the COVID-19 (Coronavirus Disease 2019) pandemic on zoonoses data collection in accordance with Directive 2003/99/EC, a questionnaire was submitted by EFSA and ECDC to the reporting countries. They were asked to evaluate whether in their country, the COVID-19 pandemic might have had an impact on the monitoring or surveillance and reporting of zoonoses and foodborne outbreaks in 2020. Moreover, countries were asked whether, according to their experience, the collected 2020 data were comparable or not with the previous years' data. The answers received were used to support the interpretation of the 2020 monitoring and surveillance results (0).

The 2020 data collection was also affected by the reduction in the number of EU MS from 28 to 27, due to the withdrawal of the United Kingdom (of Great Britain and Northern Ireland) from the EU[5]. On 1 February 2020, the United Kingdom became a third country. The following approaches were used to take account of this reduction in data volume at the EU-level, for food, animals, feed and foodborne outbreaks (see below). In descriptive tables, data from the United Kingdom were included in the EU statistics for 2019 and previous years, whereas the 2020 statistical data from the United Kingdom, when available, were assigned to the non-MS group. With regard to trend analyses of human data, only

[5] Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community. OJ L 29, 31.1.2020, p. 7 ("Withdrawal Agreement").

countries having contributed data for all the years of the considered period were taken into account in the analyses, whereas for trend analyses of the estimated prevalence of *Salmonella* in poultry populations covered by National Control Programs, any data provided by the reporting EU countries were taken into account in the model. United Kingdom data were only included when available for 2019 and previous years.

### Human data collection for 2020

In the EUOHZ for 2020, the analyses of data from infections in humans were prepared by the Food- and Waterborne Diseases and Zoonoses (FWD) domain (brucellosis, campylobacteriosis, congenital toxoplasmosis, echinococcosis, listeriosis, salmonellosis, Shiga toxin-producing *E. coli* infection, trichinellosis and yersiniosis), the Emerging and Vectorborne Diseases (EVD) domain (Q fever, rabies, tularaemia and West Nile virus (WNV) infection) and the tuberculosis (TB) domain (TB due to *Mycobacterium bovis* and *M. caprae*) at ECDC. Please note, as explained above, that the numbers presented in the report may differ from those in national reports due to differences in the case definitions used at EU and at national level, or due to differing dates of data submission and extraction. The latter may also result in some divergence in the case numbers presented in the different ECDC reports.

TESSy is a software platform that has been operational since April 2008 and in which data on 56 diseases and special health issues are collected. Both aggregated and case-based data were reported to TESSy by Member States and other European countries. Although aggregated data did not include individual case-based information, both reporting formats were included when possible to calculate the number of cases and country-specific case notification rates. Human data used in the report were extracted from TESSy as of 15 July 2021 for EVD, as of 28 July 2021 for FWD and as of 30 September 2021 for TB due to *M. bovis* and *M. caprae*. The denominators used for calculating notification rates were the human population data from Eurostat's 01 January 2021 update.

Data on human zoonoses cases were received from 27 MS and from two non-MS (Iceland and Norway). Switzerland reported its data on human cases directly to EFSA. These aggregated data also include data from Liechtenstein. Since the United Kingdom became a third country on 1 February 2020, human data from the United Kingdom were not collected by ECDC for 2020.

The interpretation of data should consider data quality issues and the differences between MS surveillance systems; comparisons between countries should therefore be undertaken with caution.

### Data collection on food, animals, feed and foodborne outbreaks

For the year 2020, 27 MS submitted data and national zoonoses reports on monitoring results in food, animals, feed and foodborne outbreaks. In addition, data and reports were submitted by four non-MS and European Free Trade Association (EFTA) countries: Iceland, Norway, Switzerland and Liechtenstein[6]. For some food, animal and feed matrices, and for foodborne outbreaks, EFSA received data and reports from the following pre-accession countries: Albania (no foodborne outbreak data), Bosnia and Herzegovina, North Macedonia, Montenegro and Serbia, as well as from the United Kingdom, which became a third country on 1 February 2020. Food, animal, feed and foodborne outbreak data for 2020 received by EFSA from the United Kingdom in the framework of Zoonoses Directive 2003/99/EC were excluded from EU 2020 statistics.

Data were submitted electronically to the EFSA zoonoses database, through EFSA's Data Collection Framework (DCF). MS could also update data from previous years (before 2020).

The deadline for data submission was 31 May 2021. Two data validation procedures were implemented through 11 June 2021 and 15 July 2021 respectively. Validated data on food, animals and feed used in the report were extracted from the EFSA zoonoses database on 2 August 2021.

The draft EUOHZ report was sent to the MS for consultation on 13 October 2021 and comments were collected by 26 October 2021. The utmost effort was made to incorporate comments and data

[6] Based on the customs union treaty of the Principality of Liechtenstein with Switzerland, Liechtenstein is part of the Swiss customs territory. Due to the strong connection between the veterinary authorities of Liechtenstein and Switzerland, and Liechtenstein's integration into the Swiss system in the veterinary field, in principal, all legislation, rules and data on contagious diseases are identical for both Switzerland and Liechtenstein. If not mentioned otherwise, the Swiss data also include the data from Liechtenstein.

amendments within the available time frame. The report was finalised by 15 November 2021 and published online by EFSA and ECDC on 9 December 2021.

A detailed description of the terms used in the report is available in EFSA's manuals for reporting on zoonoses (EFSA, 2021a; 2021b; 2021c).

The national zoonoses reports submitted in accordance with Directive 2003/99/EC are published on the EFSA website together with the EU One Health Zoonoses Report. They are available online at http://www.efsa.europa.eu/en/biological-hazards-data/reports.

## Data analyses and presentation

### Comparability and quality of data

#### *Humans*

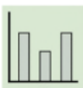
For data on human infections, please note that the numbers presented in this report may differ from national zoonoses reports due to differences in case definitions used at EU and national level or because of differing dates of data submission and extraction. Results are not directly comparable among the MS.

#### *Food–animals–feed and foodborne outbreaks*

For data on food, animals and feed, please note that the numbers presented in this report may differ from national zoonoses reports due to differing dates of data submission and extraction.

The data obtained by the EFSA DCF can vary according to the level of data quality and harmonisation. Therefore, the type of data analyses suggested by EFSA for each zoonosis and matrix (food, animals, feed or foodborne outbreaks) strongly depended on this level of harmonisation and can either be a descriptive summary of submitted data, the following-up of trends (trend watching) or the (quantitative) analysis of trends. Data analyses were carried out according to (0), as adapted from Boelaert et al. (2016). Food, animals, feed and foodborne outbreak data can be classified into three categories according to the zoonotic agent monitored and the design of the monitoring or surveillance carried out. It follows that the type of data analyses that can be implemented is conditioned by these three distinct categories.

**Table 1:** Categorisation of the data used in the EU One Health Zoonoses 2020 Summary Report (adapted from Boelaert et al., 2016)

| Category | Type of analysis | | Type/comparability between MS | Examples |
|---|---|---|---|---|
| | Descriptive summaries at the national level and EU level |  | Programmed harmonised monitoring or surveillance | *Salmonella* national control programmes in poultry, bovine tuberculosis, bovine and small ruminant brucellosis, *Trichinella* in pigs at slaughterhouse |
| I | EU trend watching (trend monitoring) |  | Comparable between MS | |
| | Spatial and temporal trend analyses at the EU level |  o | Results at the EU level are interpretable | |

| | | | |
|---|---|---|---|
| | Descriptive summaries at national level and EU level | Monitoring or surveillance not fully harmonised | Foodborne outbreak data; Official samplings related to process hygiene criteria for carcases at the slaughterhouse for *Salmonella* and *Campylobacter* and to food safety criteria for *Campylobacter*, *L. monocytogenes*, *Salmonella* and STEC in the context of Regulation (EC) No. 2073/2005; Rabies monitoring |
| II | EU trend watching (trend monitoring) | Not fully comparable between MS | |
| | **No** EU trend analysis | Caution needed when interpreting results at the EU level | |
| III | Descriptive summaries at national level and EU level | Non-harmonised monitoring or surveillance data with no (harmonised) reporting requirements | *Campylobacter*, *Yersinia*, Q fever, *Francisella tularensis*, West Nile virus, *Taenia* spp., *Toxoplasma* and other zoonoses |
| | **No** EU trend watching (trend monitoring) | Not comparable between MS; extreme caution needed when interpreting results at the EU level | |
| | **No** EU trend analysis | | |

**Rationale of the table of contents**

In keeping with the rationale of zoonoses listing in Annex I of Directive 2003/99/EC, for the mandatory reporting of foodborne outbreaks and of the above-mentioned categorisation of food, animal and feed data (0), the following table of contents has been adopted for the 2020 EUOHZ report.

Zoonoses and zoonotic agents included in compulsory annual monitoring (Directive 2003/99/EC List A)

1. *Campylobacter*
2. *Salmonella*
3. *Listeria*
4. Shiga toxin-producing *Escherichia coli*
5. Tuberculosis due to *Mycobacterium bovis* and *Mycobacterium caprae*
6. *Brucella*
7. *Trichinella*
8. *Echinococcus*

Foodborne and waterborne outbreaks (according to Directive 2003/99/EC)

Zoonoses and zoonotic agents monitored according to the epidemiological situation (Directive 2003/99/EC List B)

1. *Yersinia*
2. *Toxoplasma gondii*
3. Rabies
4. Q fever
5. West Nile virus
6. Tularaemia

7. Other zoonoses and zoonotic agents

Microbiological contaminants subject to food safety criteria (Regulation (EC) No 2073/2005)

### Chapter sections

The EU One Health Zoonoses 2020 Summary Report presents a harmonised structure for each chapter, starting with key facts. In addition, there is a section on 'Monitoring and surveillance' in the EU for the specific disease or for foodborne outbreaks. A 'Results' section summarises the major findings of 2020 as regards trends and sources. A summary table displaying the data for the last 5 years (2016–2020) for human cases and for major animal and food matrices is also presented. Each chapter also contains a 'Discussion' section and ends with a list of 'Related projects and links' with useful information for the specific disease. For foodborne and waterborne outbreaks, the main findings are presented and discussed in a joint 'Results and discussion' section and key messages are summarised in the 'Conclusions' section.

For each chapter, overview tables present the data reported by each reporting country. However, for the tables summarising MS-specific results and providing EU-level results, unless stated otherwise, data from industry own-check programmes, hazard analysis and critical control point (HACCP) sampling, as well as data from suspect sampling, selective sampling and outbreak or clinical investigations are excluded. Moreover, regional data reported by countries without statistics at the national level were also excluded from these summary tables.

### Data analyses

Statistical trend analyses in humans were carried out to evaluate the significance of temporal variations in the EU and the specifications of these analyses are explained in each separate chapter. The number of confirmed cases for the EU by month is presented as a trend figure. All countries that consistently reported cases – or reported zero cases over the whole reporting period – were included. The trend figure also shows a centred 12-month moving average over the last five years, illustrating the overall trend by smoothing seasonal and random variations. Moreover, the same trend analysis was carried out separately for each country (MS and non-MS countries). Analyses of data from humans were carried out for confirmed EU cases only, except for WNV infection, for which total cases (i.e. probable and confirmed cases) were considered.

The notification rates were calculated taking into account the coverage of the human population under surveillance (percentage of national coverage). For countries where surveillance did not apply to the whole population, estimated coverage – if provided – was used to calculate the country-specific rate. Cases and populations of those countries not providing information on national coverage or reporting incomplete data were excluded from the EU notification rate.

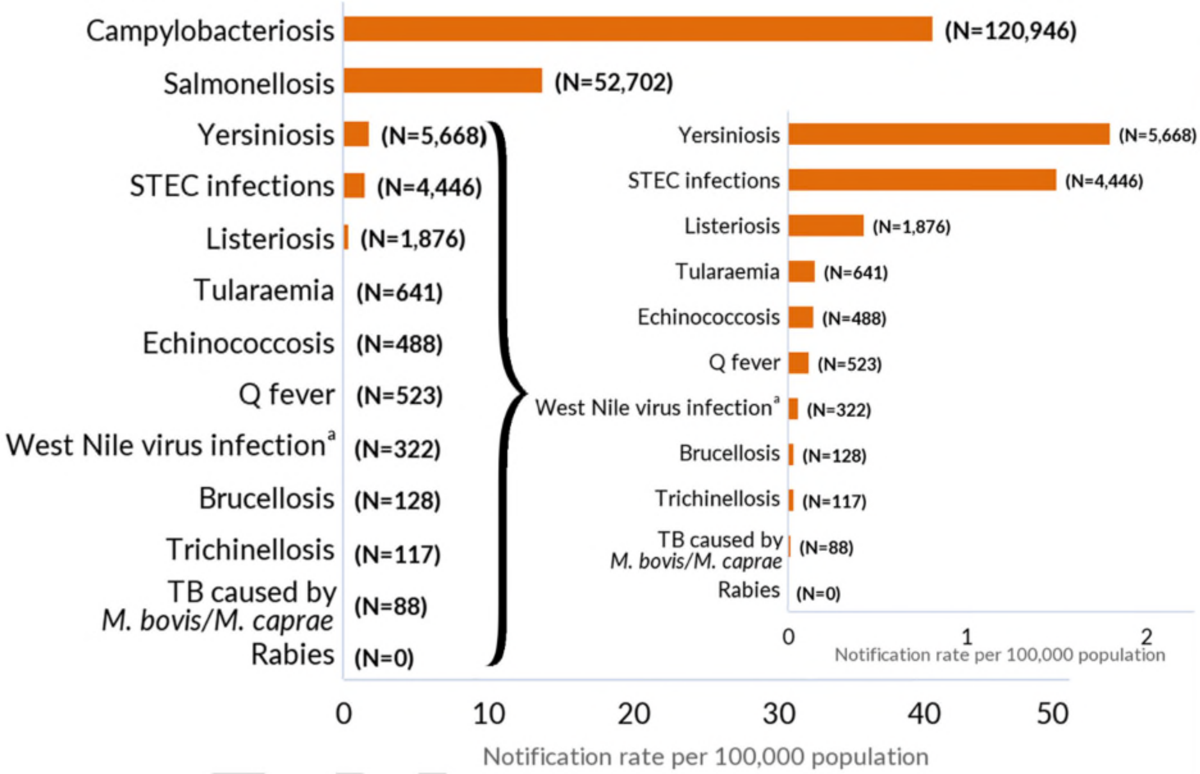
ESRI ArcMap 10.5.1 was used to map the data. Choropleth maps with graduated colours over five class scales of values, according to the natural breaks function proposed by the ArcGIS software, were used to map the proportion of positive sample units across the EU and other reporting countries. In the maps included in the present report, EU MS were represented with a blue label, whereas all the non-EU MS (including EFTA countries: Iceland, Norway, Switzerland and Liechtenstein; pre-accession countries: Albania, Bosnia and Herzegovina, North Macedonia, Montenegro and Serbia; and the United Kingdom, which on 1 February 2020 became a third country) were represented with an orange label.

Statistical trend analysis of foodborne outbreaks was performed to evaluate the significance of temporal variations at the single MS level over the 2010–2020 period, as described in the foodborne outbreaks chapter.

All undisplayed summary tables and figures used to produce this report are published as supporting information and are available as downloadable files from the EFSA knowledge junction at the Zenodo general-purpose open-access repository at https://doi.org/10.5281/zenodo.5682809. All validated country-specific data on food, animals, feed and foodborne outbreaks are also available at the above-mentioned URL.

## Summary of human zoonoses data for 2020

The numbers of confirmed human cases of the zoonoses presented in this report are summarised in Figure 1: . In 2020, campylobacteriosis was the most commonly reported zoonosis, as it has been since 2005. It represented more than 60% of all the reported cases in 2020. It was followed by other bacterial diseases, with salmonellosis, yersiniosis and STEC infections being the most frequently reported. The severity of the diseases was descriptively analysed based on hospitalisations and the outcomes of reported cases (0). Based on severity data, listeriosis and West Nile virus infection were the two most severe diseases with the highest case fatality and hospitalisation rates. Almost all confirmed cases with available hospitalisation data for these two diseases were hospitalised. About one out of every seven, and one out of every eight, confirmed listeriosis and WNV cases with known data, were fatal.




Note: The total number of confirmed cases is indicated in parentheses at the end of each bar.
[a] Regarding West Nile virus infection, the total number of cases was used (includes probable and confirmed cases).

**Figure 1:** Reported numbers of cases and notification rates of confirmed human zoonoses in the EU, 2020

**Table 2:** Reported hospitalisations and case fatalities due to zoonoses in confirmed human cases in the EU, 2020

| Disease | Number of confirmed human cases | Hospitalisation | | | | | Deaths | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Status available (N) | Status available (%) | Number of reporting MS[(b)] | Reported hospitalised cases | Proportion hospitalised (%) | Outcome available (N) | Outcome available (%) | Number of reporting MS[(b)] | Reported deaths | Case fatality (%) |
| **Campylobacteriosis** | 120,946 | 41,037 | 33.9 | 14 | 8,605 | 21.0 | 83,744 | 69.2 | 15 | 45 | 0.05 |
| **Salmonellosis** | 52,702 | 20,562 | 39.0 | 13 | 6,149 | 29.9 | 30,355 | 57.6 | 15 | 57 | 0.19 |
| **Yersiniosis** | 5,668 | 1,214 | 21.4 | 12 | 353 | 29.1 | 3,072 | 54.2 | 13 | 2 | 0.07 |
| **STEC infections** | 4,446 | 1,593 | 35.8 | 16 | 652 | 40.9 | 3,094 | 69.6 | 19 | 13 | 0.42 |
| **Listeriosis** | 1,876 | 803 | 42.8 | 18 | 780 | 97.1 | 1,283 | 68.4 | 18 | 167 | 13.0 |
| **Tularaemia** | 641 | 123 | 19.2 | 9 | 64 | 52.0 | 200 | 31.2 | 10 | 0 | 0 |
| **Echinococcosis** | 488 | 73 | 15.0 | 12 | 44 | 60.3 | 204 | 41.8 | 14 | 0 | 0 |
| **Q fever** | 523 | NA | NA | NA | NA | NA | 235 | 44.9 | 14 | 5 | 2.1 |
| **West Nile virus infection[(a)]** | 322 | 239 | 74.2 | 8 | 219 | 91.6 | 322 | 100 | 8 | 39 | 12.1 |
| **Brucellosis** | 128 | 56 | 43.8 | 8 | 36 | 64.3 | 55 | 43.0 | 9 | 2 | 3.6 |
| **Trichinellosis** | 117 | 22 | 18.8 | 5 | 16 | 72.7 | 24 | 20.5 | 6 | 0 | 0 |
| **Rabies** | 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

MS: Member State(s).
NA: Not applicable, as information is not collected for this disease.
(a): Locally acquired infections – for West Nile virus infection the total number of cases was used (includes probable and confirmed cases).
(b): Not all countries observed cases for all diseases.

## Comparison of human zoonoses data for 2019-2020

According to an MS survey conducted to interpret the possible impact of the COVID-19 pandemic on surveillance activities and the reporting of FWD data (0), in humans, for ten out of 22 MS that provided answers to the survey, the pandemic impacted their surveillance/monitoring systems, whereas for seven MS, there were no reported effects due to the pandemic. The comparability of FWD data for 2020 and 2019 were considered low-medium for 15 MS, whereas for only three MS were the human data reported over the last 2 years considered comparable.

**Table 3:** Results of the survey on the impact of COVID-19 on the surveillance/reporting of human cases of FWDs (brucellosis, campylobacteriosis, echinococcosis, listeriosis, salmonellosis, STEC infection, trichinellosis, congenital toxoplasmosis and yersiniosis) and comparability of collected data (2019, 2020)

| Country | Impact on surveillance and reporting | | | | Comparability of 2020 and 2019 data | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | No | Unknown | Variable * | Low | Medium | High | Variable */Unknown |
| Austria | | x | | | | | | x |
| Belgium | | x | | | | x | | |
| Czechia | | | x | | | x | | |
| Denmark | x | | | | x | | | |
| Estonia | | x | | | | x | | |
| Finland | | | x | | x | | | |
| France | | | | x | | | | x |
| Germany | x | | | | x | | | |
| Greece | x | | | | | | | x |
| Hungary | x | | | | | x | | |
| Ireland | x | | | | x | | | |
| Italy | | x | | | | x | | |
| Latvia | x | | | | | x | | |
| Lithuania | | | x | | | x | | |
| Luxembourg | | x | | | | x | | |
| Malta | | x | | | | | x | |
| Netherlands | | | x | | | x | | |
| Romania | x | | | | x | | | |
| Slovakia | x | | | | x | | | |
| Slovenia | x | | | | | | x | |
| Spain | x | | | | | | | x |
| Sweden | | x | | | | | x | |
| Iceland | | x | | | | | x | |
| Norway | x | | | | | x | | |

* varies according to the zoonosis

The comparison of data from 2020 and 2019 was influenced by the pandemic and by the withdrawal of the United Kingdom from the EU. In order to estimate the impact of both of these events on reported data, the absolute and relative difference between the number of cases and the notification rate reported in the EU for 2020 compared with 2019 for each disease was estimated (0). For all zoonoses except trichinellosis and yersiniosis, there was a reduction in the notification rates (*100,000 population) in 2020 as compared with 2019. The relative fall in notification rates in the EU varied from -52.6% for brucellosis to -7.1% for listeriosis. For trichinellosis and yersiniosis there was an increase of 39.1% and

6.0% respectively in the 2020 EU notification rate as compared with 2019. For each disease, the 2020/2019 relative difference in EU notification rates was also calculated based on EU 27 data only (i.e. excluding data reported by the United Kingdom for 2019) (0) in order to provide evidence of the effect of the withdrawal of the United Kingdom from the EU.

The relative difference in human notification rates at the EU-27 level allows for a more precise assessment of the impact of the COVID-19 pandemic on zoonoses in the EU (0). A fall in notification rates (≥ 30% relative decrease) was reported for brucellosis, tularaemia, Q fever and salmonellosis. For echinococcosis, campylobacteriosis, WNV infections,_tuberculosis, STEC infections, listeriosis and yersiniosis, the drop was less relevant. For trichinellosis, an increase in the relative difference between the 2020 and 2019) EU (27) notification rates was observed.

According to the feedback provided by MS along with the survey and the evidence deriving from the scientific literature (Haldane et al., 2021; Müller et al., 2021; Ullrich et al., 2021), the COVID-19 pandemic might have caused a drop in reported human cases and notification rates for almost all zoonotic diseases. Various factors, in fact, might have had an effect: national health care resilience (health workforce, laboratory and diagnostic capability, access to hospitals and medical assistance), the shutdown of domestic and international travel, restrictions on sporting and recreational/social events, the closing of restaurants and catering facilities (i.e. schools, workplaces), quarantine, lockdown and other non-pharmaceutical mitigation measures (face masking, hand washing/sanitisation, physical distancing, restricted movement and social gatherings).

Instead, looking at the relative difference in notification rates in the EU (2019) and EU-27 (2020), the withdrawal of the United Kingdom from the EU seems to have had little impact on salmonellosis and tuberculosis. For campylobacteriosis and STEC infection, the withdrawal of the United Kingdom from the EU seems to have had a positive impact in terms of reduction of the EU notification rate, probably related to a recurring high number of cases reported by the United Kingdom relative to population size. In contrast, for the remaining diseases the withdrawal of the United Kingdom from the EU seems to have had a negative impact because an increase in the EU notification rate was noted, likely due to the low number of cases reported by the United Kingdom relative to population size.

**Table 4:** 2020/2019 absolute difference in the number of confirmed human cases by zoonosis and absolute and relative (%) difference in notification rates per 100,000 population for zoonoses reported in the EU, 2020

| Zoonosis | EU level (a) | Cases (N) | | Rate | | |
|---|---|---|---|---|---|---|
| | | 2020 | 2020-2019 difference | 2020 | 2020-2019 difference | |
| | | | | | Absolute difference (%) | Relative difference (%) |
| Campylobacteriosis | EU | 120,946 | -99,693 | 40.3 | -20.3 | -33.4 |
| | EU-27 | | -40,975 | | -13.7 | -25.4 |
| Salmonellosis | EU | 52,702 | -35,206 | 13.7 | -5.8 | -29.7 |
| | EU-27 | | -25,488 | | -6.7 | -32.8 |
| Yersiniosis | EU | 5,668 | -1,299 | 1.8 | 0.10 | 6.0 |
| | EU-27 | | -1,136 | | -0.27 | -13.4 |
| STEC infections | EU | 4,446 | -3,355 | 1.5 | -0.43 | -22.4 |
| | EU-27 | | -1,768 | | -0.33 | -18.2 |
| Listeriosis | EU | 1,876 | -745 | 0.42 | -0.03 | -7.1 |
| | EU-27 | | -591 | | -0.07 | -14.2 |
| Tularaemia | EU | 641 | -639 | 0.15 | -0.11 | -42.5 |
| | EU-27 | | -639 | | -0.15 | -50.0 |
| Q fever | EU | 523 | -428 | 0.12 | -0.07 | -36.7 |
| | EU-27 | | -419 | | -0.10 | -44.6 |
| Echinococcosis | EU | 488 | -278 | 0.14 | -0.03 | -16.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | EU-27 | | -275 | | -0.06 | -28.4 |
| West Nile virus [b] | EU | 322 | -68 | 0.07 | -0.01 | -12.9 |
| | EU-27 | | -68 | | -0.02 | -24.4 |
| Brucellosis | EU | 128 | -182 | 0.03 | -0.03 | -52.6 |
| | EU-27 | | -158 | | -0.04 | -55.3 |
| Trichinellosis | EU | 117 | 20 | 0.03 | 0.01 | 39.1 |
| | EU-27 | | 20 | | < 0.01 | 20.4 |
| Tuberculosis | EU | 88 | 64 | 0.02 | -0.01 | -32.0 |
| | EU-27 | | 29 | | -0.01 | -24.9 |

In 2019 data from the United Kingdom were collected because the UK was an EU MS, but since 1 February 2020 it has become a third country. To calculate the 2020/2019 difference, data from the United Kingdom for 2019 were included in this 'EU' calculation, whereas human data from the United Kingdom were not collected by ECDC for 2020 ('EU-27').
For West Nile virus infection the total number of cases was used (includes probable and confirmed cases).

# Zoonoses included in compulsory annual monitoring (Directive 2003/99 List A)

## 1. *Campylobacter*

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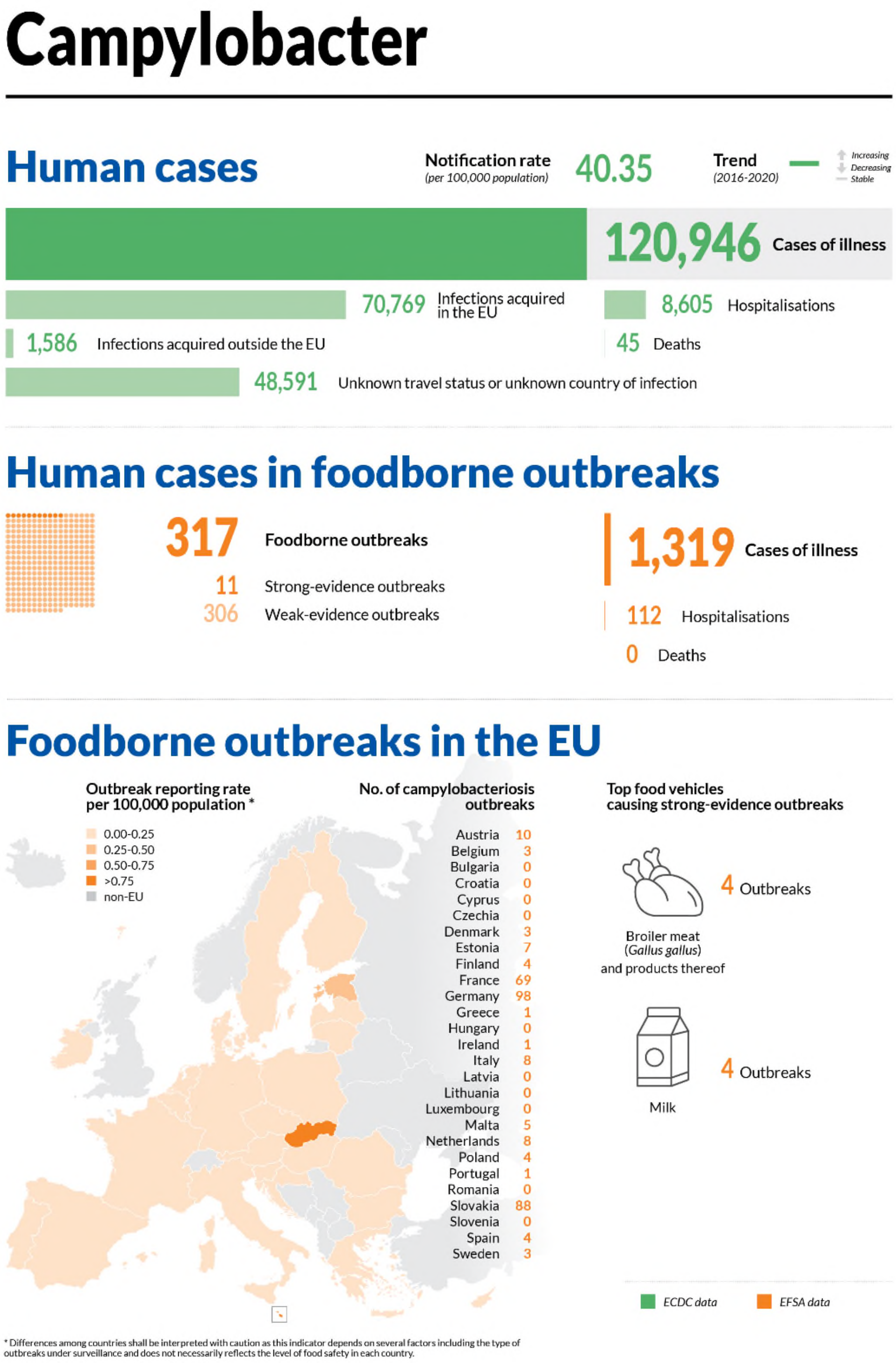

## 1.1. Key facts

- Campylobacteriosis is the most commonly reported foodborne gastrointestinal infection in humans in the EU and has been so since 2005.
- In 2020, *Campylobacter* reporting recorded the lowest number of human cases since campylobacteriosis surveillance began in 2007, owing to the impacts of the withdrawal of the United Kingdom from the EU and the COVID-19 pandemic.
- In 2020, the number of confirmed cases of human campylobacteriosis totalled 120,946, corresponding to an EU notification rate of 40.3 per 100,000 population. This is a decrease of 33.4% and 25.4% compared with the rate in 2019 (60.6 and 54.0 per 100,000 population) with and without the 2019 data from the United Kingdom, respectively.
- A decrease in cases was observed in 2020, probably due to the COVID-19 pandemic. However, the overall campylobacteriosis trend in 2016-2020 showed no statistically significant increase or decrease.
- In most of the cases (98.5%), where the origin was known, the infection was acquired in the EU.
- In 2020, *Campylobacter* was the fourth most frequent cause of foodborne outbreaks reported by 17 MS at EU level. In total, 317 outbreaks caused by *Campylobacter* were reported to EFSA, including 1,319 cases of illness, 112 hospitalisations and no deaths. Eleven outbreaks were reported with strong-evidence and 306 with weak-evidence. The most common food vehicles for the strong-evidence campylobacteriosis foodborne outbreaks were 'broiler meat' and 'raw milk', as in previous years.
- Twenty-one MS reported data in the context of the *Campylobacter* process hygiene criterion, set out in Regulation (EC) No 2073/2005. In particular, 12 MS reported official controls from 6,384 neck skin samples. Of the results reported, 38.7% were *Campylobacter*-positive, and 17.8% exceeded the limit of 1,000 CFU/g. Seventeen MS reported monitoring data based on sampling results collected from food business operators. A total of 46,259 test results from neck skin samples were reported. Of the results reported, 31.3% were *Campylobacter*-positive, whereas 17.6% exceeded the limit of 1,000 CFU/g and this percentage was comparable with the results from official controls. Eight MS reported results from both samplers and showed 42.1% and 40.1% *Campylobacter*-positive samples from official and food business operators samples, respectively. Overall for these 8 MS the number of samples exceeding the limit was significantly higher in official samples (16.6%) than those based on own-checks (8.9%).
- In 2020, 3,202 'ready-to-eat' and 13,240 'non ready-to-eat' results from food sampling unit were reported by seven and 16 MS, respectively. In the 'ready-to-eat' category, four *Campylobacter*-positive sampling units were detected: two from 'raw milk', one from 'meat products' and one from 'fruit, vegetables and juices'. In the 'non ready-to-eat' food category, 2,684 (20.3%) *Campylobacter*-positive sampling unit were reported. The food category with the highest level of contamination was 'meat and meat products' with 25.2% positive units. Overall, *Campylobacter* was isolated from all fresh meat categories, with meat from broilers and turkeys showing the highest percentage of *Campylobacter*-positive samples, 30.5% and 21.5%, respectively.
- In 2020, *Campylobacter* spp. was detected by 17 MS and four non-MS in more than 50 different animal categories. However, the vast majority of units tested (N= 13,625) were collected from broilers, where the observed proportion of positives was 24.5%. Although fewer samples were reported by a small number of countries for turkeys and pigs alone, these categories had the highest proportion of positives, 62.1% and 58.5%, respectively. Surveillance and monitoring of *Campylobacter* in the EU

## 2. *Salmonella*

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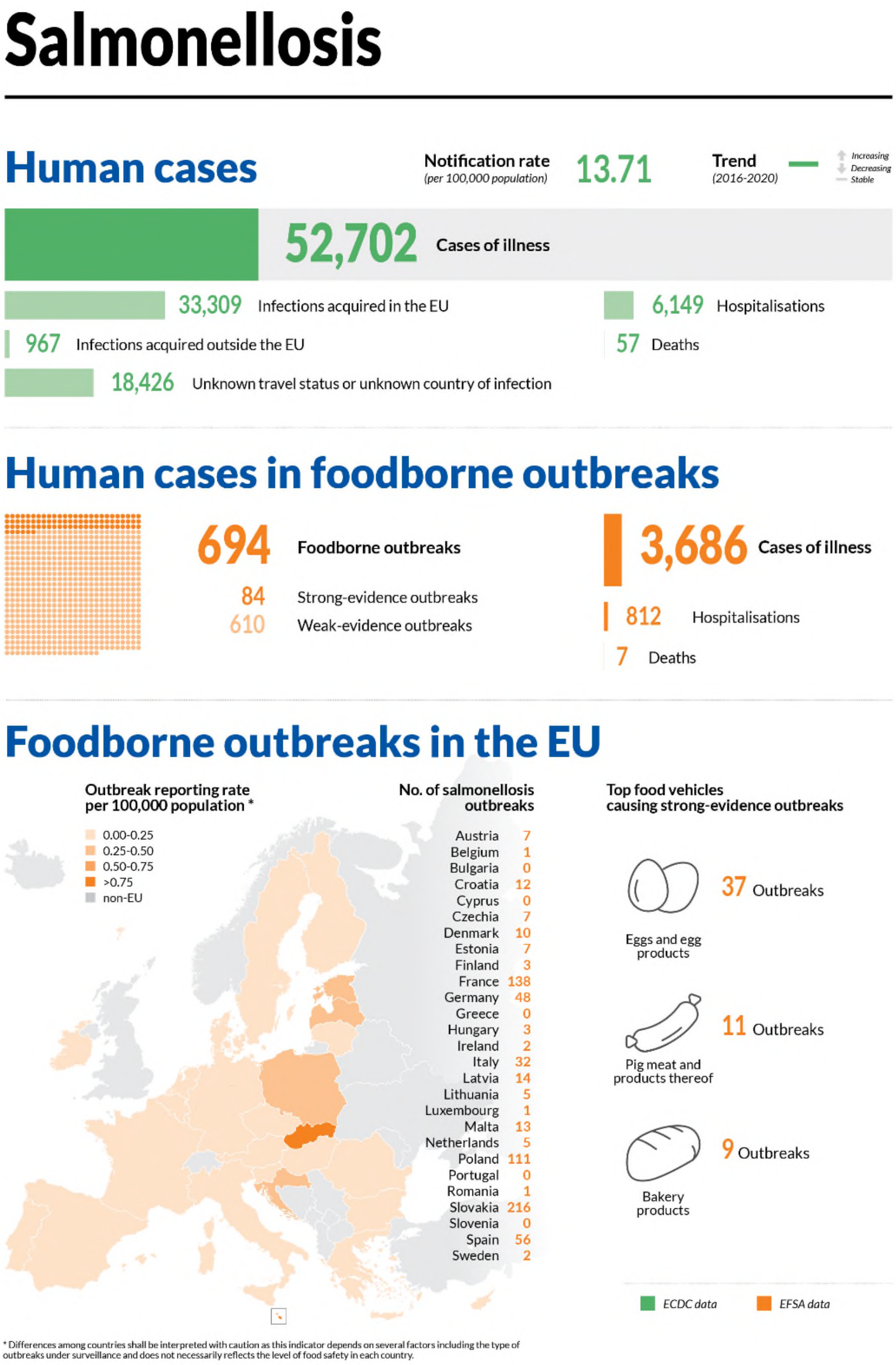

## 2.1. Key facts

- Salmonellosis was the second most commonly reported foodborne gastrointestinal infection in humans after campylobacteriosis and was an important cause of foodborne outbreaks in EU MS and non-MS countries.
- In 2020, *Salmonella* reporting recorded the lowest number of human cases since 2007, when salmonellosis surveillance started, owing to the impacts of the withdrawal of the United Kingdom from the EU on the one hand and the COVID-19 pandemic on the other.
- In 2020, the number of confirmed cases of human salmonellosis was 52,702, corresponding to an EU notification rate of 13.7 per 100,000 population. This was a decrease of 29.7% and 32.8% compared with the rate in 2019 (19.5 and 20.4 per 100,000 population) with and without the 2019 data from the United Kingdom, respectively.
- Notwithstanding, the overall trend for salmonellosis in 2016-2020 did not show any statistically significant increase or decrease.
- The proportion of hospitalised cases was 29.9%, which was lower than in 2019, with an EU case fatality rate of 0.19%.
- The top five *Salmonella* serovars involved in human infections overall were distributed as follows: *S.* Enteritidis (48.7%), *S.* Typhimurium (12.4%), monophasic *S.* Typhimurium (1,4,[5],12:i:-) (11.1%), *S*. Infantis (2.5%) and *S.* Derby (1.2%).
- In total, 694 foodborne outbreaks of *Salmonella* were reported by 22 MS in 2020, causing 3,686 illnesses, 812 hospitalisations and seven deaths. *Salmonella* caused 22.5% of all foodborne outbreaks in 2020. The majority (57.9%) of the reported foodborne outbreaks of *Salmonella* were caused by *S.* Enteritidis. The three food vehicles most commonly involved in strong-evidence foodborne salmonellosis outbreaks were 'eggs and egg products', followed by 'pig meat and products thereof' and 'bakery products'.
- For 2020, 69,898 'ready-to-eat' food sampling units collected according to an 'objective sampling' strategy were reported by 22 MS with 0.15% positive samples overall. Within each food category, 1.6% of 'meat and meat products from broilers', 0.8% of 'spices and herbs', 0.6% of 'meat and meat products from pigs', 0.5% of 'meat and meat products from turkeys' and 0.5% of 'other meat and meats products' were positive for *Salmonella*.
- Sampling to verify compliance with process hygiene criteria, according to Regulation (EC) No 2073/2005 found significantly lower proportions of *Salmonella*-positive carcases of pigs, broilers, turkey and cattle in samples collected by food business operators as own-check controls, compared with the official control samples collected by the Competent Authorities at EU level.
- Fourteen of the 26 MS reporting on *Salmonella* control programmes met the reduction targets for all poultry populations, compared to 18 in 2019. The number of MS that did not meet the *Salmonella* reduction targets was three for breeding flocks of *Gallus gallus*, seven for laying hen flocks, three for broiler flocks, one for breeding flocks of turkeys and three for fattening turkey flocks.
- In the context of *Salmonella* control programmes in poultry, the prevalence of target *Salmonella* serovars in broiler and fattening turkey flocks reported by food business operators was significantly lower than that reported by the Competent Authorities at EU level.
- A significant increase in the estimated prevalence of *Salmonella* was noted for laying hens and breeding turkeys in 2020 compared with 2014 and 2015 respectively, when prevalence reached the lowest level in these poultry populations. Flock prevalence trends for target *Salmonella* serovars were, in contrast, fairly stable over the last few years for all poultry populations.
- Considering the top five serovars responsible for human infections and the major putative sources (broilers, cattle, turkeys, laying hens and pigs, isolated from both animals and food thereof), a panel of 17,877 serotyped isolates from food and food-producing animals was reported. *S.* Enteritidis was primarily related to broiler sources and to layers and eggs. *S.* Typhimurium was mainly linked with broiler and pig sources. Monophasic *S.* Typhimurium (1,4,[5],12:i:-) was related mainly to pig and secondly to broiler sources. *S*. Infantis was strictly related to broiler sources, whereas *S.* Derby was primarily linked with pigs.

## 3. *Listeria monocytogenes*

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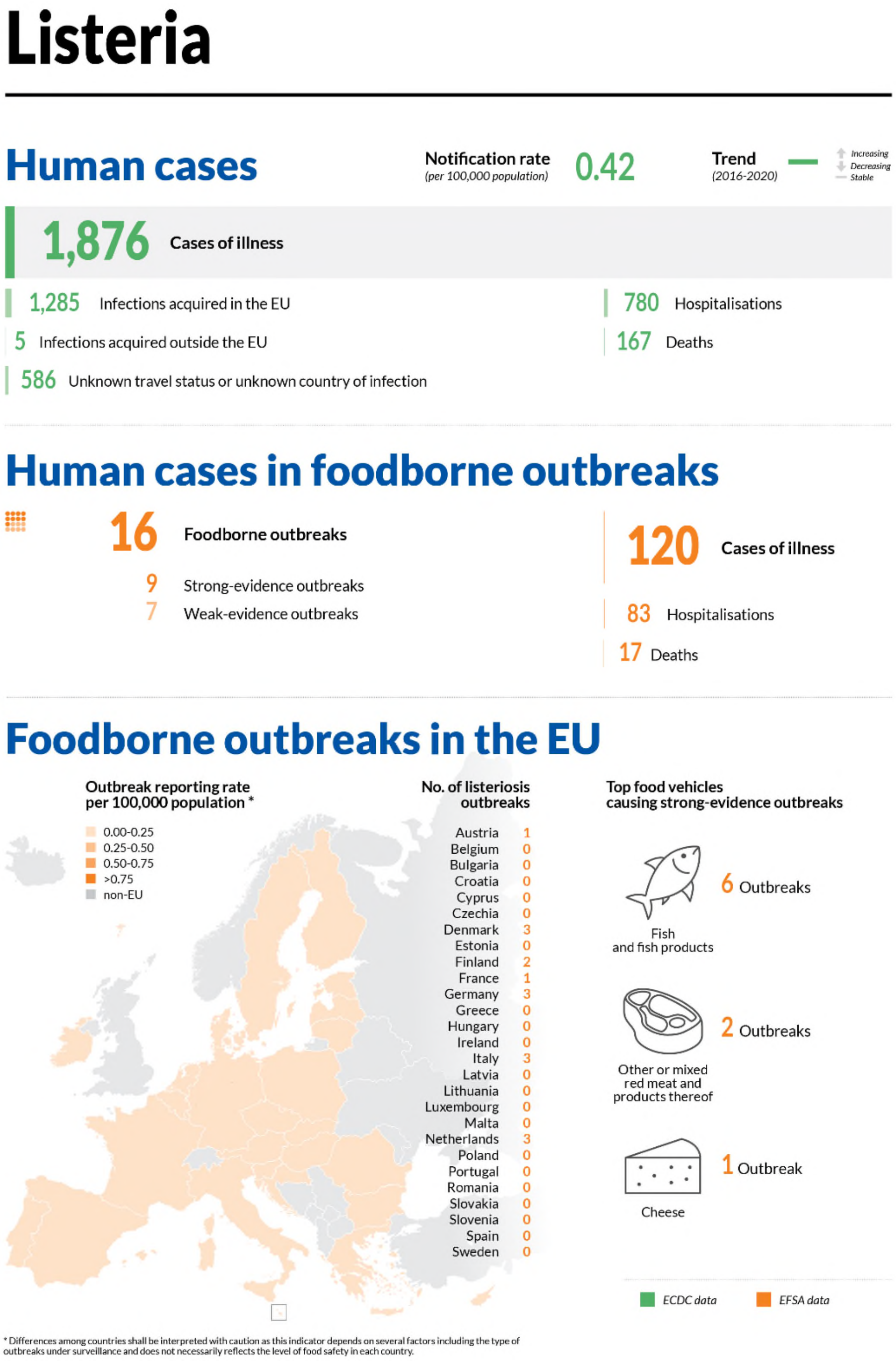


### 3.1. Key facts

- In 2020, 27 MS reported 1,876 confirmed invasive human cases of *L. monocytogenes* that caused 780 hospitalisations and 167 deaths in the EU. Listeriosis was the fifth most commonly reported zoonosis in humans in the EU.

- The EU notification rate of *L. monocytogenes* was 0.42 per 100,000 population. This is a decrease of 7.1% and 14.2% compared with the rate in 2019 (0.46 and 0.49 per 100,000 population) with and without the 2019 data from the United Kingdom, respectively.
- Although a decrease in cases was observed at the EU level in 2020, probably due to the effect of the COVID-19 pandemic, the overall trend for listeriosis in 2016-2020 did not show any statistically significant increase or decrease.
- The overall EU case fatality was high (13.0%), but decreased compared with 2019 and 2018 (17.6% and 13.6%, respectively). This still makes listeriosis one of the most serious foodborne diseases under EU surveillance.
- *L. monocytogenes* infections were most commonly reported in the age group 'over 64 years' and particularly in the age group 'over 84 years'.
- In 2020, *L. monocytogenes* was the causative agent of 16 foodborne outbreaks at the EU level, involving 7 MS and 120 cases of illness, 83 hospitalisations and 17 deaths. Nine outbreaks were reported with strong-evidence and 8 with weak-evidence. The most common implicated food vehicles for the strong-evidence listeriosis foodborne outbreaks were 'fish and fish products', 'other or mixed meat and products thereof' and 'cheese'.
- 24 MS reported 136,346 samples in different 'ready-to-eat food' categories at the retail or processing stages; this corresponds to a 37.6% decrease of the reported sampling effort compared with 2019.
- The occurrence of *L. monocytogenes* gives an indication of the reasonably foreseeable contamination rate in different food categories. These results varied according to the 'ready-to-eat' food category and the sampling stage.
- At retail, the proportion of single samples positive for *L. monocytogenes* taken by the competent authority remained very low to low in all 'ready-to-eat' food categories covered by Regulation (EC) No 2073/2005, from 0.0% for 5 out of 11 'ready-to-eat' categories to 1.3% and 1.4% for 'ready-to-eat' fishery products and ready-to-eat fish, respectively.
- At processing, the proportion of single samples positive for *L. monocytogenes* taken by the competent authority was systematically higher compared to the retail level, for all categories of 'ready-to-eat' food. As at retail, the highest proportion at processing was found for 'ready-to-eat' fishery products (3.8%) and 'ready-to-eat' fish (3.5%), followed by products of meat origin other than fermented sausages (2.2%).
- In primary production, the percentage of positive units was very low (1.0%) in cattle, which is the most sampled animal species in the EU. The low number of data reported by MS reflects the absence of harmonised EU regulations at primary production.

# 4. Shiga toxin-producing *Escherichia coli* (STEC)

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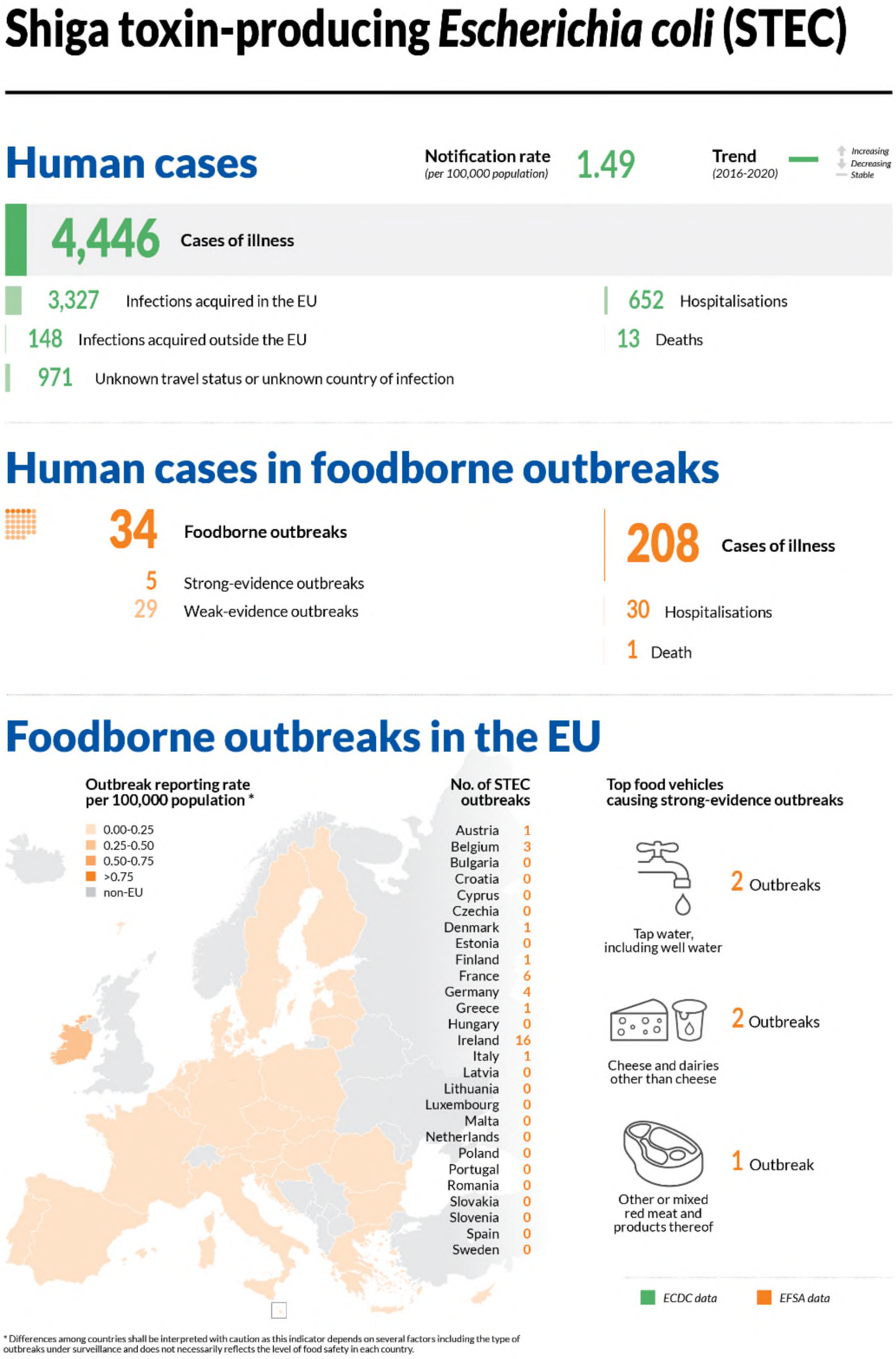

## 4.1. Key facts

- In 2020, the number of confirmed cases of human STEC infection was 4,446. This made STEC the fourth most commonly reported foodborne gastrointestinal infection in humans in the EU.
- A decrease of cases in 2020 was observed, probably due to the COVID-19 pandemic. The overall trend for STEC infections however did not show any statistically significant increase or decrease in 2016-2020.
- The EU notification rate was 1.5 per 100,000 population. This is a decrease of 22.4% and 18.2% compared with the rate in 2019 (1.9 and 1.8 per 100,000 population) with and without the 2019 data from the United Kingdom, respectively.
- STEC was the fourth most frequent bacterial agent detected in foodborne outbreaks in the EU, with 34 outbreaks, 208 cases, 30 hospitalisations and 1 death reported in 2020.
- The sources in the five strong-evidence STEC foodborne outbreaks during 2020 were 'tap water, including well water' (two outbreaks), 'meat and meat products', 'dairy products other than cheese' and 'cheeses made from cows' milk' (one outbreak each).
- In 2020, 22 MS reported the presence of STEC in 2.4% of 19,036 food sample units taken according an 'objective sampling' strategy, compared with 2.8% in 2019.
- 'Sprouted seeds' were tested by six MS in the context of Regulation (EC) No 2073/2005 with no positive STEC units in 323 official samples.
- Overall, STEC was most commonly found in 'meat of different types' derived from different animal species (3.4% STEC-positive), followed by 'milk and dairy products' (2.1%), while 'fruits and vegetables' was the least contaminated category (0.1%).
- Seventeen MS tested 7,924 ready-to-eat (RTE) food samples for STEC of which 105 (1.3%) were found to be STEC-positive, including 28 (1.7%) 'meat and meat product samples', 33 (1.5%) 'milk and milk product samples', two (0.5%) samples from 'spices and herbs' and four STEC-positive samples from 'fruits, vegetables and juices' (0.2%).
- Of the STEC strains from food detected with the reference method ISO TS 13136:2012 and provided with information on the serogroup in 2020, 17.7% belonged to the so-called 'top five' serogroups (O157, O26, O103, O111 and O145) and many of the remaining STEC belonged to the top 20 STEC serogroups reported in human infections to ECDC in 2016–2019.
- Most of the virulotypes of STEC isolates from food and animals were also identified in severe STEC infections in humans. Only 39.3% (N=220) of the STEC isolated from food in 2020 were reported together with information on the *stx* gene typing (*stx1* or *stx2*) and only 48.2% of these were also tested for the presence of the intimin-coding gene *eae.* When considering the *stx* gene subtypes, about 8% of the food and animal isolates were provided with this level of characterisation.
- Testing of animal samples was still not widely carried out in the EU, with 2,112 animal samples reported taken with any sampling strategy for STEC by six MS in 2020.

# 5. Tuberculosis due to *Mycobacterium bovis* or *Mycobacterium caprae*

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## Tuberculosis
due to *Mycobacterium bovis* or *Mycobacterium caprae*

### Human cases

**Notification rate** *(per 100,000 population)* 0.023

**Trend** *(2016-2020)* *

Increasing
Decreasing
Stable

* Excluded from plan of analysis 2020

**88** **Cases of illness**

49 Cases in individuals of EU origin
32 Cases in individuals originating from outside the EU
7 Unknown infections

0 Hospitalisations
0 Deaths

### Human cases in foodborne outbreaks

**0** **Foodborne outbreaks**

0 Strong-evidence outbreaks
0 Weak-evidence outbreaks

**0** **Cases of illness**

0 Hospitalisations
0 Deaths

## 5.1. Key facts

- In 2020, 88 confirmed cases of tuberculosis due to *Mycobacterium bovis* or *M. caprae* were reported in the EU.
- Although *M. bovis* and *M. caprae* cases were more frequently reported by MS that were not officially bovine tuberculosis free (non-OTF) compared with MS that were officially bovine tuberculosis free in cattle (OTF), the notification rate in the two groups of MS was similar (0.02 cases per 100,000 in OTF and 0.02 per 100,000 in non-OTF).
- In 2020, the majority of *M. bovis* and *M. caprae* cases in humans (55.7%) were of EU origin (native cases and/or cases originating from other EU MS).
- The EU notification rate of *M. bovis* and *M. caprae* has ranged from 0.02 to 0.05 per 100,000 population between 2016 and 2020.
- In 2020, the EU notification rate of tuberculosis due to *M. bovis* or *M. caprae* was 0.02 per 100,000 population. This is a decrease of 32.2% and 25.8% compared with the rate in 2019 (0.035 and 0.032 per 100,000 population) with and without the data from the United Kingdom, respectively.
- No foodborne outbreak due to the *Mycobacterium tuberculosis* complex has ever been reported to EFSA since the start of the data collection on foodborne outbreaks in 2004; 2020 was no exception.
- In 2020, the overall prevalence of bovine tuberculosis and the number of positive bovine herds in the EU decreased to 0.4% and 7,372 herds, respectively, compared to 0.8% and 16,420 herds in 2019. This decrease was mainly due to the withdrawal of the United Kingdom from the EU.
- Thirteen MS detected the presence of bovine tuberculosis in 2020. Similar to previous years, the distribution of positive herds was heterogeneous and spatially clustered, with herd prevalence ranging from <0.1% (Belgium, Poland) to 4.7% (Ireland) at a national level and a regional-level prevalence of 8.3% in the Castilla-La Mancha region, Spain.
- Seventeen MS were officially bovine tuberculosis-free (OTF) during 2020. Ten MS were non-OTF, of which only three MS (Italy, Portugal and Spain) had OTF regions.
- Overall, 139 bovine tuberculosis-infected cattle herds (0.013% of all herds in the OTF regions of these 20 MS), making infection a rare event, as in previous years.
- In the non-OTF regions of 10 MS, 7,233 bovine herds (1.01% of total herds in these regions) tested positive for bovine tuberculosis in 2020. Ireland and Spain were the only MS that reported prevalence rates >1%; in particular, bovine tuberculosis prevalence was 4.7% in Ireland and 1.5% in Spain. Greece, Italy and Portugal reported very low (<1%) prevalence rates. No infected herds were reported by Malta.
- From 2010 to 2020, the annual number of bovine tuberculosis-positive cattle herds and the prevalence of bovine tuberculosis in non-OTF regions decreased by 59.4% and 3.2%, respectively. This decrease was attributable to the withdrawal of the United Kingdom from the EU in 2020. In fact, the annual prevalence of bovine tuberculosis-positive herds in non-OTF regions of the United Kingdom (i.e. Wales, England and Northern Ireland) was consistently greater than 10% between 2010 and 2019. Moreover, in non-OTF regions, the total number of cattle herds dropped by 56.5% during the same period (there were half as many herds in 2020 as in 2010). Compared with 2019, in non-OTF regions, the total number of cattle herds, the prevalence and the number of positive cattle herds decreased in 2020 by 55.6%, 43.8% and 21%, respectively. However, excluding the United Kingdom from the data for 2019 reveals an increase of about 7% and 23% in the annual number of positive cattle herds and the prevalence of cattle herds in the non-OTF regions, respectively, and a decrease of 12.8% in the total number of cattle herds for 2020.

## 6. *Brucella*

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# Brucella

## Human cases

Notification rate (per 100,000 population) 0.03

Trend (2016-2020): Decreasing (Increasing / Decreasing / Stable)

**128** Cases of illness

- 63 Infections acquired in the EU
- 14 Infections acquired outside the EU
- 51 Unknown travel status or unknown country of infection

- 36 Hospitalisations
- 2 Deaths

## Human cases in foodborne outbreaks

**1** Foodborne outbreak

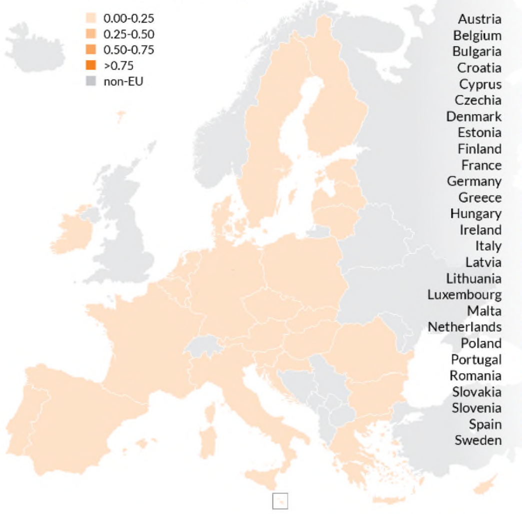
- 0 Strong-evidence outbreaks
- 1 Weak-evidence outbreak

**2** Cases of illness

- 2 Hospitalisations
- 0 Deaths

## Foodborne outbreaks in the EU

Outbreak reporting rate per 100,000 population *




| No. of brucellosis outbreaks | |
|---|---|
| Austria | 1 |
| Belgium | 0 |
| Bulgaria | 0 |
| Croatia | 0 |
| Cyprus | 0 |
| Czechia | 0 |
| Denmark | 0 |
| Estonia | 0 |
| Finland | 0 |
| France | 0 |
| Germany | 0 |
| Greece | 0 |
| Hungary | 0 |
| Ireland | 0 |
| Italy | 0 |
| Latvia | 0 |
| Lithuania | 0 |
| Luxembourg | 0 |
| Malta | 0 |
| Netherlands | 0 |
| Poland | 0 |
| Portugal | 0 |
| Romania | 0 |
| Slovakia | 0 |
| Slovenia | 0 |
| Spain | 0 |
| Sweden | 0 |

Top food vehicles causing strong-evidence outbreaks

ECDC data / EFSA data

* Differences among countries shall be interpreted with caution as this indicator depends on several factors including the type of outbreaks under surveillance and does not necessarily reflects the level of food safety in each country.

## 6.1. Key facts

- In 2020, the number of confirmed cases of human brucellosis was 128 in the EU.
- The EU notification rate of 0.03 per 100,000 population was the lowest notification rate reported since the beginning of surveillance in the European Union in 2007.
- There was a decrease of 52.6% and 55.3% compared with the rate in 2019 (0.06 and 0.06 per 100,000 population) with and without the 2019 data from the United Kingdom, respectively.
- From 2016 to 2020 there was a significantly declining trend of confirmed human cases of brucellosis in the EU.
- Three MS (Greece, Italy and Portugal) had significantly decreasing five-year trends from 2016 to 2020.
- Forty-nine (38.3%) out of 128 human cases were reported with information on the *Brucella* species. This is an increase of 5.8% compared with the data in 2019 (36.2%). *Brucella melitensis* was reported as the etiological agent in 43 (87.8%) out of 49 cases. This is a reduction of 7.2% compared with the data in 2019 (94.6%).
- In 2020, one weak-evidence foodborne brucellosis outbreak was reported in the European Union, due to *Brucella melitensis* in sheep meat and products thereof, affecting two persons from the same household, who contracted the infection abroad.
- In cattle, the trend is favourable in 20 officially brucellosis-free Member States and seven non-officially brucellosis-free Member States (Bulgaria, Croatia, Greece, Hungary, Italy, Portugal and Spain). Overall, in the officially brucellosis-free regions of the European Union there were six infected herds in 2020 with an extreme low prevalence (< 0.001). In the non-officially brucellosis-free regions of the European Union, bovine brucellosis remained a rare event with 603 positive herds (0.38%) out of 157,000 tested herds, which was the lowest annual count since 2012. Data from Bulgaria were missing for 2020.
- In sheep and goats, a stable situation was reported for 19 officially *Brucella melitensis*-free Member States and eight non-officially *Brucella melitensis*-free Member States (Bulgaria, Croatia, France, Greece, Italy, Malta, Portugal and Spain). Overall in the non-officially *Brucella melitensis*-free regions of the European Union, 349 (0.22%) sheep and goat flocks were reported brucellosis-positive out of 160,000 tested, which was the lowest count since 2012. However, data from Bulgaria were missing for 2020.
- The eradication of brucellosis in cattle and in sheep and goats is close to being achieved in Croatia and Spain, with almost no positive herds reported for these infections in recent years.
- Brucellosis in cattle, and in sheep and goats is still prevalent in Greece and in some regions of Italy and Portugal. In Italy and Portugal, the proportion of brucellosis-positive cattle herds, and sheep and goat flocks in non-officially free regions decreased in recent years.
- Brucellosis is still an animal health concern with public health relevance in southern European countries that are not officially free of brucellosis.

# 7. *Trichinella*

Tables and figures that are not presented in this chapter are published as supporting information to this report and are available as downloadable files from the EFSA Knowledge Junction on Zenodo at https://doi.org/10.5281/zenodo.5682809. Summary statistics of human surveillance data with downloadable files are retrievable using ECDC's Surveillance Atlas of Infectious Diseases at http://atlas.ecdc.europa.eu/public/index.aspx

# Trichinella

## Human cases

Notification rate (per 100,000 population) **0.03**

Trend (2016-2020): Stable (Increasing / Decreasing / Stable)

**117** Cases of illness

- 99 Infections acquired in the EU
- 2 Infections acquired outside the EU
- 16 Unknown travel status or unknown country of infection

- 16 Hospitalisations
- 0 Deaths

## Human cases in foodborne outbreaks

**6** Foodborne outbreaks

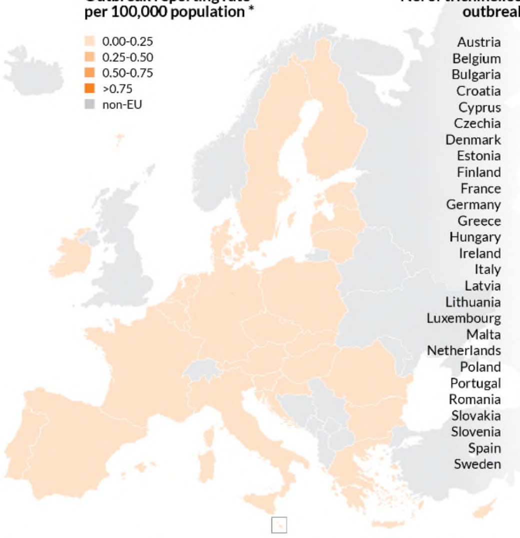
- 5 Strong-evidence outbreaks
- 1 Weak-evidence outbreaks

**119** Cases of illness

- 13 Hospitalisations
- 0 Deaths

## Foodborne outbreaks in the EU

Outbreak reporting rate per 100,000 population *




| No. of trichinellosis outbreaks | |
|---|---|
| Austria | 0 |
| Belgium | 0 |
| Bulgaria | 0 |
| Croatia | 0 |
| Cyprus | 0 |
| Czechia | 0 |
| Denmark | 0 |
| Estonia | 0 |
| Finland | 0 |
| France | 1 |
| Germany | 0 |
| Greece | 0 |
| Hungary | 0 |
| Ireland | 0 |
| Italy | 1 |
| Latvia | 0 |
| Lithuania | 0 |
| Luxembourg | 0 |
| Malta | 0 |
| Netherlands | 0 |
| Poland | 2 |
| Portugal | 0 |
| Romania | 1 |
| Slovakia | 0 |
| Slovenia | 0 |
| Spain | 1 |
| Sweden | 0 |

Top food vehicles causing strong-evidence outbreaks

Other or mixed red meat and products thereof: 3 Outbreaks

Pig meat and products thereof: 2 Outbreaks

ECDC data   EFSA data

* Differences among countries shall be interpreted with caution as this indicator depends on several factors including the type of outbreaks under surveillance and does not necessarily reflects the level of food safety in each country.

## 7.1. Key facts

- In 2020, the number of confirmed cases of human trichinellosis was 117 corresponding to an EU notification rate of 0.03 per 100,000 population. This was an increase of 39.1% and 20.4% compared with the rates in 2019 (0.02 and 0.02 per 100,000 population) with and without the 2019 data from the United Kingdom, respectively. This increase was mainly due to the number of confirmed cases reported by four MS (Austria, Bulgaria, Italy, and Poland).
- The trend in the number of confirmed cases of trichinellosis in the EU did not significantly increase or decrease in 2016-2020.
- In terms of reported *Trichinella* outbreaks in the EU, there were five strong-evidence outbreaks and one weak-evidence outbreak, with 119 illnesses, 13 people hospitalised and no deaths. In the strong-evidence outbreaks, the responsible food vehicles were, in each one, 'fresh raw sausages from wild boar meat', 'pig meat and products thereof', 'other or mixed red meat and products thereof', 'meat and meat products' and 'fresh pig meat'. Two strong-evidence outbreaks were reported by a single non-EU country with eight confirmed cases, seven hospitalisations and no deaths.
- In 2020, no infections with *Trichinella* were reported in tested fattening pigs (55 million) or breeding pigs (0.9 million) kept under controlled housing conditions, confirming that farming conditions are a key factor to prevent infection with this zoonosis.
- In pigs not kept under controlled housing conditions, 0.0001% (179 out of 139 million) were positive for *Trichinella*. Romania accounted for almost half of the positive pigs (91), followed by Bulgaria (60), Greece (11), Croatia (nine), France (three from Corsica Island), Spain (three) and Italy (two).
- No *Trichinella* infections were detected in domestic solipeds in the EU in 2020, as had been the case in 2016–2019.
- In 2020, the proportion of hunted wild boar that tested positive was 0.05%, which was a decrease versus the previous three-year period.
- The proportion of *Trichinella*-positive red foxes (indicator animals) was 0.85% in 2020, which was the lowest prevalence in the 2016-2020 period.

# 8. *Echinococcus*

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## Echinococcus

### Human cases

Notification rate (per 100,000 population) 0.14

Trend (2016-2020) *

Increasing
Decreasing
Stable

* Excluded from plan of analysis 2020

**488** Cases of illness

64 Infections acquired in the EU
70 Infections acquired outside the EU
354 Unknown travel status or unknown country of infection

44 Hospitalisations
0 Deaths

### Human cases in foodborne outbreaks

**0** Foodborne outbreaks
0 Strong-evidence outbreaks
0 Weak-evidence outbreaks

**0** Cases of illness
0 Hospitalisations
0 Deaths

## 8.1. Key facts

- In 2020, the number of confirmed cases of human echinococcosis from 25 EU Member States was 488, corresponding to an EU notification rate of 0.14 per 100,000 population. This is a decrease of 16.2% and 28.4% compared with the rate in 2019 (0.17 and 0.20 per 100,000 population), with and without the 2019 data from the United Kingdom, respectively. The notification rate in 2020 is the lowest since EU surveillance of *Echinococcus* spp. began in 2007.
- *Echinococcus granulosus sensu lato* (*s.l.*) accounted for 67.8% (242) of cases reported with species information for 2020, and *Echinococcus multilocularis* accounted for 32.2% (115) of such cases.
- The number of human cases and animal infections caused by *E. multilocularis* or *E. granulosus s.l.* showed a sudden decrease in 2020 compared to previous years (2016–2019) in the EU.
- In total, 20 Member States and three non-Member States provided 2020 monitoring data for *Echinococcus* spp. in animals.
- Ten Member States and three non-Member States reported data on, respectively, 5,506 and 1,999 foxes that were examined for *E. multilocularis*. Seven Member States and one non-Member State reported positive findings with an overall proportion of test-positives of 12.5%.
- Data for 2019 from Finland, Ireland, Malta, the United Kingdom and mainland Norway confirmed the free status of these countries for *E. multilocularis* in the context of Commission Delegated Regulation (EU) No 2018/772 (EFSA and Zancanaro, 2021).
- For *E. granulosus* s.l., 17 Member States and two non-Member States reported data from around 76.5 million animals, which were mainly domestic livestock (> 99%), compared to 113.8 million animal results reported in 2019 by 19 Member States. The overall proportion of test-positives was 0.16%, and positives were reported by nine Member States. Positive samples were mainly from small

ruminants (sheep and goats; 85.3%), whereas cattle accounted for 11.8% of total positives, and pigs for 3%, with most (92.9%) positive pigs reported by Spain.

# Foodborne outbreaks (according to Directive 2003/99/EC)

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## 1. Key facts

- In 2020, 3,086 foodborne outbreaks, 20,017 cases of illness, 1,675 hospitalisations and 34 deaths were reported by 27 EU MS. In addition, 57 outbreaks, 1,496 cases of illness, 155 hospitalisations and 14 deaths were communicated by seven non-MS.
- In 2020, the number of reported outbreaks dropped compared to 2019 by 47% (5,823 in 2019), with human cases falling by 61.3% (51,694 in 2019), hospitalisations by 60.0% (4,298 in 2019) and deaths by 43.3% (60 in 2019). These findings are mainly attributable to the indirect consequences of the COVID-19 pandemic among EU populations leading to a reduced exposure of people to contaminated food and a higher under-reporting of outbreaks. The withdrawal of the United Kingdom from the EU also contributed to the decrease.
- In 2020, the foodborne outbreak reporting rate in the EU was 0.69 per 100,000 population. This is equivalent to a decrease of 39.3% and 46.6% compared with the rate in 2019 (1.1 and 1.3 per 100,000 population, respectively), with and without the 2019 data from the United Kingdom, respectively.
- The fall in foodborne outbreaks did not affect all causative agents equally. The number of outbreaks caused by agents associated with severe clinical conditions in humans such as botulisms, listeriosis, trichinellosis and Shiga toxin-producing *E. coli* infections decreased less than those caused by other agents or did not even decrease at all. Foodborne outbreaks caused by norovirus and Hepatitis A decreased sharply by 72% and 65%, respectively, in 2020 (130 and 7, respectively) compared to 2019 (458 and 20, respectively).
- Although the number of fatal cases in 2020 was lower than in 2019, the death toll caused by foodborne outbreaks in Europe was high, with 34 deaths in MS and 14 deaths in non-MS. *L. monocytogenes* was associated with 30 fatal cases (62.5%) and *Salmonella* with 8 (16.7%).
- *Salmonella* was the agent most frequently identified in foodborne outbreaks in the EU (N=694), accounting for 22.5% of total outbreaks. *Salmonella* caused the highest number of cases (N=3,686; 18.4% of the total) and hospitalisations (N=812; 48.5% of all outbreak-associated hospitalisations). *S*. Enteritidis was the predominant serovar (N=402; 82.4% of outbreaks).
- One major finding emerging from the analysis of 2020 outbreak data is the progressive increase in the case fatality and hospitalisation rate connected with *L. monocytogenes*. This is a reason for concern given the multi-faceted epidemiology of this agent. In 2020, a wide variety of food vehicles were implicated in listeriosis outbreaks, including smoked fish and other fish products, meat and meat products, and soft cheese.
- The number of strong-evidence outbreaks in 2020 totalled 248 (8.0% of all reported foodborne outbreaks). Food vehicles of animal origin (i.e., fish, meat and products thereof, milk, cheese and dairy products, etc.) were implicated in most of these outbreaks (65.7%). The most frequently reported agent/food pairs in outbreaks caused by food of animal origin were: *Salmonella* in 'eggs and egg products' and norovirus in 'crustaceans, shellfish, molluscs and products thereof'.
- Composite foods or multi-ingredient foods including 'mixed food' were responsible for the highest number of illnesses in strong-evidence outbreaks (21% of all cases, one in five) and were associated with a wide range of causative agents.
- Among the higher risk foods, 'water' ranked first in 2020 as the main vehicle implicated in strong-evidence outbreaks caused by Shiga toxin-producing *E. coli.*
- In 2020 overall, most outbreaks concerned public catering and restaurants, pubs, street vendors, take away and canteens. However, a similar number of outbreaks were reported in domestic settings. These findings underline the importance of correctly implementing HACCP in public catering, and also of educating consumers on preparing and storing food in domestic kitchens.
- With the present report, EFSA has also published two new interactive communication tools on foodborne outbreaks: the EFSA story map (available here) and the dashboard (available here).

# 5. Conclusions

## 5.1. Health impact, causative agents and trends

In 2020, the number of foodborne and waterborne outbreaks notified to EFSA was the lowest ever reported since the beginning of data collection in 2007. Compared with 2019, a remarkable drop in the number of outbreaks was observed for both MS and non-MS countries. Overall, the number of outbreaks decreased by 47.0% in MS, while a similar or even larger absolute decrease was observed for other indicators relating to the impact of foodborne and waterborne outbreaks on health. Outbreak cases of illness decreased by 61.3%, while hospitalisations and deaths among outbreak cases fell by 60.0% and 43.3% respectively, compared with 2019. This remarkable drop can probably be attributed almost entirely to the indirect impact of the COVID-19 pandemic in Europe. The contribution of the withdrawal of the United Kingdom from the EU appears to be only marginal. This is evidenced by the fact that the United Kingdom contributed to cases at EU level in only a very small proportion, ranging between 0.8% and 1.1% of the overall FBO reported annually by MS between 2015 and 2019.

These findings should be interpreted with caution, since outbreaks may have decreased in 2020 either as a result of reduced exposure to contaminated food or of the underdetection and underreporting of outbreaks.

The reasons underlying the reduced health burden of foodborne outbreaks in 2020 must interpreted cautiously, considering that the decrease in reported FBO could correspond to a true fall in the number of outbreaks at EU level or, alternatively, it could mirror a reduced sensitivity in MS surveillance systems, i.e. the ability to detect, investigate, collect and report outbreak data. The impact of the COVID-19 pandemic on FBO surveillance and reporting will be evaluated retrospectively in the coming years.

Control measures to limit the spread of COVID-19 may have helped prevent the contamination of foodstuffs in domestic and public settings. The lockdown measures adopted in 2020, including stay-at-home orders, the banning of private gatherings, the closures and restrictions applied to restaurants, pubs and public catering as well as canteens in schools, universities, workplaces, etc. may have substantially reduced the food poisoning typically linked to these settings (e.g., food contamination by norovirus, bacterial toxins and *Salmonella*). On the other hand, the reinforced measures taken to control COVID-19, including personal hygiene equipment (masks, gloves, etc.) and other safety and hygiene measures (washing and sanitising hands, temperature monitoring, etc.), along with frequent cleaning of domestic kitchens and public settings (shops, restaurants), may have reduced food contamination and contributed to a general improvement in food safety at consumer level. Restrictions on international travel and mobility may also have contributed to reducing travel-related FBO.

It is nevertheless likely that a proportion of foodborne outbreaks remained unidentified in 2020. The pandemic has impacted primary care globally (Kastritis et al., 2020) with major voluntary and involuntary changes in the healthcare seeking behaviours of patients. A number of foodborne illnesses among the population, especially cases with mild symptoms, may have gone undetected. A significant decrease in the number of patients visiting doctors, the samples submitted to laboratories and the people accessing emergency departments during the pandemic was documented in many European countries (Verhoeven et al., 2020; Kurotschka et al., 2021; Lim et al., 2021), with most regular GP consultations replaced by telephone triage or even suspended. FBO investigation and response is a complex activity involving several players. It also requires a well-structured and flexible organisation, and this was dramatically challenged in 2020. During the pandemic, the fragmentation of the primary care structure, which is the level at which suspicions of outbreak are usually raised, may have impaired the identification and investigation of foodborne outbreaks. The diversion of technical and human resources, and the lack of coordination with public health and food safety departments, hospitals and diagnostic laboratories during the pandemic, may also have impaired the identification and investigation of FBO.

It is interesting to note that the decline in outbreaks in 2020 did not affect all causative agents equally. In particular, the number of outbreaks of botulisms and listeriosis decreased less than other agents, as a percentage. Given that severe conditions such as botulism or invasive listeriosis are unlikely to remain undiagnosed, this finding shows that exposure to food contaminated with *C. botulinum* toxins or *Listeria monocytogenes* did not substantially change in 2020 and that, for other causative agents associated with milder illnesses, the reasons for the fall in the number of outbreaks are more likely to be linked to under-diagnosis/underreporting than to a true reduction in population exposure through food.

At country level, considerable variability was observed in the epidemiological indicators adopted to describe FBO, such as the reporting rate, the mean outbreak size, the type of outbreaks and their severity. This reflects the epidemiological differences and divergences in the approach and sensitivity of FBO surveillance at national level.

The pattern of causative agents implicated in FBO in the EU in 2020 did not differ substantially from 2019. This observation applies not only at EU level to the overall number of outbreaks reported, but in particular at MS level. At EU level, among the outbreaks with known aetiology, the highest impact on health in terms of the number of outbreaks, cases and hospitalisations was associated with *Salmonella*. At MS level, this was true for only ten MS (Croatia, Estonia, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Romania, Slovakia). For the other MS, the aetiology was more varied, with either norovirus, *Campylobacter*, bacterial toxins or STEC playing a noteworthy role. It is important to remember that these differences may depend not only on true variability in the epidemiology of FBO but also on the scope and objectives of the outbreak surveillance in place in MS. This is clearly documented by the significant differences in MS reporting behaviour for outbreaks of unknown aetiology. While, for some MS, these outbreaks make up the vast majority of FBO, for others, this type of reporting is absent. This finding highlights the different approaches of each MS to outbreak surveillance, with countries such as Belgium and the Netherlands reporting small family outbreaks, and others reporting only general outbreaks of known aetiology.

One major finding emerging from the analysis of 2020 outbreak data is the high burden of *L. monocytogenes* in terms of hospitalisations and deaths. The death toll of a *L. monocytogenes* outbreak may be high or very high, as was the case for the outbreak in Switzerland caused by a persistent contamination of cheese with *L. monocytogenes* from 2018 to 2020 (Nüesch-Inderbinen et al., 2021). At EU level, both the case fatality and hospitalisation rate for listeriosis outbreaks have increased progressively over the last five years and this is a reason of concern, given the multi-faceted epidemiology of *L. monocytogenes.* In recent years, this agent has been responsible for small size family clusters as well as for large or very large prolonged cross-border outbreaks, as in Spain in 2019 and in many EU countries in 2017, respectively. Moreover, foodborne exposure to *L. monocytogenes* has been documented in a wide range of settings, including hospital and residential institutions, and this is a cause for concern (Lachmann et al., 2021; Russini et al., 2021). Listeriosis outbreaks are associated with a variety of foodstuffs including cheese, meat and meat products, and fish and fishery products as well as food of non-animal origin as is clearly indicated by the data reported in 2020. The increased occurrence and severity of *L. monocytogenes* outbreaks may also reflect more widespread application of the fine-tuning characterisation methods for *L. monocytogenes,* and in particular Whole Genome Sequencing (WGS), which has considerably improved the detection of outbreaks within the community in recent years. The routine implementation of WGS in laboratories is rapidly changing the surveillance approach to foodborne pathogens. WGS improves the linking of sporadic cases associated with different food products and geographical regions to a point source outbreak. It can also facilitate epidemiological investigations, allowing the use of previously sequenced genomes (EFSA BIOHAZ Panel, 2019a). Although sequence-based typing is primarily applied to the surveillance of major foodborne bacterial agents (*Listeria*, STEC, *Salmonella*, *Campylobacter*), the possible expansion of this approach to viruses (Enkirch et al., 2019) and other pathogens holds out promising perspectives for outbreak detection and control.

## 5.2. Food vehicles and places of exposure

The relative fall in outbreaks in domestic settings, compared with 2019, could be the result of a weakened capacity to detect and investigate household foodborne outbreaks in domestic settings during the pandemic, for the reasons described in section 5.1. In addition, sanitisation and improvements in general and personal hygiene during the COVID-19-pandemic have probably led to a general improvement in hygiene spanning food manipulation in domestic kitchens and shopping at food retailers or markets. This has likely contributed to the decrease of outbreaks in domestic settings, providing direct evidence of the importance of promoting food safety and appropriate hygiene practices in home kitchens (e.g. washing hands, wearing gloves, cleaning surfaces, etc.).

On the other hand, the proportion of strong-evidence general outbreaks associated with the consumption of food in 'restaurants, pubs, street vendors, take away' also fell sharply in 2020 (8.3% less). The number totalled 58 in 2020 (38.2% of total strong-evidence general outbreaks) and 204 in 2019 (46.5% of total strong-evidence general outbreaks). The reasons for this drop include restrictions on gatherings at restaurants with fewer people from different households consuming meals together, and the closure of restaurants, pubs, bar etc.

The range of foodstuffs implicated in FBO closely reflects the known epidemiology of the implicated causative agents. Eggs and egg products, pig meat and products thereof and bakery products were the main food sources in many countries, primarily implicated in *Salmonella* outbreaks. Fish and fishery products including crustaceans, shellfish and molluscs were associated with a high number of cases, hospitalisations and deaths in 2020 in food poisoning events caused by *L. monocytogenes*, histamine or norovirus.

The consumption of highly manipulated foodstuffs such as mixed foods and other composite, multi-ingredient foods was also frequently implicated in outbreaks and caused the highest number of cases among strong-evidence outbreaks. The contamination of these food vehicles may occur in several ways, including unsafe food mixing, processing and manipulation by infected food handlers or cross contamination. Incorrect storage conditions, including time/temperature abuse and inadequate chilling may boost contamination with harmful bacteria or toxins introduced in the final stage of food preparation through single ingredients. This heterogeneity in the risk factors and mechanisms leading to food poisoning makes it difficult to identify the primary source of contamination in many cases. Strengthening the implementation of HACCP in public settings, with high standard of hygiene and correct procedures for food preparation and storage in domestic kitchens should be recommended.

# Zoonoses monitored according the epidemiological situation (Directive 2003/99 List B)

## 1. *Yersinia*

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# Yersinia

## Human cases

Notification rate (per 100,000 population) 1.78

Trend (2016-2020): Decreasing (Increasing / Decreasing / Stable)

**5,668** Cases of illness

- 2,679 Infections acquired in the EU
- 61 Infections acquired outside the EU
- 2,928 Unknown travel status or unknown country of infection
- 353 Hospitalisations
- 2 Deaths

## Human cases in foodborne outbreaks

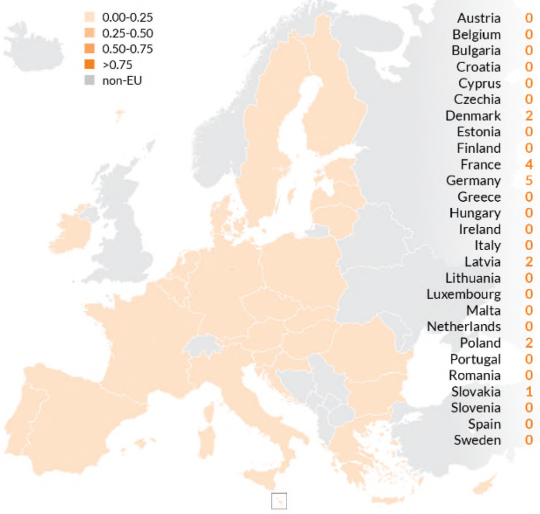
**16** Foodborne outbreaks

- 1 Strong-evidence outbreaks
- 15 Weak-evidence outbreaks

**236** Cases of illness

- 11 Hospitalisations
- 0 Deaths

## Foodborne outbreaks in the EU




| No. of yersiniosis outbreaks | |
|---|---|
| Austria | 0 |
| Belgium | 0 |
| Bulgaria | 0 |
| Croatia | 0 |
| Cyprus | 0 |
| Czechia | 0 |
| Denmark | 2 |
| Estonia | 0 |
| Finland | 0 |
| France | 4 |
| Germany | 5 |
| Greece | 0 |
| Hungary | 0 |
| Ireland | 0 |
| Italy | 0 |
| Latvia | 2 |
| Lithuania | 0 |
| Luxembourg | 0 |
| Malta | 0 |
| Netherlands | 0 |
| Poland | 2 |
| Portugal | 0 |
| Romania | 0 |
| Slovakia | 1 |
| Slovenia | 0 |
| Spain | 0 |
| Sweden | 0 |

Top food vehicles causing strong-evidence outbreaks

Mixed food: 1 Outbreak

ECDC data / EFSA data

* Differences among countries shall be interpreted with caution as this indicator depends on several factors including the type of outbreaks under surveillance and does not necessarily reflects the level of food safety in each country.

## 1.1. Key facts

- Yersiniosis is the third most commonly reported zoonosis in humans in the EU. In 2020, the number of confirmed cases of human yersiniosis was 5,668.
- The EU notification rate of yersiniosis was 1.8 per 100,000 population in 2020. This is an increase of 5.9% compared with the rate in 2019 (1.7 per 100,000 population) with data from the United Kingdom included, and a decrease of 13.4% compared with the rate in 2019 (2.1 per 100,000 population) without the 2019 data from the United Kingdom.
- There was a statistically significant decreasing trend ($p < 0.01$) of human yersiniosis cases for 2016-2020.
- Foodborne outbreaks of yersiniosis (N=16) were reported by six MS, involving 236 human cases. One outbreak reported by Denmark with strong-evidence was caused by 'mixed food (pasta-based dish)'.
- In 2020, five MS reported information on 766 'ready-to-eat' food sampling units tested for the presence of *Yersinia*. There were 40 positive units and all were from the 'ready-to-eat' meat and meat products category, in particular, 'mixed meat and meat products from bovine animals and pigs' (5.9% positive samples).
- In 'non ready-to-eat' food, seven MS provided results on 811 sampling units and reported 43 positive units among samples from 'meat and meat products' (34) and from 'milk and milk products' (9). In 'fresh meat', *Yersinia* was isolated from 'fresh meat of pigs' in about one of ten samples tested.
- In animals, seven MS and two non-MS reported results of sampling activities in 2020 in pigs, 'domestic livestock other than pigs' and 'other animal species': the highest overall proportion of *Yersinia*-positive units was observed in 'other animal species' (4.4%).

# 2. *Toxoplasma gondii*

Tables and figures that are not presented in this chapter are published as supporting information to this report and are available as downloadable files from the EFSA Knowledge Junction on Zenodo at https://doi.org/10.5281/zenodo.5682809. Summary statistics of human surveillance data with downloadable files are retrievable using ECDC's Surveillance Atlas of Infectious Diseases at http://atlas.ecdc.europa.eu/public/index.aspx

## 2.1. Key facts

- Only confirmed cases of congenital toxoplasmosis are reported to ECDC, with a two-year delay in human data analyses and reporting at the EU level.
- In 2019, 176 confirmed human cases of congenital toxoplasmosis were reported in the EU. The notification rate was 5.2 cases per 100,000 live births, which decreased by 13.3% in 2019 compared to 2018.
- In 2019, France accounted for 76% of reported cases of congenital toxoplasmosis due to the active screening of pregnant women.
- Overall, the number of human cases of congenital toxoplasmosis has shown a gradual decrease in the EU in the 2015-2019 period, mainly due to the reduction in cases reported by a single member state (France), which reported 85.4% of EU cases in 2015, down to 76.1% in 2019.
- No foodborne toxoplasmosis outbreaks were reported in the EU in 2020, and no such single foodborne outbreak has been reported to EFSA since the start of its foodborne outbreak data collection in 2004.
- In total, 11 MS and three non-MS reported 2020 monitoring data on *Toxoplasma gondii* infections in animals. Most animals tested were sheep and goats, which also showed the highest overall prevalence of *T. gondii* infections in animals (21.3%), as reported by 11 MS. Most samples were obtained from clinical investigations. It is not possible to accurately estimate the prevalence of *T. gondii* infections in animals due to the use of different diagnostic methods, the different sampling schemes in the MS, and the lack of information on the animals' ages and rearing conditions.

# 3. Rabies

Tables and figures that are not presented in this chapter are published as supporting information to this report and are available as downloadable files from the EFSA Knowledge Junction on Zenodo at https://doi.org/10.5281/zenodo.5682809. Summary statistics of human surveillance data with downloadable files are retrievable using ECDC's Surveillance Atlas of Infectious Diseases at http://atlas.ecdc.europa.eu/public/index.aspx

## 3.1. Key facts

- For 2020, EU MS and non-MS countries reported no human *Lyssavirus* infections for the first time since 2015. Travel-associated rabies cases have been reported every year in Europe since then (N = 4 in 2019, N = 1 per year 2016-2018).
- In non-flying terrestrial animals, a total of 12 cases of rabies of autochthonous origin were reported by two MS: seven cases in Poland (five foxes, one cow and one dog) and five cases in Romania (one fox, two cows and two dogs). The total number of reported indigenous rabies cases in terrestrial animals in the EU increased in 2020 (N = 5 in 2019; N = 8 in 2018; N = 6 in 2017).
- Surveillance data on *Lyssavirus* in bats were reported by 15 EU MS. Five MS reported positive results for *Lyssavirus*, mainly of the European bat 1 lyssavirus (EBLV-1) species, with a total of 31 cases in bats.
- A case of rabies was reported by France in an illegally imported dog, infected with a virus lineage (Africa 1 lineage) from North Africa. In Ireland, an imported sable (*Martes zibellina*) kept as a pet was reported positive for rabies.
- Two indigenous cats were reported positive for a bat lyssavirus [N = 1 EBLV-1 in France and N = 1 West Caucasian bat lyssavirus (WCBV) in Italy].

# 4. Q fever

Tables and figures that are not presented in this chapter are published as supporting information to this report and are available as downloadable files from the EFSA Knowledge Junction on Zenodo at https://doi.org/10.5281/zenodo.5682809. Summary statistics of human surveillance data with downloadable files are retrievable using ECDC's Surveillance Atlas of Infectious Diseases at http://atlas.ecdc.europa.eu/public/index.aspx

## 4.1. Key facts

- For 2020, EU MS reported 523 confirmed human cases of Q fever corresponding to an EU notification rate of 0.12 per 100,000 population. This is a decrease of 36.7% and 44.6% compared with the rate in 2019 (0.19 and 0.22 per 100,000 population) with and without the 2019 data from the United Kingdom, respectively.
- In 2020, the seasonal pattern was different to previous years and human cases were largely distributed from winter to early autumn. Cases increased with age and were highest in the age group over 65 years.
- From 2016 to 2020 there was a significantly declining trend of confirmed human cases of Q fever in the EU.
- In animals, cattle and small ruminants were mostly sampled due to clinical investigations and passive monitoring of animals suspected to be infected with *Coxiella burnetii*. In the absence of harmonised reporting data in animals in the EU, the data reported to EFSA cannot be used to track or analyse spatial representativeness and trends over years for Q fever at the EU level or to compare differences among reporting countries.
- In total, 15 MS (18 in 2019 including the United Kingdom) and six non-MS including the United Kingdom (four in 2019) reported 2020 data for *C. burnetii* from cattle, sheep and goats and several other domestic and wild animal species. The overall proportion of test-positive animals was 14.7% in sheep and goats (8.9% in 2019), 4.3% in cattle (5.3% in 2019) and 2.5% in other domestic and wild animals (1% in 2019). Herd-scale analysis was added this year. The overall proportion of test-positive herds was 4.1% in sheep and goats (6.6% in 2019) and 7.2% in cattle (9.9% in 2019).
- Other species have sometimes been investigated, mostly farmed or exotic animals in captivity. Among them, only pigs and water buffalos tested positive.

# 5. West Nile virus

Tables and figures that are not presented in this chapter are published as supporting information to this report and are available as downloadable files from the EFSA Knowledge Junction on Zenodo at https://doi.org/10.5281/zenodo.5682809. Summary statistics of human surveillance data with downloadable files are retrievable using the ECDC's Surveillance Atlas of Infectious Diseases at http://atlas.ecdc.europa.eu/public/index.aspx

## 5.1. Key facts

- In 2020, the number of locally acquired probable and confirmed human cases of West Nile virus infection was 322, corresponding to an EU notification rate of 0.07 per 100,000 population. This is a decrease of 12.9% and 24.4% compared with the rate in 2019 (0.08 and 0.10 per 100,000 population, with and without 2019 data from the United Kingdom, respectively).
- Most locally acquired human infections were reported by Greece, Spain and Italy, accounting respectively for 44.7%, 23.9% and 21.4% of the total number of reported probable/confirmed infections in the EU. In 2020, Spain reported an unprecedented increase in WNV infections.
- Excluding the epidemic year of 2018, there was no statistically significant ($p = 0.07$) increase or decrease of reported WNV infections over the last five years (2016–2020) in the EU. At national level, Spain has reported a significantly ($p = 0.04$) increasing trend in the past five years (2016–2020). Aside from an epidemic peak observed in 2018, when the EU notification rate of confirmed and probable human WNV infections per 100,000 population reached 0.31, the yearly EU notification rate for the period 2016-2020 ranged from 0.05 in 2017 to 0.08 in 2019. In 2020, 325 confirmed/probable human WNV infections were reported. Of those, 323 were acquired in the EU (322 locally acquired and one imported from another EU country).
- In 2020, 15 MS submitted WNV monitoring and surveillance data from birds and equids to EFSA. Italy and Spain submitted respectively 48.8% and 25.3% of these data for birds, while Germany, Greece and Spain submitted most of the data for equids, at 33.7%, 15.8% and 28.3%, respectively.
- Ten MS reported 191 WNV outbreaks in birds (two) and equids (189) to the ADNS. Bulgaria reported two outbreaks in birds. Italy, Germany and Spain reported the highest number of outbreaks in equids among MS, accounting for 8.5%, 12% and 74% of the total number of outbreaks, respectively.
- ADNS outbreak data and surveillance data submitted to EFSA for 2020 indicated WNV circulation in countries in central and eastern Europe (Austria, Hungary, Germany and Bulgaria) and in the Mediterranean basin (Greece, Italy, France and Spain). WNV infections of humans and equids now regularly occur in those countries."

# 6. Tularaemia

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## 6.1. Key facts

- In 2020, the number of confirmed human cases of tularaemia was 641, corresponding to an EU notification rate of 0.15 per 100,000 population. This was a decrease of 42.5% and 50.0% compared with the rates in 2019 (0.25 and 0.29 per 100,000 population) with and without the 2019 data from the United Kingdom, respectively.
- In 2020, the seasonal pattern was similar to previous years with infections peaking in September. Cases increased with age and were highest in the age group over 65 years.
- No foodborne disease outbreaks due to *Francisella tularensis* were reported for 2020.
- Tularaemia in animals is rarely reported in the EU as submission of the data to EFSA is on a voluntary basis. In 2020, three MS (Austria, Finland and Sweden) reported data on the occurrence of *F. tularensis* in hares. Sweden also reported cases in dogs and squirrels. One non-MS (Switzerland) reported samples taken from wild species, zoo animals and pets.
- Three MS (Austria, Finland and Sweden) reported that 81 out of 223 wild animals had positive results (36.5%) (31.7% in 2019), all of which were hares. Among pets, only one dog tested serologically positive. In Switzerland, the occurrence of *F. tularensis* in the tested hares was 46.2%.

# 7. Other zoonoses and zoonotic agents

Tables and figures that are not presented in this chapter are published as supporting information to this report and are available as downloadable files from the EFSA Knowledge Junction on Zenodo at https://doi.org/10.5281/zenodo.5682809.

In 2020, data on *Bacillus*, *Chlamydia*, *Clostridium*, *Cysticercus*, *Enterococcus*, *Klebsiella*, hepatitis A virus, calicivirus, *Leishmania*, *Leptospira*, marine biotoxins, non-pathogenic *Escherichia coli*, *Proteus*, *Sarcocystis*, *Shigella*, *Staphylococcus*, *Streptococcus*, tick-borne encephalitis virus and *Vibrio*, among others, were reported to EFSA.

## 7.1. *Bacillus* spp.

Lithuania submitted 2020 data on *Bacillus* spp. in food (N = 15), and Bulgaria and Greece in animals (N = 29). Greece reported 13 (59.1%) positives in cattle, goats and sheep collected at the farm level during clinical investigations out of 22 animals tested. Lithuania and Bulgaria reported no positive samples.

## 7.2. *Chlamydia* spp.

Austria and the non-MS North Macedonia reported data on *Chlamydia* spp. in various animal species. Austria reported 155 (2.9%) positives out of 5,400 samples, and North Macedonia reported 31 (57.4%) positives out of 54 samples.

## 7.3. *Clostridium* spp.

Greece, Lithuania and the non-MS North Macedonia reported data on *Clostridium* spp. from various animals. Greece obtained 45 animal samples on farms during clinical investigations, whereof 18 were positive. None of the 27 food samples collected by Lithuania at food catering services, processing plants or slaughterhouses were positive. None of the 256 food samples collected by North Macedonia were positive, but *Clostridium perfringens* was detected in one animal sample collected during passive monitoring at the farm level.

## 7.4. Hepatitis A virus

Bulgaria, France and Romania provided data on hepatitis A virus monitoring in fruits and vegetables collected at retail establishments, processing plants, wholesale establishments and border control posts. None of the 404 tested samples were positive.

## 7.5. Norovirus (calicivirus)

Bulgaria, Croatia, France, Portugal and Romania tested 814 samples of 'fruits' and 'vegetables' for caliciviruses, whereof nine (1.1%) were positive.

## 7.6. *Proteus* spp.

Greece reported data from 171 animal samples (from cattle, goats and sheep) collected during clinical investigations, whereof overall 13 (7.6%) were positive for *Proteus* spp.

## 7.7. *Staphylococcus* spp. and staphylococcal enterotoxins

Four MS (Bulgaria, Greece, Italy and Poland) provided data on *Staphylococcus* spp. (reported as *Staphylococcus* unspecified or *S. aureus*) in various animals (N = 1,004) and food matrices (N = 6,095). Overall, 35.8% from animals and 11.7% from food were reported positive. 'Milk from other animal species or unspecified – pasteurised milk', 'cheese made from unspecified milk or other animal milk – unspecified' and 'other processed food products and prepared dishes – pasta' were the food categories with the highest numbers of positive results.

Eleven MS (Bulgaria, Cyprus, Czechia, Estonia, Germany, Italy, Portugal, Romania, Slovakia, Slovenia and Spain) reported data on staphylococcal enterotoxins collected in contexts other than the framework of Regulation (EC) No 2073/2005. From an overall total of 267 batches tested, one was positive and was from 'ice cream and similar frozen desserts' collected at a 'processing plant' during an official sampling programme in Slovakia. Sixteen out of the 3,835 single samples collected from different foods were positive. Staphylococcal enterotoxins were found in samples of 'milk from other animal species or unspecified – pasteurised', 'cheeses', 'ready-to-eat salads', 'other processed food products and prepared dishes', 'cakes' and 'egg products'.

## 7.8. Tick-borne encephalitis virus

Slovenia provided data on tick-borne encephalitis virus monitoring from raw goats' and sheep's milk. None of the 19 tested batches were positive.

## 7.9. *Cysticercus* spp.

Eight MS (Belgium, Finland, Luxembourg, Malta, Slovakia, Slovenia, Spain and Sweden) submitted data on *Cysticercus* spp. in various animal species. Data were collected at slaughterhouses (N = 64,117,417), game handling establishments (N = 193,790), hunting establishments (N = 3,935) and on farms (N = 6,534). Belgium collected 785,559 bovine carcases from slaughterhouses and found 1,138 positive samples (0.145%). None of the 2,179,846 carcases from cattle, pigs or wild boars collected by Finland were positive. Luxembourg found 52 positive bovine carcases out of 26,575 collected samples (0.196%). None of the 66,070 cattle, goat or sheep carcases collected by Malta were positive. Slovakia reported four positive pig carcases out of 689,446 collected samples, but no positives were found from tests on 36,656 cattle carcases. Slovenia provided results on 118,245 cattle and 245,921 pig carcases, detecting 10 positives in cattle carcases (0.008%). Sweden found no positives out of 434,450 cattle and 2,622,800 pig carcases. Spain provided data on *Cysticercus* spp. in various animal species: 214 out of 2,420,563 cattle (0.009%), 15,772 out of 933,337 goats (1.7%), 3,189 out of 46,007,287 pigs (0.007%), 192,692 out of 7,549,509 sheep (2.55%), 94 out of 7,687 other domestic solipeds (1.22%), as well as 47 out of 100,232 (0.47%) wild boars were positive. No positives were found upon testing 92,260 deer and 5,233 mouflons.

Overall, almost all positive samples (213,163 out of 213,212) were collected at the slaughterhouse level.

## 7.10. *Leishmania*

Greece and North Macedonia provided data on *Leishmania* in pet dogs and stray dogs. Greece found 109 (7.7%) positive blood samples out of 1,410, and North Macedonia reported 1,313 positives (34.1%) out of 3,852.

## 7.11. *Sarcocystis* spp.

Belgium reported data from 785,559 cattle samples collected at the slaughterhouse, whereof 65 (0.008%) were positive for *Sarcocystis* spp.

## 7.12. Other

Bulgaria provided data on non-pathogenic *E. coli* and *Enterococcus* spp. in various food matrices and potable water, respectively. None of the 1,039 collected samples were positive. Greece reported data on *Klebsiella* spp. monitoring, with no positives from 76 cattle and 33 goats' milk samples collected at the farm level. For *Leptospira* spp., Bulgaria and Slovenia collected 322 samples from cattle, pigs, dogs and domestic solipeds, with no positives. Data on monitoring of *Shigella* spp. in meat preparations and ready-to-eat salads were provided by Greece, with no positives of out of five tested samples. Greece also reported data on *Streptococcus* spp. in dairy, goats' and sheep's milk collected at the farm level, detecting 44 positives out of 200 tested samples. The Netherlands provided data on *Vibrio* spp. in cooked shrimp and fish products collected at border control posts, and in leaf vegetables collected at the retail and wholesale levels. None of the 169 vegetable samples were positive, but 35 of out 382 samples of fish and crustaceans were positive. Bulgaria provided data on marine biotoxins in live bivalve molluscs and frozen shelled and raw molluscs, with no positives of out 70 tested samples.

# Microbiological contaminants subject to food safety criteria (Regulation (EC) No 2073/2005)

This chapter summarises the 2020 information and data provided by reporting countries on microbiological contaminants in food, histamine, staphylococcal enterotoxins and *Cronobacter sakazakii,* for which food safety criteria (FSC) have been set down in EU legislation (Regulation (EC) No 2073/2005).

## 1. Histamine

Histamine is a biogenic amine involved in important physiological functions of the human body. However, its ingestion at high concentrations through food is associated with the onset of health disorders such as scombroid poisoning.

Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs defines FSC for histamine in food at the retail level in three categories: 'fishery products from fish species associated with a high amount of histidine' (food category 1.26), 'fishery products which have undergone enzyme maturation treatment in brine, manufactured from fish species associated with a high amount of histidine' (food category 1.27), and 'fish sauce produced by fermentation of fishery products' (food category 1.27a). Data on histamine in the aforementioned food categories were reported by 18 MS (Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, France, Germany, Ireland, Italy, Latvia, Lithuania, Portugal, Romania, Slovakia, Slovenia and Spain) and two non-MS (Iceland and Serbia).

In official control samples (n=2,637) for histamine in food category 1.26 at the distribution level (wholesale establishments, retail establishments, border control posts and restaurants), 0.46% had a histamine content higher than 200 mg/kg, 0.38% a histamine content between 100 and 20 mg/kg, and 70.42% a histamine content above the limit of detection, but less than or equal to 100 mg/kg. An EU origin (Romania, Spain, the Netherlands, Ireland, Norway) was reported for 16% of sample units, 11% were of non-EU origin (Vietnam, Indonesia, non-EU countries), whereas for 72%, no information was available. Fish species information (tuna, mackerel, sardine and escolar) was reported by Denmark for 99 samples (3.75%). At the manufacturing level (processing plants, packaging centres), 1,337 official control sampling units were collected and the results were as follows: 0.8% had a histamine amount higher than 200 mg/kg, 0.29% a histamine content between 100 and 20 mg/kg, and 73.24% a histamine content higher than the limit of detection, but less than or equal to 100 mg/kg. An EU origin was reported for 24.83% of samples (Romania, Greenland, Denmark, Estonia, Portugal), 3.26% were of non-EU origin and, for 71.75%, no information was reported. The fish species was mentioned in 9.15% of the sample units (mackerel, herring).

For food category 1.27, 442 and 148 official control sample units were collected at the distribution and manufacturing level, respectively. At the distribution level, 63.35% of the samples had a histamine concentration less than or equal to 200 mg/kg and, at the manufacturing level, that percentage was 70.95%. An EU origin was indicated for 6.1% and 33.1% samples at the distribution and manufacturing level, respectively; 26.4% of the samples were of non-EU origin at the distribution level.

For food category 1.27a, Spain reported 19 units at the manufacturing level and 18 units at the distribution level. All samples had a histamine content lower than 400 mg/kg. All official sample units were collected as part of official surveillance activity.

## 2. Staphylococcal enterotoxins

Data on staphylococcal enterotoxins collected in the context of Regulation (EC) No 2073/2005 were reported by four MS (Croatia, Estonia, Romania and Spain). No positives were found in 1,269 samples collected at the distribution level (wholesale establishments and retail establishments). Out of 723 tested samples, only one sample (0.138%) of goat cheese made from raw or low-heat-treated milk collected at the processing plant in Spain was positive.

## 3. *Cronobacter sakazakii*

*Cronobacter sakazakii* in infant formula and dietary foods for special medical purposes was reported by six MS (Estonia, Hungary, Luxembourg, Slovakia, Slovenia and Spain). No positives were found in 91 samples collected at the processing plant and 244 at the distribution level (235 samples collected at retail establishments and nine at wholesale establishments).