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SCIENTIFIC REPORT OF EFSA AND ECDC

The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2012[1]

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This scientific output, published on 10 March 2016, replaces the earlier versions published on 19 February 2014, 17 July 2014 and 13 October 2015 (see page 2 for details).

ABSTRACT

The European Food Safety Authority and the European Centre for Disease Prevention and Control analysed information submitted by 27 European Union Member States on the occurrence of zoonoses and food-borne outbreaks in 2012. Campylobacteriosis was the most commonly reported zoonosis, with 214,268 confirmed human cases. The occurrence of *Campylobacter* continued to be high in broiler meat at EU level. The decreasing trend in confirmed salmonellosis cases in humans continued with a total of 91,034 cases reported in 2012. Most Member States met their *Salmonella* reduction targets for poultry. In foodstuffs, *Salmonella* was most often detected in meat and products thereof. The number of confirmed human listeriosis cases increased to 1,642. *Listeria* was seldom detected above the legal safety limit from ready-to-eat foods. A total of 5,671 confirmed verocytotoxigenic *Escherichia coli* (VTEC) infections were reported. VTEC was also reported from food and animals. The number of human tuberculosis cases due to *Mycobacterium bovis* was 125 cases, and 328 cases of brucellosis in humans were reported. The prevalence of bovine tuberculosis in cattle increased, and the prevalence of brucellosis in cattle, sheep or goats decreased. *Trichinella* caused 301 human cases and was mainly detected in wildlife. One domestically acquired human case and one imported human case of rabies were reported. The number of rabies cases in animals increased compared with 2011. A total of 643 confirmed human cases of Q fever were reported. Almost all reporting Member States found *Coxiella burnetii* (Q fever) positive cattle, sheep or goats. A total of 232 cases of West Nile fever in humans were reported. Nine Member States reported West Nile virus findings in solipeds. Most of the 5,363 reported food-borne outbreaks were caused by *Salmonella*, bacterial toxins, viruses and *Campylobacter*, and the main food sources were eggs, mixed foods and fish and fishery products.

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KEY WORDS

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

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1 On request of EFSA, Question No EFSA-Q-2013-00780, approved on 22 January 2014.

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* Changes have been made to the *Salmonella* compliance on fresh poultry meat text on page 28, data on category 1.28 in Table SA5 on page 28, and Figure SA4 on page 29. The changes do not affect the overall discussion of the *Salmonella* chapter and the main findings of the output. To avoid confusion the original version of the output has been removed from the website but is available on request.

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THE EUROPEAN UNION SUMMARY REPORT

Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2012

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This report was revised to reflect updated datasets submitted by Romania in September 2015 related to Salmonella in poultry species. The sections affected are: Main Findings (section 2.2, p. 15); Section 3.1.3 on Salmonella in animals (Table SA17 Salmonella in breeding flocks, Table SA18 Salmonella in laying hen flocks, Table SA19 Salmonella in broiler flocks, Table SA21 Salmonella in fattening flocks of turkeys and related Figures SA8, SA10, SA11, SA14, and SA15); and Section 3.1.5 (Salmonella discussion). The revised data did not change the outcome that Romania met its Salmonella reduction targets for poultry in 2012. At EU level, the prevalence of the five targeted Salmonella serovars in adult breeding flocks tested under the mandatory Salmonella control programmes was 0.6% in 2012, unchanged from 2011.

About EFSA

The European Food Safety Authority (EFSA), located in Parma, Italy, was established and funded by the European Union (EU) as an independent agency in 2002 following a series of food scares that prompted the European public to voice concerns about food safety and the ability of regulatory authorities to protect consumers. EFSA provides objective scientific advice on all matters, in close collaboration with national authorities and in open consultation with its stakeholders, with a direct or indirect impact on food and feed safety, including animal health and welfare and plant protection. EFSA is also consulted on nutrition in relation to EU legislation. EFSA's work falls into two areas: risk assessment and risk communication. In particular, EFSA's risk assessments provide risk managers (EU institutions with political accountability, i.e. the European Commission, the European Parliament and the Council) with a sound scientific basis for defining policy-driven legislative or regulatory measures required to ensure a high level of consumer protection with regard to food and feed safety. EFSA communicates to the public in an open and transparent way on all matters within its remit. Collection and analysis of scientific data, identification of emerging risks and scientific support to the Commission, particularly in the case of a food crisis, are also part of EFSA's mandate, as laid down in the founding Regulation (EC) No 178/2002[4] of 28 January 2002.

About ECDC

The European Centre for Disease Prevention and Control (ECDC), an EU agency based in Stockholm, Sweden, was established in 2005. The objective of ECDC is to strengthen Europe's defences against infectious diseases. According to Article 3 of the founding Regulation (EC) No 851/2004[5] of 21 April 2004, ECDC's mission is to identify, assess and communicate current and emerging threats to human health posed by infectious diseases. In order to achieve this mission, ECDC works in partnership with national public health bodies across Europe to strengthen and develop EU-wide disease surveillance and early warning systems. By working with experts throughout Europe, ECDC pools Europe's knowledge on health so as to develop authoritative scientific opinions about the risks posed by current and emerging infectious diseases.

About the report

EFSA is responsible for examining the data on zoonoses, antimicrobial resistance and food-borne outbreaks submitted by Member States in accordance with Directive 2003/99/EC[6] and for preparing the EU Summary Report from the results. Data from 2012 in this EU Summary Report were produced in collaboration with ECDC which provided the information on, and analyses of, zoonoses cases in humans.

Acknowledgement

EFSA and ECDC wish to thank the members of the Task Force on Zoonoses Data Collection, the Food and Waterborne Diseases and Zoonoses Network members and the Emerging and Vector-borne Diseases Network members who provided the data and reviewed the report. The contributions of the following for the support provided to this scientific output are also gratefully acknowledged: EFSA staff members Pia Mäkelä, Frank Boelaert, Valentina Rizzi, Marios Georgiadis, Anca Stoicescu, Giusi Amore, Roisin Rooney, Emanuela Tacci, Francesca Riolo, Kenneth Mulligan; ECDC staff members Therese Westrell, Eva Warns-Petit, Joana Gomes Dias, Virginia Estevez, Taina Niskanen and Johanna Takkinen; and EFSA's contractor, the National Food Institute, Technical University of Denmark, and their staff members Helle Korsgaard, Anna Irene Vedel Sørensen, Jeffrey Edward Skiby, Lars Stehr Larsen, Birgitte Helwigh and Birgitte Borck Høg.

[4] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31, 1.2.2002, p. 1–24.

[5] Regulation (EC) No 851/2004 of the European Parliament and of the Council of 21 April 2004 establishing a European Centre for Disease Prevention and Control. OJ L 142, 30.4.2004, p. 1–11.

[6] 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.

Summary

Zoonoses are infections and diseases that are naturally transmissible, directly or indirectly, for example via contaminated foodstuffs, between animals and humans. The severity of these diseases in humans varies from subclinical infection or mild symptoms to life-threatening conditions. In order to prevent zoonoses from occurring, it is important to identify which animals and foodstuffs are the main sources of infection. For this purpose information aimed at protecting human health is collected and analysed from all European Union Member States.

In 2012, 27 Member States submitted information on the occurrence of zoonoses, zoonotic agents and food-borne outbreaks to the European Commission and the European Food Safety Authority. Furthermore, information on cases of zoonoses reported in humans was provided by the European Centre for Disease Prevention and Control. In addition, three European countries that were not European Union Member States provided information. The European Food Safety Authority and the European Centre for Disease Prevention and Control jointly analysed the data, the results of which are published in this annual European Union Summary Report, which covers 15 zoonoses and food-borne outbreaks.

In 2012, the notification rate and confirmed number of cases of human campylobacteriosis in the European Union decreased compared with 2011. Human campylobacteriosis, however, continued to be the most commonly reported zoonosis with 214,268 confirmed cases. The number of confirmed cases of campylobacteriosis in the European Union has followed a significant increasing trend in the last five years (2008-2012), along with a clear seasonal trend. The proportion of *Campylobacter*-positive food and animal samples remained mainly at levels similar to previous years, with the occurrence of *Campylobacter* continuing to be high in broiler meat.

The number of salmonellosis cases in humans decreased by 4.7 % compared with 2011. A statistically significant decreasing trend in the European Union was observed over the period 2008-2012. In total, 91,034 confirmed human cases were reported in 2012. It is assumed that the observed reduction in salmonellosis cases is mainly a result of the successful *Salmonella* control programmes in poultry populations. Most Member States met their *Salmonella* reduction targets for poultry, and *Salmonella* is declining in these animal populations. In foodstuffs, *Salmonella* was most often detected in fresh broiler meat. The food categories with the highest proportion of products not complying with the European Union *Salmonella* criteria were minced meat and meat preparations, meat products, as well as live bivalve molluscs.

The number of listeriosis cases in humans increased slightly compared with 2011, and 1,642 confirmed human cases were reported in 2012. A statistically significant increasing trend in the European Union was observed over the period 2008-2012, though only slowly increasing, along with a seasonal pattern. As in previous years, a high fatality rate (17.8 %) was reported among the cases. A total of 198 deaths due to listeriosis were reported by 18 Member States in 2012, which was the highest number of fatal cases reported since 2006. *Listeria monocytogenes* was seldom detected above the legal safety limit from ready-to-eat foods at point of retail. Samples exceeding this limit were most often found in fishery products.

A total of 5,671 confirmed verocytotoxigenic *Escherichia coli* infections were reported in 2012, which was a decrease of 40 % compared with 2011. Of those cases in which the serogroup was known, most were caused by serogroup O157, followed by O26 and O91. There was an increasing European Union trend of confirmed human verocytotoxigenic *Escherichia coli* infections in 2008–2012. Even without the 2011 data the European Union trend for verocytotoxigenic *Escherichia coli* infections during 2008–2010 was significantly increasing. Human pathogenic verocytotoxigenic *Escherichia coli* strains were detected by the reporting Member States from fresh bovine meat occasionally and at low levels. The human pathogenic verocytotoxigenic *Escherichia coli* serogroups isolated from the bovine meat and cattle samples included VTEC O157, O26, O91, O103 and O145.

The number of confirmed human tuberculosis cases due to *Mycobacterium bovis* in the European Union in 2012 was 125. This was a decrease compared with 2011, with a few Member States accounting for the majority of the reported cases. The reported prevalence of bovine tuberculosis in cattle increased slightly at European Union level, but remained at a very low level. This slight increase was, however, due to one Member State that reported an increase in prevalence of bovine tuberculosis for the fourth consecutive year.

The number of confirmed brucellosis cases in humans was 328 at European Union level, which was almost the same as in 2011. The number of brucellosis-positive cattle, and sheep and goat herds continued to decrease, although marginally compared with 2011.

Trichinella caused 301 confirmed human cases in the European Union. Although the number of cases was slightly higher in 2012 than in 2011, human trichinellosis cases remained at a low level in the European Union compared with 2009 and previous years. In 2012, the prevalence of *Trichinella* in pigs was similar to that observed in 2011. The parasite was more prevalent in wildlife than in farmed animals. However, seven out of the nine strong-evidence outbreaks reported were due to consumption of pig meat.

Toxoplasma was reported by the Member States from pigs, sheep, goats, hunted wild boar and hunted deer, in 2011 and 2012. In addition, positive findings were detected in cats (the natural hosts), cattle and dogs as well as several other animal species, indicating the wide distribution of the parasite among different animal and wildlife species.

One domestically acquired human case and one imported human case of rabies were reported in the European Union in 2012. The general decreasing trend in the total number of rabies cases in animals observed in previous years was reversed in 2012, as there was an increase in the rabies cases reported in animals. In the European Union, the number of cases reported in farm animals and foxes increased.

In 2012, a total of 643 confirmed cases of Q fever in humans were reported in the European Union. There was an overall 15.3 % decrease in the number of reported confirmed cases compared with 2011 (759 cases). All 22 reporting Member States, except one, found animals positive for *Coxiella burnetii*, the causative agent of Q fever, which demonstrates that the pathogen is widely distributed in the European Union. Positive findings were detected in cattle, sheep as well as goats.

A total of 232 cases of West Nile fever in humans were reported in the European Union. There was an overall 75.8 % increase in the number of reported cases compared with 2011 (132 cases), but a 33.5 % decrease compared with 2010 (349 cases). 2012 was the first year in which Member States were specifically invited to report data on West Nile virus in animals. Most data were from solipeds, notably horses, and less information was received from birds and other animal species. Test-positive solipeds were reported by Southern European countries but few test-positive horses were also reported by Central and Western European Member States.

A total of 5,363 food-borne outbreaks were reported in the European Union, resulting in 55,453 human cases, 5,118 hospitalisations and 41 deaths. Most of the reported outbreaks were caused by *Salmonella*, bacterial toxins, viruses and *Campylobacter*. The most important food sources of the outbreaks were eggs and egg products, followed by mixed food and fish and fish products. Overall, 16 waterborne outbreaks were reported in 2012, caused by calicivirus, verocytotoxigenic *E. coli, Cryptosporidium parvum* and rotavirus.

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1. INTRODUCTION

The European Union (EU) system for the monitoring and collection of information on zoonoses is based on the Zoonoses Directive 2003/99/EC, which obliges EU Member States (MSs) to collect relevant and, where applicable, comparable data on zoonoses, zoonotic agents, antimicrobial resistance and food-borne outbreaks. In addition, MSs are required to assess trends and sources of these agents as well as outbreaks in their territory, submitting an annual report to the European Commission (EC) covering the data collected. The European Food Safety Authority (EFSA) is assigned the tasks of examining these data and publishing the EU Summary Report.

Decision 2119/98/EC[7] on setting up a network for the epidemiological surveillance and control of communicable diseases in the EU, as complemented by Decision 2000/96/EC[8] on the diseases to be progressively covered by the network, established the basis for data collection on human diseases from MSs. The Decisions anticipated that data from the networks would be used in the EU Summary Report.

Since 2005, the European Centre for Disease Prevention and Control (ECDC) has provided data on zoonotic infections in humans, as well as their analyses, for the EU Summary Report. Starting in 2007, data on human cases have been reported from The European Surveillance System (TESSy), maintained by ECDC.

This EU Summary Report 2012 on zoonoses, zoonotic agents and food-borne outbreaks was prepared by EFSA in collaboration with ECDC. MSs, other reporting countries, the EC, members of EFSA's Scientific Panels on Biological Hazards (BIOHAZ) and Animal Health and Welfare (AHAW) and the relevant EU Reference Laboratories (EURLs) were consulted while preparing the report.

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

The data on antimicrobial resistance in zoonotic agents in 2012 are published in a separate EU Summary Report.

In 2012, data were collected on a mandatory basis for the following eight zoonotic agents in animals, food and feed: *Salmonella*, *Campylobacter, Listeria monocytogenes* (*L. monocytogenes*), verocytotoxigenic *Escherichia coli* (VTEC), *Mycobacterium bovis* (*M. bovis*), *Brucella, Trichinella* and *Echinococcus*. Data on human cases were reported via TESSy by the 27 MSs and 2 European Economic Area (EEA)/European Free Trade Association (EFTA) countries (Iceland and Norway) for all diseases. Switzerland reported human cases directly to EFSA. Moreover, mandatory reported data included antimicrobial resistance in *Salmonella* and *Campylobacter* isolates from animals and food, food-borne outbreaks and susceptible animal populations. In addition, based on the epidemiological situations in MSs, data were reported on the following agents and zoonoses: *Yersinia*, *Toxoplasma,* rabies virus, *Coxiella burnetii* (Q fever), West Nile virus (WNV), *Anisakis*, *Cysticerci*, *Francisella* and *Sarcocystis*. Data on *Staphylococcus* and antimicrobial resistance in indicator *E. coli* and enterococci isolates were also submitted. Furthermore, MSs provided data on certain other microbiological contaminants in foodstuffs - histamine, staphylococcal enterotoxins and *Enterobacter sakazakii* (*Cronobacter* spp.) - for which food safety criteria are set down in EU legislation.

All 27 MSs submitted national zoonoses reports concerning the year 2012. In addition, zoonoses reports were submitted by three non-MSs (Iceland, Norway and Switzerland).

The 2012 EU Summary Report on zoonoses and food-borne outbreak is a restricted report focusing on the most relevant annual information on zoonoses and food-borne outbreaks. If substantial changes compared with the previous year were observed, they have been reported.

The current report includes a general summary and main findings (Level 1), and EU assessments of the specific zoonoses and items (Level 2). Level 3 of the report consists of an overview of all data submitted by MSs in table format (Level 3 Tables) and is available only online (http://www.efsa.europa.eu/en/efsajournal/pub/3547.htm).

[7] Decision No 2119/98/EC of the European Parliament and of the Council of 24 September 1998 setting up a network for the epidemiological surveillance and control of communicable diseases in the Community. OJ L 268, 3.10.98, p. 1-6.

[8] Commission Decision 2000/96/EC of 22 December 1999 on the communicable diseases to be progressively covered by the Community network under Decision No 2119/98/EC of the European Parliament and of the Council. OJ L 28, 3.2.2000, p. 50–53.

Monitoring and surveillance schemes for most zoonotic agents covered in this report are not harmonised among MSs, and findings presented in this report must, therefore, be interpreted with care. The data presented may not have necessarily been derived from sampling plans that were statistically designed, and, thus, findings may not accurately represent the national situation regarding zoonoses. Regarding 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 different dates of data submission and extraction. Results are generally not directly comparable among MSs and sometimes not even between different years in one country.

The national zoonoses reports submitted in accordance with Directive 2003/99/EC are published on the EFSA website together with the EU Summary Report.

2. MAIN FINDINGS

2.1. Main conclusions of the European Union Summary Report in 2012

- In 2012, the notification rate and the reported confirmed number of cases of human campylobacteriosis in the European Union decreased compared with 2011. Despite this, the number of confirmed campylobacteriosis cases in humans shows an increasing trend over the past five years in the EU, and campylobacteriosis remains the most frequently reported zoonotic disease in humans. Overall, about a quarter of the tested fresh broiler meat samples were reported as *Campylobacter* positive, although there were large differences between the MSs.

- The number of notified salmonellosis cases in humans in the EU decreased, and this decline is a continuation of the significant declining trend observed during the past five years. It is assumed that the observed reduction in salmonellosis cases is mainly a result of the successful *Salmonella* control programmes in poultry populations. Most MSs met their *Salmonella* reduction targets for poultry in 2012, and *Salmonella* is declining in these animal populations. *Salmonella* in foodstuffs was mainly detected in meat and products thereof.

- The reported number of confirmed human cases of listeriosis in the EU increased compared with 2011 and there was a statistically increasing trend over the past five years, though only slowly increasing. The highest proportions of food samples exceeding the legal safety limit, at retail, set for *Listeria monocytogenes* (*L. monocytogenes*) in 2012 were observed in ready-to-eat (RTE) fishery products and RTE products of meat origin.

- The number of confirmed verocytotoxigenic *Escherichia coli* (VTEC) infections reported in the EU in 2012 decreased markedly compared with 2011 when a large outbreak of STEC/VTEC occurred in several MSs but primarily affecting Germany. However, the EU trend for VTEC infections during 2008–2010 was significantly increasing even without the 2011 data and the case numbers also increased in 2012 compared with 2010. Human-pathogenic VTEC strains were detected by the reporting MSs from fresh bovine meat occasionally and at low levels.

- In 2012, the reported total number of confirmed human tuberculosis cases due to *Mycobacterium bovis* in the EU decreased for the second consecutive year. The reported prevalence of bovine tuberculosis in cattle increased slightly at the EU level. However, this was mainly due to one MS.

- The annual number of human brucellosis cases reported in the EU has decreased over the past five years. Concomitantly, the prevalence of both bovine and small ruminant brucellosis has continued to decrease within the EU.

- The five-year trend of trichinellosis in the EU was greatly influenced by a number of small and large outbreaks reported, particularly in the first two years of the period. All pigs reported as *Trichinella* positive in 2012 were from non-controlled housing conditions. The proportion of positive farmed wild boar was higher than the prevalence in pigs. One horse was found positive for *Trichinella*.

- *Toxoplasma* was reported by the MSs from pigs, sheep, goats, hunted wild boar and hunted deer, in 2011 and 2012. In addition, positive findings were made from cats (the natural hosts), cattle and dogs as well as several other animal species, indicating the wide distribution of the parasite among different animal and wildlife species.

- Two human rabies cases, one domestically acquired and another one related to travel outside the EU were reported in 2012. The number of animals reported rabies-positive in 2012 increased compared with 2011. Six Central and Western European MSs reported rabies positive bats.

- In 2012, the reported number of human Q fever cases decreased compared with 2011. In animals all 22 reporting MSs except one found the causative agent (*Coxiella burnetii)* in cattle, goats or sheep.

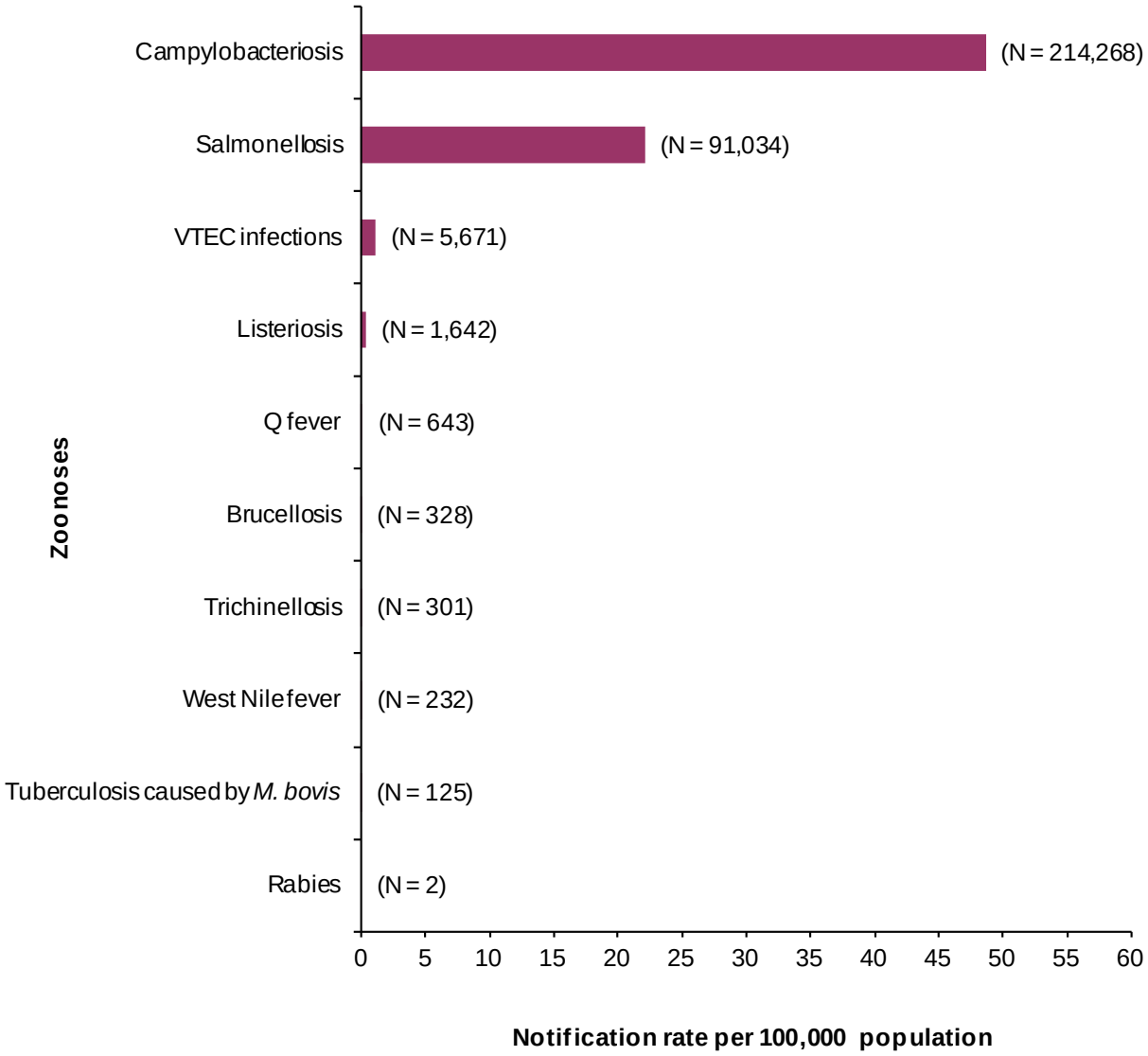
- There was an increase in the numbers of total cases of West Nile fever reported in humans in the EU compared with 2011 but the case numbers still remained below those reported in 2010. West Nile virus (WNV) test-positive solipeds were reported by Southern European countries but few test-positive horses were also reported by Central and Western European MSs. Two Southern MSs reported positive WNV findings in birds.

- *Salmonella* remained the most frequently reported cause of food-borne outbreaks in EU, with a slight increase in the numbers of outbreaks compared with 2011. The second most important causative agent group was bacterial toxins, followed by viruses and *Campylobacter.* The main food vehicles in the reported food-borne outbreaks were eggs and egg products, mixed food and fish and fish products. In terms of the number of people affected, however, the largest outbreak in 2012 was due to norovirus in frozen strawberries.

2.2. Zoonoses and item-specific summaries

The public health importance of a zoonosis is not only dependent on its incidence in the human population. The severity of the disease, case fatality, post-infection (chronic) complications and possibilities for prevention are also key factors determining the importance of the disease. For instance, despite the relatively low number of cases caused by *Listeria* and *Lyssavirus* (rabies), compared with the number of human campylobacteriosis and salmonellosis cases (Figure SU1), these infections are considered important because of the severity of the associated illness and the higher case-fatality rate (Table SU1). The case-fatality rates should, however, be interpreted with caution as the final fate of surviving cases is often unknown beyond the initial sampling and, regarding fatal cases, it can be difficult to ascertain that the disease was the primary cause of death.

Figure SU1. Reported notification rates of zoonoses in confirmed human cases[1,2] in the EU, 2012



Note: Total number of confirmed cases is indicated in parenthesis at the end each bar.

1. For West Nile fever the total number of cases is indicated.
2. Due to the restricted nature of the present report, the 2012 human notification rates for yersiniosis and echinococcosis were not produced but will be available in the 'Annual Epidemiological Report 2014 - Reporting on 2012 surveillance data and 2013 epidemic intelligence data, ECDC 2014' (in preparation). The 2011 rates for these diseases were reported in 'The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2011. EFSA Journal 2013;11(4):3129'.

Table SU1. Reported hospitalisation and case-fatality rates due to zoonoses in confirmed human cases in the EU, 2012

Disease	Number of confirmed[1] human cases	Hospitalisation				Deaths			
		Confirmed cases covered[1,2] (%)	Number of reporting MSs[3]	Reported hospitalised cases	Hospitalisation rate (%)	Confirmed cases covered[1,2] (%)	Number of reporting MSs[3]	Reported deaths	Case-fatality rate (%)
Campylobacteriosis	214,268	9.7	12	9,946	47.7	52.0	14	31	0.03
Salmonellosis	91,034	10.1	10	4,134	45.1	48.9	14	61	0.14
VTEC infections	5,671	37.5	13	777	36.5	58.7	18	12	0.36
Listeriosis	1,642	41.5	14	624	91.6	67.7	18	198	17.8
Q fever	643	NA	NA	NA	NA	56.1	12	1	0.28
Brucellosis	328	51.2	6	131	78.0	32.9	7	1	0.93
Trichinellosis	301	73.1	5	177	80.5	72.4	7	0	0
West Nile fever	232	13.8	3	28	84.4	85.3	6	22	11.1
Rabies	2	100	2	2	100	100	2	2	100

Note: NA: not applicable as the information is not collected for this disease.

1. Except for West Nile fever, for which the total number of cases was included.
2. The proportion (%) of confirmed cases for which the information on hospitalisation or death was available.
3. Not all countries observed cases of all diseases.

Campylobacter

Humans

Campylobacteriosis has been the most frequently reported zoonotic disease in humans in the EU since 2005. In 2012, 214,268 confirmed cases of campylobacteriosis were reported, which was a decrease of 4.3 % compared with 2011. The EU notification rate was 55.49 per 100,000 population in 2012. There was a clear seasonal trend in confirmed campylobacteriosis cases reported in the EU in 2008–2012 and a significant increasing EU trend. Considering the high number of human campylobacteriosis cases, the severity in terms of reported fatalities was low (0.03 %) (Table SU1).

Foodstuffs

Overall, 23.6 % of the samples (single or batch) of fresh broiler meat were found to be positive for *Campylobacter* in the reporting MSs, which was less than in 2011, when 31.3 % of the samples were positive. However, the reporting MSs in 2011 and 2012 were not exactly the same ones, which make the data non-comparable. In addition, for the MSs reporting data for both years, there were increases, decreases and comparable prevalence in the reported proportions of positive samples compared with 2011.

Animals

In two of the five MSs reporting flock-based data for broilers, the reported prevalence was very high (63.4 %) to extremely high (83.6 %). The occurrence of *Campylobacter* varied widely among the three MSs reporting slaughter batch-based data, with prevalence ranging from 1.6 % to 62.1 %. One MS, Germany, also reporting animal-based data, found 9.2 % of broilers positive out of 672 units tested at the farm.

Salmonella

Humans

In 2012, a total of 91,034 confirmed cases of human salmonellosis were reported in the EU. This represents a decrease of 4.7 % compared with 2011 and a decrease of 43,546 cases (32 %) compared with the case numbers reported in 2008. The EU notification rate for confirmed cases was 22.2 cases per 100,000 population. The EU case-fatality rate was 0.14 % as 61 deaths due to non-typhoidal salmonellosis were reported in the EU in 2012 (Table SU1). As in previous years, *S.* Enteritidis and *S*. Typhimurium were the most frequently reported serovars (41.3 % and 22.1 %, respectively, of all known reported serovars in human cases). As a result of the harmonised reporting and also several large outbreaks, monophasic *S.* Typhimurium 1,4,[5],12:i:- was the third most commonly reported serovar in the EU (7.2 %). The fourth most common serovar in humans was *Salmonella* Infantis (*S*. Infantis), of which the numbers of reported isolates have been increasing over the last five years.

It is assumed that the observed reduction in salmonellosis cases in humans is mainly the result of successful *Salmonella* control programmes in fowl (*Gallus gallus*) populations that are in place in EU MSs and that have particularly resulted in a lower occurrence of *Salmonella* in eggs, though other control measures might also have contributed to the reduction.

Foodstuffs

Information on *Salmonella* was reported from a wide range of foodstuff categories in 2012, but the majority of data were from various types of meat and products thereof. The highest proportions of *Salmonella*-positive single samples were reported for fresh broiler meat at an average level of 5.5 %. In fresh turkey, pig and bovine meat, the percentage of tested single samples found positive for *Salmonella* in the group of reporting MSs were, respectively, 5.5 %, 0.7 % and 0.2 %.

Salmonella was found in a very low proportion of table eggs, at levels of 0.1 % (single samples) or <0.1 % (batch samples). *Salmonella* was also detected in other foods, including vegetables, but also in samples originating from both fruit and vegetables, in spices and herbs, in egg products and in live bivalve molluscs.

Non-compliance with the EU *Salmonella* criteria was most often observed in food categories of meat origin. Minced meat and meat preparations from poultry intended to be eaten cooked had the highest level of non-compliance (8.7 % of single samples and 5.7 % of batches). A high proportion of non-compliance was also reported for minced meat and meat preparations from animal species other than poultry intended to be eaten

cooked (2.0 % of single samples and 0.9 % of batch samples) and meat products from poultry meat intended to be eaten cooked (2.9 % of single samples). In 12 batch samples, 8.3 % of mechanically separated meat was found to be contaminated with *Salmonella*. Of relevance are the *Salmonella* findings in RTE foods, such as minced meat and meat preparations intended to be eaten raw. 0.2 % of single samples and 0.5 % of batch samples were found positive. Non-compliance was also observed in live bivalve molluscs and live echinoderms, tunicates and gastropods, where 1.8 % of batches were non-compliant. All samples of egg products and RTE sprouted seeds were compliant with the criteria in 2012.

Animals

In 2012, 19 MSs met the *Salmonella* reduction target of ≤1 % set for breeding flocks of *Gallus gallus* (fowl), which covers five target serovars (*S.* Enteritidis, *S.* Typhimurium, *S.* Hadar, *S.* Infantis, *S.* Virchow). Overall, 0.6 % of breeding flocks of *Gallus gallus* in the EU were positive for the target serovars during the production period, as in 2011. In 2012, 0.2 % of the adult breeding flocks tested under the mandatory *Salmonella* control programmes was positive for *S.* Enteritidis. Altogether 3.0 % of the breeding flocks of *Gallus gallus* in the EU were positive for *Salmonella* spp. (1.9 % in 2011).

In the case of flocks of laying hens, 24 MSs (compared with 22 MSs in 2011) met their relative *Salmonella* reduction targets, which cover *S.* Enteritidis and *S.* Typhimurium. The EU prevalence was reduced for the two target serovars from 1.5 % in 2011 to 1.3 % in 2012. Overall, during the production period, 3.5 % (4.2 % in 2011) of laying hen flocks in the EU were positive for *Salmonella* spp.

2012 was the fourth year for implementing the EU reduction target of ≤1 % prevalence for *S.* Enteritidis and *S.* Typhimurium in broiler flocks. As in 2011, 24 MSs met this target in 2012. The EU prevalence for the target serovars was 0.3 %, as in 2011. The prevalence of *Salmonella* spp. was 3.2 % as in 2011.

2012 was the third year of MSs implementing the *Salmonella* reduction targets for turkey flocks (≤1 % for *S.* Enteritidis and *S.* Typhimurium). All but 1 of the 14 MSs which reported data on turkey breeding flocks met the target, with an overall prevalence of 0.5 % for the two target serovars (0.2 % in 2011). A further 21 MSs met the target for fattening turkey flocks before slaughter, with only 1 MS not meeting the target. At the EU level 0.4 % of the fattening turkey flocks were infected with the two target serovars (0.5 % in 2011, two MSs with target-positive flocks). In total, 4.6 % and 14.6 % of turkey breeding and fattening flocks, respectively, were positive for *Salmonella* spp. in 2012 (3.5 % and 10.1 % in 2011).

All these results indicate that MSs continued to invest in *Salmonella* control and that this work is yielding further improvements in results.

Salmonella findings were also reported in other animal species, including ducks, geese, pigs, cattle, sheep and goats.

Feedingstuffs

Salmonella was detected most often in feed materials from fish meal, up to levels of 4.5 %. Some findings were also detected in feed materials derived from land animal origin, cereals and oil seeds. *Salmonella* was reported in compound feedingstuffs for cattle, pigs and poultry with the proportion of positive samples ranging between 0.2 % (batch level) and 2.1 % (single samples) at the EU level.

Listeria

Humans

The number of reported listeriosis cases in humans in the EU in 2012 increased by 10.5 % compared with 2011. The overall EU notification rate was 0.41 cases per 100,000 population. The highest notification rates of listeriosis, in 2012, were reported in children below one and persons aged 65 years and above. A total of 198 deaths due to listeriosis were reported by 18 MSs in 2012, which was the highest number of fatal cases reported since 2006. The EU case-fatality rate was 17.8 % among the confirmed cases for which this information was reported (67.7 % of all confirmed cases). The number of listeriosis cases reported in the EU in the last five years has fluctuated somewhat over time, but overall in the period 2008-2012, a slowly increasing trend was observed.

Foodstuffs

MSs provided information on numerous investigations of *L. monocytogenes* in different categories of RTE food in 2012. In the case of RTE products at point of retail, very low proportions of samples were generally found to be non-compliant with the EU criterion of ≤100 cfu/g. The highest reported levels of non-compliance at retail were observed in RTE fishery products (0.5 % of single samples and 0.7 % of batch samples), followed by RTE products of meat origin (0.4 % of single samples). Concerning samples taken at processing, the highest level of non-compliance in single food samples was observed in RTE fishery products (8.0 %), followed by unspecified cheeses (3.4 %). Unspecified cheeses was also the food category with the highest reported level of non-compliance at processing in batch samples (7.2 %).

Animals

In 2012, *L. monocytogenes* was detected by several MSs in various animal species, including cattle, fowl, sheep, goats and horses. As in previous years the highest proportions of positive findings were reported from goats and sheep, especially from Germany, where 13.3 % of the tested goat herds and 14.5 % of the tested sheep herds were positive for this ubiquitous environmental organism.

Verocytotoxigenic *E. coli*

Humans

In 2012, a total of 5,671 confirmed human VTEC cases were reported by 22 MSs. This represents a decrease of 40 % compared with 2011 (N = 9,487) when a large outbreak of STEC/VTEC O104:H4 occurred in the EU, primarily in Germany. The overall EU notification rate of VTEC was 1.15 cases per 100,000 population in 2012. An increase in the reported number of confirmed VTEC infections was observed in the EU in the past five years. This trend also remained when the 2011 outbreak data were omitted. As in previous years, the most commonly identified VTEC serogroup was O157 followed by O26 and O91. The case fatality rate for human VTEC infections in 2012 was 0.36 % compared with 0.75 % in 2011, with 12 deaths reported (Table SU1).

Foodstuffs and animals

Human pathogenic VTEC strains were detected by the reporting MSs from fresh bovine meat occasionally and at low levels. The human pathogenic VTEC serogroups isolated from bovine meat and cattle samples included VTEC O157, O26, O91, O103 and O145.

Tuberculosis due to *Mycobacterium bovis*

Humans

Tuberculosis due to *M. bovis* is a rare infection in humans in the EU. In 2012, the total number of confirmed human tuberculosis cases due to *M. bovis* was 125, representing a decrease of 15.5 % compared with 2011. This was the second consecutive year for which a decrease in the confirmed human case numbers in the EU was observed.

Animals

In 2012, two provinces in one MS as well as a superior administrative unit in another MS were declared officially bovine tuberculosis free (Officially Tuberculosis Free, OTF). As in 2011, 15 MSs were OTF as well as 3 non-MSs. Additionally, Scotland (in the United Kingdom), the superior administrative unit of Algarve in Portugal as well as 6 regions and 15 provinces in Italy were OTF in 2012. Seven OTF MSs reported infected cattle herds in 2012. Eight non-OTF MSs reported positive or infected herds. In most of these non-OTF MSs, the prevalence of bovine tuberculosis remained at a level comparable with 2011 or decreased, except in the United Kingdom, which reported an increase in the overall proportion of existing herds positive from 9.06 % to 10.4 %. *M. bovis* was also detected in over 10 animal species other than cattle, including wildlife.

Brucella

Humans

In 2012, a total of 328 confirmed cases of human brucellosis were reported in the EU, representing a decrease of 2.4 % compared with the 336 confirmed cases in 2011. An overall decrease in the reported number of confirmed brucellosis cases was also noted in the EU in the past five years. As in previous years, the highest numbers were reported by non-Officially Brucellosis-Free (non-OBF)/non-Officially *Brucella melitensis* (*B. melitensis)*-Free (non-ObmF) MSs. Significant decreasing trends by country were also observed in two MSs, Italy and Spain, which is in accordance with the findings in the animal population in these countries. Almost four out of five of the human brucellosis cases (for which hospitalisation information was available) had been hospitalised but only one fatal case was reported in 2012 (Table SU1).

Foodstuffs

In 2012 *Brucella* was reported in milk samples at processing plant, by two MSs.

Animals

In 2012, 16 MSs were OBF and 19 MSs were ObmF for sheep and goats. In addition, some regions and provinces in Italy, Spain and Portugal as well as England, Scotland, Wales and the Isle of Man, in the United Kingdom, were OBF. Furthermore, a number of departments in France and some regions and provinces in Italy, Portugal and Spain were ObmF.

At the EU level, the prevalence of bovine brucellosis in cattle herds has been decreasing, and in 2012, only 0.05 % of the existing cattle herds were infected with or positive for *Brucella*. In the EU non-OBF MSs, the percentage of existing infected/positive herds decreased between 2005 and 2007, then stabilised until 2011, after which a decrease continued in 2012. In 2012, bovine brucellosis was rare also in the non-OBF MSs (0.09 %). The prevalence of brucellosis in sheep and goat herds decreased more substantially both at the EU level and in the non-ObmF MSs, with a statistically significant decreasing trend in EU co-financed non-ObmF MSs since 2004. In 2012, the proportion of existing infected/positive sheep and goat herds infected with *B. melitensis* in the EU was 0.14 %.

Trichinella

Humans

In 2012, confirmed cases of trichinellosis increased by 12.3 %, with 301 cases reported, compared with 268 cases in 2011. The EU notification rate was 0.06 cases per 100,000 population and the highest notification rates in 2012 were reported in Latvia, Lithuania, Romania and Bulgaria. These four countries accounted for 82.4 % of all confirmed cases reported in 2012. No increasing or decreasing EU trend could be observed for the period 2010-2012. No deaths due to trichinellosis were reported in 2012 from the seven MSs that provided information (Table SU1).

Animals

All MSs and three non-MSs provided data on *Trichinella* in animals. *Trichinella* was very rarely detected in 2012 from pigs in the EU, and all the positive findings reported by MSs were from pigs from non-controlled housing conditions. Eight MSs provided data on samplings of farmed wild boar and the proportion of positive farmed wild boar was higher than the prevalence in pigs. Eighteen MSs and three non-MSs reported data on solipeds, and one (0.0005 %) was found positive for *Trichinella,* in 2012. *Trichinella* is often reported in wildlife species by some Eastern and Northern European MSs, where the parasite is circulating in wildlife populations.

Toxoplasma

Animals

Fifteen MSs reported data on *Toxoplasma* for the years 2011 or 2012. Positive findings were detected in pigs, cattle, sheep, goats, dogs, cats, water buffaloes and some wildlife animal species.

Rabies

Humans

In 2012, Romania reported one domestically acquired case in a five-year-old girl. The girl had been bitten by a stray dog in a village in Eastern Romania and she died in February 2012. In addition, in May 2012, one travel-associated case of rabies was reported in the EU, from the United Kingdom. The patient was a woman, resident in United Kingdom, who visited her country of origin, India, where she was bitten by a dog (Table SU1).

Animals

In 2012, 712 animals other than bats tested positive for either classical rabies virus or unspecified *Lyssavirus* in eight MSs and one non-MS (Norway). The number of cases reported in 2012 increased compared with 2011, when 512 cases where detected in animals other than bats. In addition, six Central and Western European MSs reported rabies cases from bats.

Q-fever

Humans

In 2012, a total of 643 confirmed human cases of Q fever were reported in the EU, representing a 15.3 % decrease compared with 2011 (759). One death due to Q fever was reported in Germany in 2012 (Table SU1).

Animals

All but one of the 22 reporting MSs found *Coxiella burnetii* (Q fever)-positive animals in their cattle, sheep or goat populations in 2011 or 2012. Positive pigs and wild boar were also reported.

West Nile virus

Humans

In 2012, a total of 232 total cases of West Nile fever in humans were reported in the EU. The EU case-fatality rate was 11.1 % among the 198 cases for which this information was reported.

Animals

Nine of 11 Southern, Central and Western European MSs reporting 2012 data on horses and donkeys, found animals that tested positive for WNV. Two from four MSs in Southern Europe and reporting 2012 data on domestic and wild birds, found animals that tested positive for WNV.

Other zoonoses and zoonotic agents

A few MSs reported data on *Anisakis*, *Cysticercus*, *Sarcocystis* or *Francisella tularensis* in food or animals for the years 2011 or 2012.

Food-borne outbreaks

A total of 5,363 food-borne outbreaks, including waterborne outbreaks, were reported in the EU. Overall, 55,453 human cases, 5,118 hospitalisations and 41 deaths were recorded. The evidence supporting the link between human cases and food vehicles was strong in 763 outbreaks.

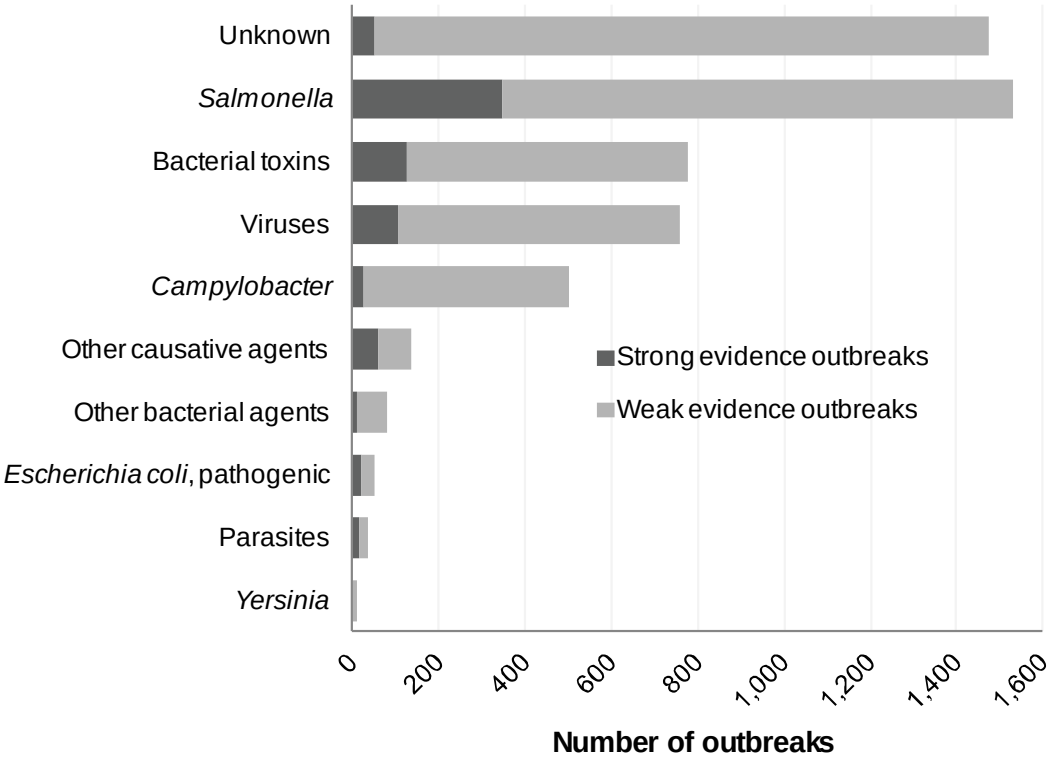
The largest number of reported food-borne outbreaks was caused by *Salmonella* (28.6 % of all outbreaks), followed by bacterial toxins (14.5 %), viruses (14.1 %) and *Campylobacter* (9.3 %). For 27.6 % of the outbreaks the causative agent was unknown. The numbers of reported outbreaks caused by viruses, *Salmonella* and bacterial toxins increased compared with the previous year. The most important food vehicles in the 763 strong evidence outbreaks were eggs and egg products (in 22.0 % of outbreaks), mixed foods (15.6 %) and fish and fish products (9.2 %).

In 2012, 16 strong-evidence waterborne outbreaks were reported in the EU, and the main causative agents were VTEC and calicivirus. *Cryptosporidium parvum* and rotavirus were also the causative agent in one outbreak each.

The largest food-borne outbreak in terms of human cases, in 2012, was a norovirus outbreak, in which 10,950 people were affected.

The revised food-borne outbreak reporting specifications were implemented for the third time in 2012. Approximately one-third of the outbreaks, supported by strong evidence, in 2012 were supported only by the new evidence categories (descriptive epidemiological evidence and detection of the causative agent in the food chain). The number of outbreaks, supported by strong evidence, increased compared with 2011 (763 in 2012 compared with 701 in 2011) as well as the proportion of these outbreaks out of the total number of outbreaks reported (14.2 % in 2012 compared with 12.4 % in 2011). This indicates that the MSs had implemented the revised reporting specifications and that these specifications had an impact on the reporting of outbreaks.

Figure SU2. Distribution of food-borne outbreaks per causative agent in the EU, 2012



Note: Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus*. Food-borne viruses include calicivirus, hepatitis A virus, flavivirus, rotavirus and other unspecified viruses. Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins, atropine and other unspecified agents. Parasites include primarily *Trichinella*, but also *Cryptosporidium*, *Giardia*, *Anisakis* and other unspecified parasites. Other bacterial agents include *Listeria*, *Brucella*, *Shigella*, *Vibrio* and *Francisella*. Pathogenic *Escherichia coli* includes also verotoxigenic *Escherichia coli*.

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.1. *Salmonella*

The genus *Salmonella* is divided into two species: *Salmonella enterica* (*S. enterica*) and *S. bongori*. *S. enterica* is further divided into six subspecies, and most zoonotic *Salmonella* belong to the subspecies *enterica*. This subspecies can be further divided into serovars, which are often named according to the place of first isolation. In the following text, a genus name followed by serovar is used, for example *S.* Typhimurium. More than 2,600 serovars of zoonotic *Salmonella* exist although a limited number are associated with most human infections and the prevalence of different serovars may change over time.

Human salmonellosis is usually characterised by acute onset of fever, abdominal pain, nausea, and sometimes vomiting, after an incubation period of 12–36 hours. Symptoms are often mild, and most infections are self-limiting, lasting a few days. However, in some patients, the infection may be more serious and the associated dehydration can be life-threatening. When *Salmonella* causes systemic infections, such as septicaemia, effective antimicrobials are essential for treatment. Salmonellosis has also been associated with long-term and sometimes chronic sequelae, e.g. reactive arthritis. Mortality is usually low, and less than 1 % of reported *Salmonella* cases have been fatal.

The common reservoir of *Salmonella* is the intestinal tract of a wide range of domestic and wild animals, which may result in a variety of foodstuffs, of both animal and plant origin, becoming contaminated with faecal organisms either directly or indirectly. Transmission often occurs when organisms are introduced into food preparation areas and are allowed to multiply in food, e.g. due to inadequate storage temperatures, inadequate cooking or cross-contamination of RTE food. The organism may also be transmitted through direct contact with infected animals or humans or faecally contaminated environments. Infected food handlers may also act as a source of contamination for foodstuffs.

Contaminated foodstuffs serving as a source for *Salmonella* infection for humans include table eggs closely followed by pig meat, whereas the risks associated with broiler and turkey meat are similar and approximately two-fold lower[9]. In the EU, *S.* Enteritidis and *S.* Typhimurium are the serovars most frequently associated with human illness. Human *S.* Enteritidis cases are most commonly associated with the consumption of contaminated eggs and poultry meat, while *S.* Typhimurium cases are mostly associated with the consumption of contaminated pig meat or bovine meat.

In animals, sub-clinical infections are common. The organism may easily spread between animals in a herd or flock without detection and animals may become intermittent or persistent carriers. Infected cattle, sheep and horses may succumb to fever, diarrhoea and abortion. Also within calf herds, *Salmonella* may cause outbreaks of diarrhoea and septicaemia with high mortality. Clinical signs are less common in pigs and goats and poultry usually show no obvious signs of infection with zoonotic serovars.

Table SA1 presents the countries reporting data for 2012.

[9] EFSA Panel on Biological Hazards (BIOHAZ), 2012. Scientific Opinion on an estimation of the public health impact of setting a new target for the reduction of *Salmonella* in turkeys. EFSA Journal 2012;10(4):2616, 89 pp. doi:10.2903/j.efsa.2012.2616

Table SA1. Overview of countries reporting data for* Salmonella*, 2012

Data	Total number of reporting MSs	Countries
Human	27	**All MSs** **Non-MSs:** CH, IS, NO
Food	26	**All MSs** except MT **Non-MSs:** CH, IS, NO
Animal	27	**All MSs** **Non-MSs:** CH, IS, NO
Feed	23	**All MSs** except BG, CY, MT, UK **Non-MSs:** CH, NO
Serovars (food and animals)	22	**All MSs** except BE, FR, LT, LU, MT **Non-MSs:** IS, NO

Note: The overview table includes all data reported by MSs and non-MSs.

3.1.1. Salmonellosis in humans

Salmonellosis continued to decrease in 2012. A total of 92,916 salmonellosis cases were reported by the 27 EU MSs (though only provisional data were reported from Italy), with 91,034 confirmed cases (EU notification rate 22.2 cases per 100,000 population) (Table SA2). This represented a 4.7 % decrease in confirmed cases compared with 2011. The highest notification rates, in 2012, were reported by the Czech Republic and Slovakia (≥85 cases per 100,000), while the lowest rates were reported by Portugal, Greece and Romania (≤4 per 100,000). The proportion of domestic cases versus travel-associated cases varied markedly between countries, with the highest proportion of travel-related cases, >70 %, in the Nordic countries, Finland, Sweden and Norway (Figure SA1).

There was a clear seasonal trend in confirmed salmonellosis cases reported in the EU in 2008–2012, with most cases reported during summer months. The significant decreasing EU trend observed for several years continued in 2012 ($p < 0.001$ with linear regression) (Figure SA2). Significant decreasing trends, by country, were observed in 15 MSs and two non-MS: Austria, Belgium, Cyprus, Denmark, Estonia, Finland, Germany, Greece, Iceland, Ireland, Lithuania, Norway, Portugal, Slovakia, Slovenia, Sweden and the United Kingdom. Significant increasing trends were observed in France and the Netherlands. The increasing trend in the Netherlands could be explained by a very large outbreak of *S*. Thompson in 2012, in which smoked salmon was the suggested vehicle[10].

Ten MSs provided information on hospitalisation for some or all of their cases. On average, 45.1 % of the confirmed salmonellosis cases were hospitalised; hospitalisation status was, however, provided for only 10.1 % of all confirmed cases. The highest hospitalisation rates were reported in Greece, Romania, Cyprus and Portugal (73–91 % of cases hospitalised). Three of these countries also reported the lowest notification rates of salmonellosis, which indicates that the surveillance systems in these countries primarily capture the more severe cases.

Fourteen MSs provided data on the outcome of their cases and, of these, eight MSs reported a total of 61 fatal cases. This gives an EU case-fatality rate of 0.14 % among the 44,532 confirmed cases for which this information was reported (48.9 % of all confirmed cases).

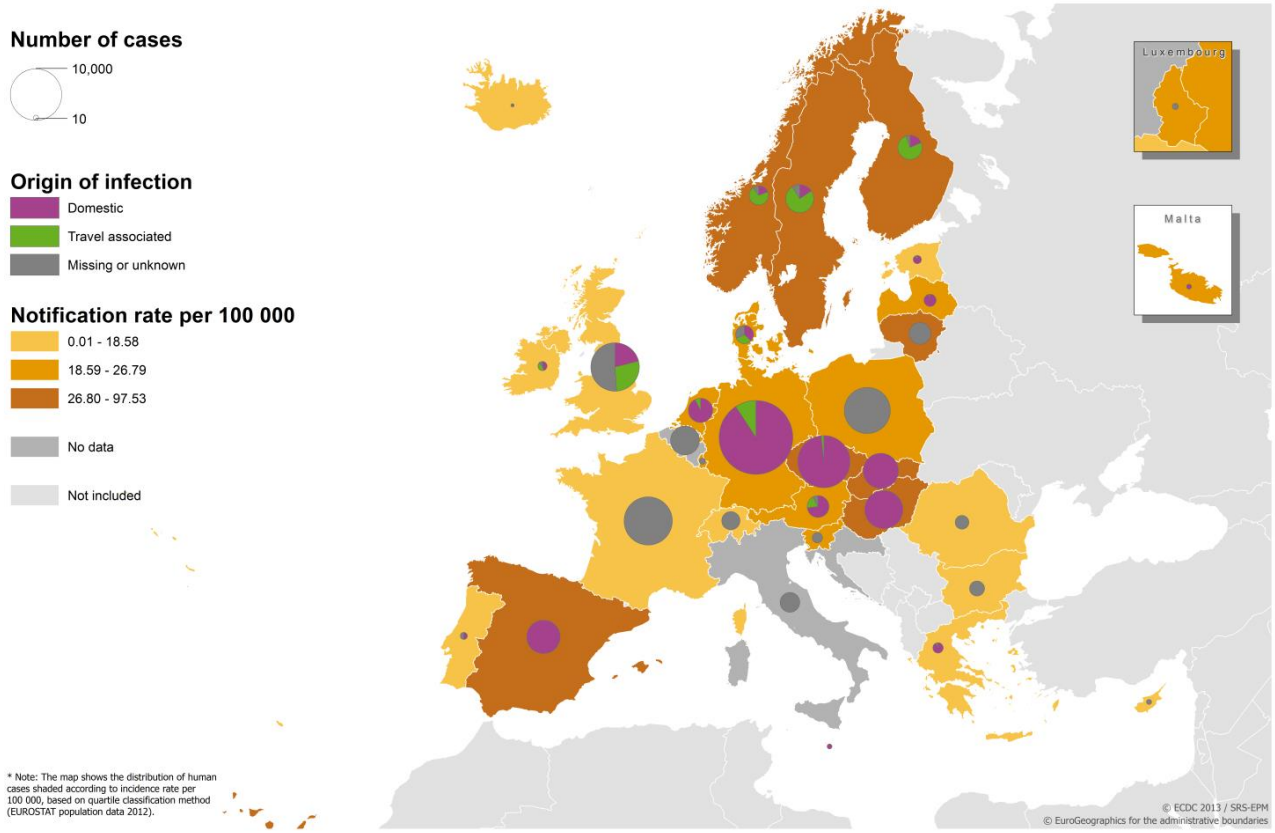
[10] Friesema IH, de Jong AE, Fitz James IA, Heck ME, van den Kerkhof JH, Notermans DW, van Pelt W and Hofhuis A, 2012. Outbreak of *Salmonella* Thompson in the Netherlands since July 2012. Euro Surveillance, 17(43): pii=20303. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20303

Table SA2. Reported cases of human salmonellosis in 2008–2012 and notification rate for confirmed cases in the EU, 2012

Country	2012				2011	2010	2009	2008
	Report type[1]	Cases	Confirmed cases	Confirmed cases/ 100,000	Confirmed cases			
Austria	C	1,778	1,773	21.0	1,432	2,179	2,775	2,312
Belgium[2]	C	3,101	3,101	–	3,177	3,169	3,113	3,831
Bulgaria	A	839	839	11.5	924	1,154	1,247	1,516
Cyprus	C	90	90	10.4	110	136	134	169
Czech Republic	C	10,397	10,245	97.5	8,499	8,209	10,480	10,707
Denmark	C	1,207	1,207	21.6	1,170	1,608	2,130	3,669
Estonia	C	287	249	18.6	375	381	261	647
Finland	C	2,204	2,204	40.8	2,108	2,437	2,338	3,126
France	C	8,705	8,705	13.3	8,685	7,184	7,153	7,186
Germany	C	20,848	20,493	25.1	23,982	24,833	31,395	42,885
Greece	C	404	404	3.6	471	297	403	792
Hungary	C	5,867	5,462	55.8	6,169	5,953	5,873	6,637
Ireland	C	315	309	6.7	311	349	335	447
Italy[3]	C	1,453	1,453	–	3,344	4,752	5,715	6,662
Latvia	C	556	547	26.8	995	877	795	1,229
Lithuania	C	1,762	1,762	58.6	2,294	1,962	2,063	3,308
Luxembourg	C	136	136	25.9	125	211	162	153
Malta	C	88	88	21.1	129	160	125	161
Netherlands[4]	C	2,198	2,198	20.5	1,284	1,447	1,204	1,627
Poland	A	8,444	7,952	20.6	8,400	9,257	8,529	9,149
Portugal	C	190	185	1.8	174	205	220	332
Romania	C	775	698	3.3	989	1,285	1,105	624
Slovakia	C	4,965	4,627	85.6	3,897	4,942	4,182	6,849
Slovenia	C	392	392	19.1	400	363	616	1,033
Spain[5]	C	4,181	4,181	36.2	3,786	4,420	4,304	3,833
Sweden	C	2,922	2,922	30.8	2,887	3,612	3,054	4,185
United Kingdom	C	8,812	8,812	14.3	9,455	9,670	10,479	11,511
EU Total		**92,916**	**91,034**	**22.2**	**95,572**	**101,052**	**110,190**	**134,580**
Iceland	C	38	38	11.9	45	34	35	134
Liechtenstein	–	–	–	–	–	–	–	2
Norway	C	1,371	1,371	27.5	1,290	1,370	1,235	1,941
Switzerland[6]	C	1,241	1,241	16.1	1,302	1,177	1,302	2,028

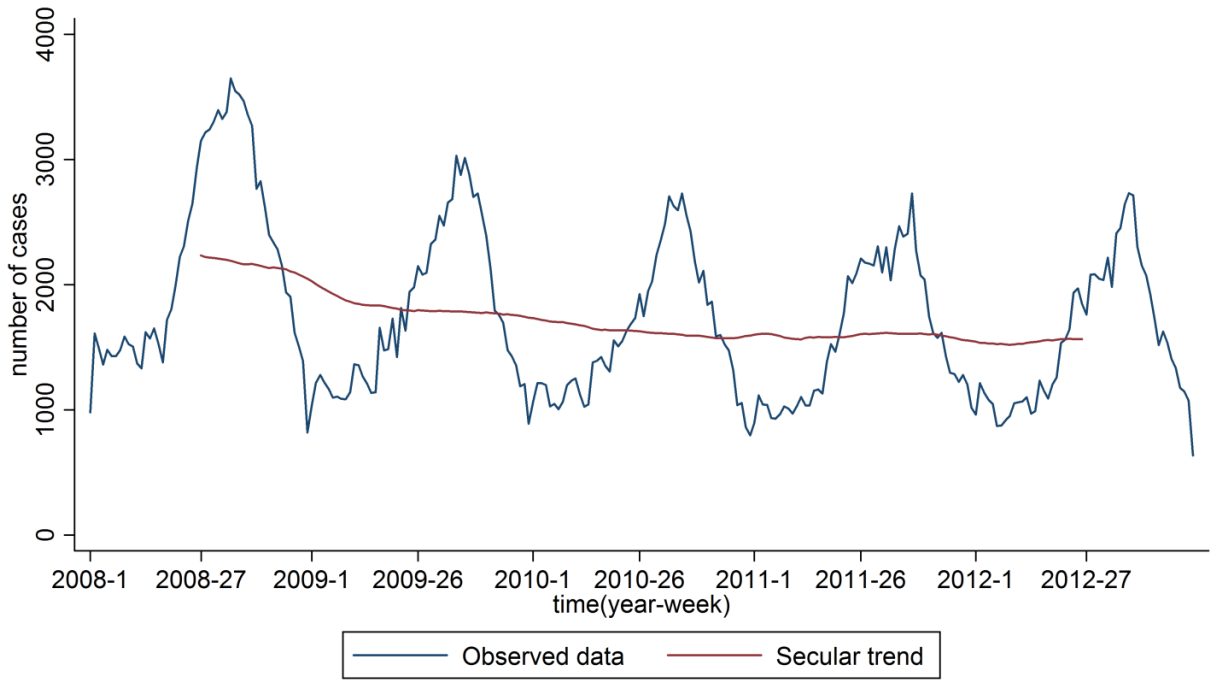
1. A: aggregated data report; C: case-based report; –: no report.
2. Sentinel surveillance; no information on estimated coverage. Thus, the notification rate cannot be estimated.
3. Provisional data for 2012. Thus, the notification rate can not be estimated.
4 Sentinel system; notification rates calculated with an estimated population coverage of 64 %.
5. Notification rates calculated with estimated population coverage of 25 %.
6. Switzerland provided data directly to EFSA.

Figure SA1. Notification rates and origin of infection in human salmonellosis in the EU/EFTA, 2012



Note: The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

Figure SA2. Trend in reported confirmed cases of human salmonellosis in the EU, 2008–2012

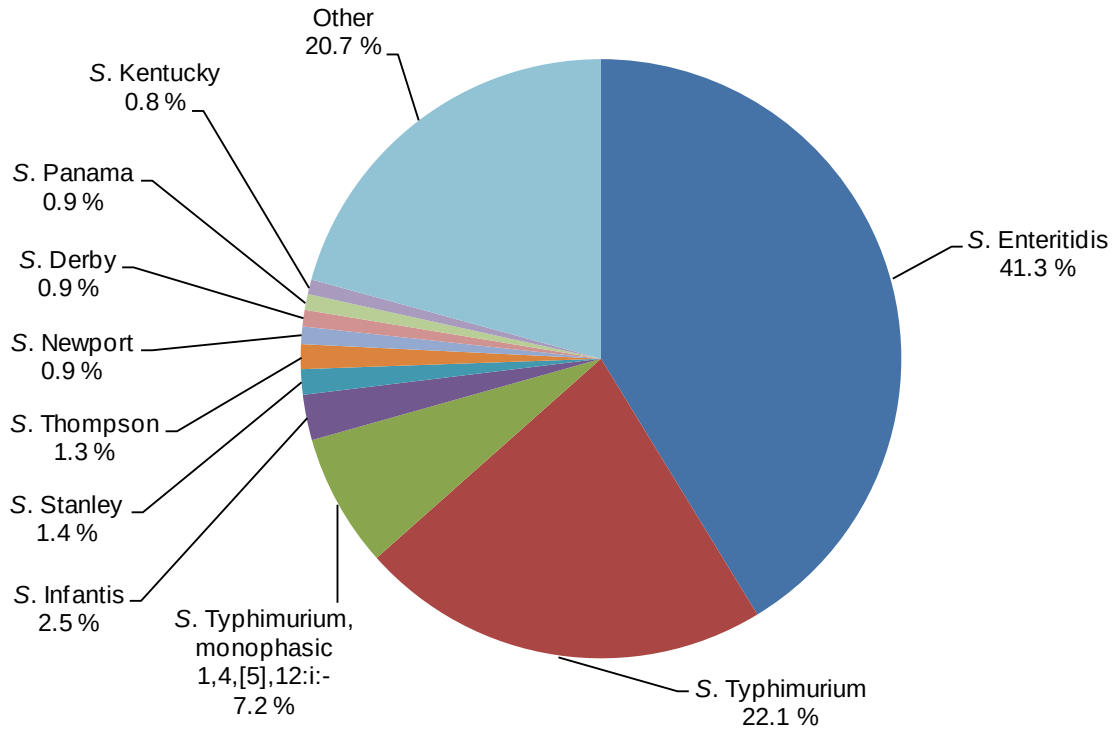


Source: 24 MSs: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Bulgaria and Poland are excluded as they reported only monthly data. Italy is excluded as its 2012 data were not representative.

Information on *Salmonella* serovars from cases of human infection was available from 25 MSs (Bulgaria and Poland reported no case-based serovar data) and two non-MSs. As in previous years, the two most commonly reported *Salmonella* serovars in 2012 were *S*. Enteritidis and *S*. Typhimurium, representing 41.3 % and 22.1 %, respectively, of all reported serovars in human confirmed cases (N = 82,409) (Figure SA3 and Table SA3). The decrease in *S*. Enteritidis continued with 2,103 fewer cases (5.8 %) reported in the EU in 2012 than in 2011. Cases of *S*. Typhimurium decreased in 2012 compared with 2011 but, if added together with the monophasic *S*. Typhimurium, there was an increase of 2.8 %. The case numbers reported for monophasic *S*. Typhimurium 1,4,[5],12:i:- continued to increase in 2012 (reported by 11 MSs compared with 10 in 2011) and with higher number of cases was reported in 2012 than in 2011 in all but one MS. (The reporting of this variant was harmonised in 2010, when a separate serovar code was introduced in TESSy).

Salmonella Infantis, the fourth most common serovar, continued to increase in 2012, by 14.5 % (from 2.1 to 2.5 %). A major increase was observed in *S.* Stanley due to a multi-country outbreak, affecting at least seven MSs, and being linked to the turkey production chain[11]. New on the top 10 serovar list were *S*. Thompson with 1,100 cases and *S*. Panama with 706 cases (Table SA3). The majority of *S*. Thompson cases were reported by the Netherlands and were linked to an outbreak with smoked salmon as the suggested vehicle[12]. The increase in *S*. Panama cases primarily occurred in one German federal state where an outbreak was reported (Christina Frank, Robert Koch Institute, personal communication, September 2013), and one Italian region (Ida Luzzi, Istituto Superiore di Sanità, personal communication, September 2013). The German outbreak involved a total of 334 cases and the highest incidence was in the age group of one- to three- year-olds, with 56 cases per 100,000 population (Sabine Schroeder, Thuringia State health office, personal communication, September 2013). The outbreak investigation concluded that consumption of raw pork products, such as seasoned minced pork and shortly ripened raw sausages, was the likely source of the outbreak.

Figure SA3. Distribution of the 10 most common* Salmonella *serovars in humans in the EU, 2012 (N = 82,409)



[11] ECDC-EFSA, 2012. Multi-country outbreak of *Salmonella* Stanley infections. Joint ECDC/EFSA rapid risk assessment. Update 20 September 2012. Available online: http://www.ecdc.europa.eu/en/publications/publications/20120921_rra_stanley_salmonella.pdf

[12] Friesema IH, de Jong AE, Fitz James IA, Heck ME, van den Kerkhof JH, Notermans DW, van Pelt W and Hofhuis A, 2012. Outbreak of *Salmonella* Thompson in the Netherlands since July 2012. Euro Surveillance, 17(43):pii=20303. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20303

Table SA3. Distribution of reported confirmed cases of human salmonellosis by serovar (10 most frequent serovars) in the EU/EEA, 2011–2012

2012			2011		
Serotype	**N**	**%**	**Serotype**	**N**	**%**
S. Enteritidis	34,019	41.3	*S.* Enteritidis	36,122	44.6
S. Typhimurium	18,248	22.1	*S.* Typhimurium	19,785	24.4
S. Typhimurium, monophasic 1,4,[5],12:i:-	5,932	7.2	*S.* Typhimurium, monophasic 1,4,[5],12:i:-	3,739	4.6
S. Infantis	2,021	2.5	*S.* Infantis	1,765	2.2
S. Stanley	1,128	1.4	*S.* Newport	813	1.0
S. Thompson	1,100	1.3	*S.* Derby	712	0.9
S. Newport	777	0.9	*S.* Kentucky	583	0.7
S. Derby	735	0.9	*S.* Poona	559	0.7
S. Panama	706	0.9	*S.* Stanley	526	0.6
S. Kentucky	651	0.8	*S.* Virchow	497	0.6
Other	17,092	20.7	Other	15,941	19.7
Total	**82,409**	**100**	**Total**	**81,042**	**100**

Source: 25 MSs and two non-MSs: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom.

3.1.2. *Salmonella* in food

Twenty-six MSs and three non-MSs provided data on *Salmonella* in various foodstuffs. Most MSs reported data on *Salmonella* in food of animal origin, primarily broiler meat, pig meat and bovine meat (Table SA4).

In the following sections, only results based on 25 or more units tested are presented, with the exception of the section on compliance with microbiological criteria, where investigations with fewer than 25 units have also been included. Results from industry own-check programmes and Hazard Analysis and Critical Control Point (HACCP) sampling, as well as specified suspect sampling, selective sampling and outbreak or clinical investigations, have also been excluded owing to difficulties with the interpretation of data. These data are, however, presented in the Level 3 Tables.

Table SA4. Overview of countries reporting data for Salmonella *in food, 2011–2012*

Data	Total number of reporting MSs	Countries
Broiler meat	2012 - 25	**All MSs** except MT, UK **Non-MSs:** CH, IS
	2011 - 25	**All MSs** except MT, SI **Non-MSs:** CH, IS
Turkey meat	2012 - 21	**All MSs** except DK, ES, FR, MT, SI, UK **Non-MSs:** CH, IS
	2011 - 20	**All MSs** except DK, ES, FR, LT, MT, SI, UK **Non-MSs:** CH, IS
Eggs and egg products	2012 - 19	**All MSs** except DK, FI, FR, LU, MT, SE, SI, UK
	2011 - 20	**All MSs** except DK, FI, FR, LU, MT, SE, SI, UK
Pig meat	2012 - 23	**All MSs** except MT,SE, SI, UK **Non-MSs:** IS, NO
	2011 - 25	**All MSs** except MT,UK **Non-MSs:** IS, NO
Bovine meat	2012 - 24	**All MSs** except MT, SE, UK **Non-MSs:** CH, NO
	2011 - 25	**All MSs** except MT, UK **Non-MSs:** CH, NO
Milk and dairy products	2012 - 20	**All MSs** except BG, DK, FI, LU, MT, SI, UK **Non MS:** CH
	2011 - 20	**All MSs** except DK, FI, FR, LT, LU, MT, UK
Fruit and vegetables	2012 - 21	**All MSs** except CY, FI, FR, GR, LU, MT
	2011 - 20	**All MSs** except CY, FI, FR, GR, LU, MT
Fish and other fishery products[1]	2012 - 21	**All MSs** except DK, FI, FR, GR, LU, MT, UK **Non-MSs:** CH, NO
	2011 - 20	**All MSs** except DK, FI, FR, LT, LU, MT, UK **Non-MSs:** CH, NO

Note: The overview table includes all data reported by MSs.

1. This category includes fish, fishery products, crustaceans, live bivalve molluscs, molluscan shellfish and surimi.

Compliance with microbiological criteria

The *Salmonella* criteria laid down by Regulation (EC) No 2073/2005[13] have been in force since 1 January 2006. The criteria were modified by Regulation (EC) No 1441/2007[14], which came into force in December 2007. The Regulations prescribe rules for sampling and testing, and set limits for the presence of *Salmonella* in specific food categories and in samples from food processing. The food safety criteria for *Salmonella* apply to products placed on the market within their shelf life. According to these criteria, *Salmonella* must be absent in the food categories listed in Table SA5. Absence is defined by testing five or 30 samples of 25 g per batch depending on the food category. In official controls, often only single samples are taken to verify compliance with the criteria.

An evaluation of compliance with the *Salmonella* criteria at EU level is presented in Table SA5. The evaluation includes only investigations where the sampling unit (single samples or batches) and sampling stage at retail level has been reported for the relevant food types. Results are highly influenced by the MSs reporting and the sample sizes in their investigations, both of which vary between the years.

In 2012, as in 2011 and in previous years, the highest levels of non-compliance with *Salmonella* criteria generally occurred in foods of meat origin which are intended to be cooked before consumption (Figure SA4). Minced meat and meat preparations from poultry intended to be eaten cooked had the highest level of non-compliance (category 1.5; 8.7 % of single samples and 5.7 % of batches). The level of non-compliance among the 15 MSs which reported data varied markedly, ranging from 0 to 48.5 %.

For minced meat and meat preparations, from animal species other than poultry intended to be eaten cooked, non-compliance was also reported (category 1.6, 2.0 % of single samples and 0.9 % of batches positive for *Salmonella*). Except for a very high level of non-compliance in one investigation of 22 single samples (54.5 %), the level of non-compliance among the 17 MSs that reported data ranged from 0 to 6.1 %.

A high proportion of non-compliance was also reported for meat products from poultry meat intended to be eaten cooked (category 1.9, 2.9 % of single samples with none of the batches being positive); however, only three of the 10 MSs that reported data reported positive samples.

The occurrence of *Salmonella* in foods of meat origin intended to be eaten raw is of particular relevance because of the risk such foods pose to human health. There were only a few positive findings of minced meat, meat preparations and meat products intended to be eaten raw (food categories 1.4 and 1.8). Most of the reported data, on minced meat and meat preparations to be eaten raw, originated from three MSs, whereas most of the single samples of meat preparations intended to be eaten raw (including all the positive samples) originated from one MS.

Non-compliance was also observed in live bivalve molluscs and live echinoderms, tunicates and gastropods (category 1.17), where 1.8 % of batches were not compliant.

In addition, very low proportions of single samples not complying with *Salmonella* criteria were observed in other ready-to-eat (RTE) products. All non-compliant samples of cheeses, butter and cream made from raw or low heat-treated milk (category 1.11, 0.6 %) originated from a small investigation where the three tested samples were all positive. Single samples of pre-cut fruit and vegetables were also found to be non-compliant (category 1.19, 0.4 %), where the few positive samples originated from three of the six included MSs.

As in previous years, all samples/batches of dried infant formulae and dried dietary foods for medical purposes were found to be compliant with the *Salmonella* criteria.

In 2012, a very low proportion of non-compliance was reported for fresh poultry meat. This is a new category 1.28 (Table SA5) and came into force in December 2011 (Regulation (EC) No 1086/2011)[15]. Of the single

[13] Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs. OJ L 338, 22.12.2005, p. 1–26.

[14] Commission Regulation (EC) No 1441/2007 of 5 December 2007 amending Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs. OJ L 322, 7.12.2007, p. 12–29.

[15] Commission Regulation (EU) No 1086/2011 of 27 October 2011 amending Annex II to Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Annex I to Commission Regulation (EC) No 2073/2005 as regards *salmonella* in fresh poultry meat. OJ L 281, 28.10.2011, p. 7–11.

samples, 0.5 % were positive, whereas 0.7 % of the batches were positive. Six MSs, out of the 15 MSs which submitted data, reported positive samples.

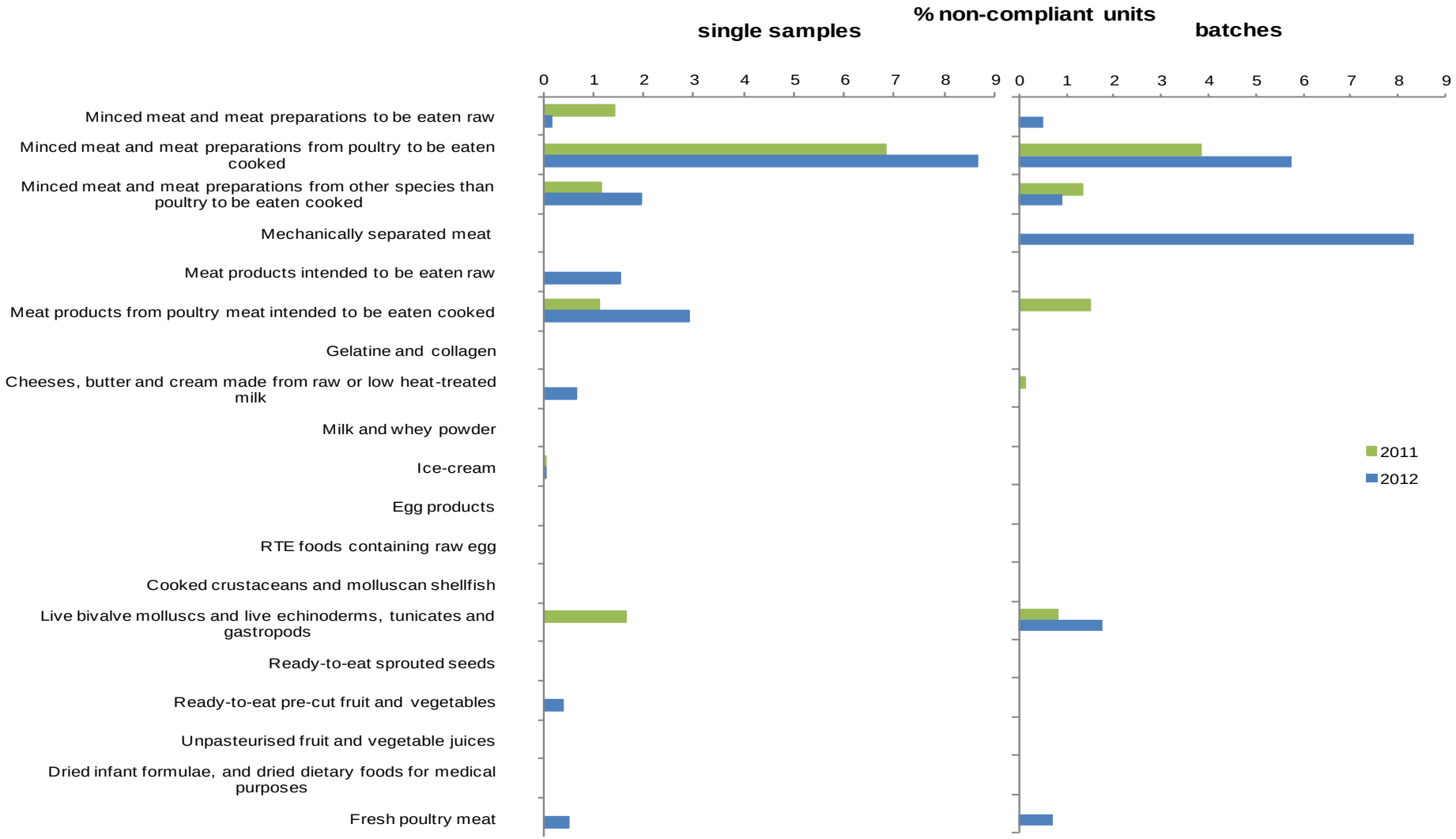
Table SA5. Compliance with the food safety Salmonella criteria laid down by EU Regulation 2073/2005 and 1441/2007, 2012

Food categories[1]		Total single samples			Total batches		
		Sample weight	N	% non-compliant	Sample weight	N	% non-compliant
1.4	Minced meat and meat preparations intended to be eaten raw	25 g	619	0.2	25 g	390	0.5
1.5	Minced meat and meat preparations from poultry intended to be eaten cooked	25 g or not stated	2,246	8.7	25 g	689	5.7
1.6	Minced meat and meat preparations from other species than poultry intended to be eaten cooked	10 g or 25 g	5,479	2.0	10 g or 14 g or 25 g or not stated	874	0.9
1.7	Mechanically separated meat	25 g	3	0	10 g or 25 g	12	8.3
1.8	Meat products intended to be eaten raw	10 g or 25 g	324	1.5	25 g	32	0
1.9	Meat products from poultry meat intended to be eaten cooked	25 g	413	2.9	25 g or 200 g	370	0
1.10	Gelatine and collagen	25 g	91	0	25 g	94	0
1.11	Cheeses, butter and cream made from raw or low heat-treated milk	25 g	462	0.6	25 g	1,506	0
1.12	Milk and whey powder	25 g	136	0	25 g	43	0
1.13	Ice cream	25 g or 50 g	8,571	<0.1	25 g	307	0
1.14	Egg products	25 g or 120 g	476	0	25 g	22	0
1.15	RTE foods containing raw eggs	25 g	25	0	25 g	43	0
1.16	Cooked crustaceans and molluscan shellfish	25 g	72	0	25 g	385	0
1.17	Live bivalve molluscs and live echinoderms, tunicates and gastropods	25 g	6	0	25 g	340	1.8
1.18	Sprouted seeds (RTE)	25 g	61	0	25 g or 250 g	60	0
1.19	Pre-cut fruit and vegetables (RTE)	25 g	1,797	0.4	25 g or 250 g or not stated	1,217	0
1.20	Unpasteurised fruit and vegetable juices (RTE)	25 g	13	0	25 g or 25 ml or not stated	366	0
1.22-1.23	Dried infant formulae, dried dietary foods for medical purposes[2] and dried follow-on formulae	25 g	788	0	25 g	262	0
1.28	Fresh poultry meat[3]	25 g	2,384	0.5	25 g	682	0.7

Note: Includes investigations where the sampling unit (single samples or batches) and sampling stage at retail (also catering, hospitals and care homes) has been specified for the relevant food types. Includes investigations with sample size <25.
RTE: ready-to-eat products.

1. Numbers before food categories refer to Annex 1, chapter 1 of Regulation (EC) No 1441/2007. See this Regulation for full description of food categories.
2. Intended for infants below six months of age.
3. *Salmonella* criterion for *S*. Enteritidis and *S*. Typhimurium (including monophasic *S*. Typhimurium strains with the antigenic formula 1,4,[5],12:i:-, in fresh poultry meat (including fresh meat from breeding flocks of *Gallus gallus*, laying hens, broilers and breeding and fattening flocks of turkeys).

Figure SA4. Proportion of units not complying with the EU* Salmonella *criteria, 2011–2012



Note: Includes investigations where the sampling unit (single samples or batches) and sampling stage at retail (also catering, hospitals and care homes) has been specified for the relevant food types. Includes investigations with sample size <25. The 8.3 % of non-compliance in mechanically separated meat is based on only 12 tested batches.

Broiler meat and products thereof

In 2012, 24 MSs and 1 non-MS, reported data on *Salmonella* in fresh broiler meat from investigations with 25 or more samples. The findings of *Salmonella* in these investigations, conducted at different points in the production chain, are presented in Table SA6.

Salmonella was detected in most of the 65 reported investigations, with only five MSs (Denmark, Finland, Ireland, Italy and Portugal) and one non-MS (Iceland) reporting no *Salmonella* findings. Overall, 51,093 fresh broiler meat units (single or batch) were tested, within the EU, and 4.1 % of these were positive. Compared with 2011, when the results of 25,611 samples were reported, the number of tested units almost doubled. Thus, comparing the EU totals for 2012 with the results of previous years should be done very cautiously.

Trends in the occurrence of *Salmonella* in broiler meat from 2004 to 2012 are presented in Figures SA5 and SA6 for MSs that have reported at least six years of data, either single samples (13 MSs) or batches (five MSs). When exploring data by logistic regression analysis, combining single sample data from all sampling levels from the 13 MSs reporting from 2004 to 2012, no significant trend was observed in the MS-group weighted prevalence of positive samples (Figure SA7).

At the slaughterhouse level, the proportions of positive samples ranged from 0 to 22.7 %, with no positive samples in five MSs. Most of the tested samples were neck skin samples.

At the processing or cutting plant, the proportion of positive samples ranged from 0 to 25.2 %, with the highest proportions found in the two MSs also reporting the highest prevalences at the slaughterhouse level. In most MSs, the sample material for testing at processing was meat samples or unspecified material, but in Poland neck skin samples and carcases were tested. At retail, more than 10 % *Salmonella*-positive samples were detected in Hungary (29.3 %), and in imported meat on the Austrian market (12.7 %). Belgium, Estonia, Hungary, Latvia, Romania and Spain sampled fresh broiler meat at all three levels in the production chain. In some cases results in all three steps were comparable, but sometimes relatively large variations were observed.

Nine MSs reported results of investigations of ready-to-eat (RTE) broiler meat products, comprising more than 25 tested units. The results are presented in Table SA7. Of the 2,673 units tested in 2012, none were found to be *Salmonella* positive. In 2011, when a larger amount of units were tested (4,702), the overall prevalence was very low (0.1 % or one positive sample in each of three different investigations).

For further information see Level 3 Tables.

Table SA6. Salmonella *in fresh broiler meat at slaughter, processing/cutting level and retail, 2012*

Country	Description	Sample unit	Sample weight	2012		
				N	N pos	% pos
At slaughterhouse						
Belgium	Neck skin	Single	1 g	270	3	1.1
Bulgaria	Meat	Batch	25 g	770	42	5.5
Cyprus	Meat	Single	25 g	80	5	6.3
	Neck skin	Single	25 g	300	68	22.7
Czech Republic	Neck skin	Batch	25 g	665	72	10.8
Denmark	Neck skin	Batch	300 g	368	0	0
Estonia	Neck skin	Batch	25 g	48	0	0
Finland	Neck skin	Batch	15x10 g	195	0	0
Greece		Single	25 g	56	11	19.6
Hungary	Neck skin	Batch	25 g	166	25	15.1
Ireland	Neck skin	Single	25 g	182	0	0
Latvia	Neck skin	Single	25 g	100	0	0
Lithuania	Neck skin	Batch	-	180	4	2.2
Poland	Meat	Batch	25 g	205	0	0
	Neck skin	Batch	25 g	7,924	265	3.3
	Meat	Single	25 g	922	13	1.4
	Neck skin	Single	25 g	2,584	179	6.9
Romania	Meat	Batch	25 g	181	0	0
	Neck skin	Batch	25 g	1,039	36	3.5
Spain	Meat	Single	25 g	203	30	14.8
Sweden	Neck skin	Batch	-	4,124	1	<0.1
Iceland	Neck skin	Batch	25 g	868	2	0.2
At processing or cutting plant						
Belgium	Meat, at processing plant	Single	25 g	590	22	3.7
Bulgaria	Meat, at processing plant	Batch	25 g	384	7	1.8
Cyprus	Meat, at processing plant	Single	25 g	170	40	23.5
Czech Republic	Meat, at processing plant	Batch	25 g	110	8	7.3
Estonia	Meat, at cutting plant	Batch	25 g	48	0	0
Germany	Meat, at processing plant	Single	25 g	88	3	3.4
Greece	At processing plant	Single	25 g	31	3	9.7
Hungary	Meat, at processing plant	Single	25 g	218	55	25.2
Italy	At processing plant	Single	25 g	36	0	0
Latvia	At processing plant	Single	25 g	35	7	20.0
Poland	Meat, at processing plant	Batch	25/125 g	7,922	207	2.6
	Neck skin, at processing plant	Batch	25 g	834	7	0.8
	Carcase swabs, at processing plant	Single	1000 g	1,229	17	1.4
	Meat, at processing plant	Single	25 g	5,568	164	2.9
	Neck skin, at processing plant	Single	25/200 g	1,030	4	0.4
	Meat, at cutting plant	Batch	25 g	105	14	13.3
	Neck skin, at cutting plant	Batch	25 g	50	11	22.0
	Meat, at cutting plant	Single	25 g	271	15	5.5

Table continued overleaf.

Table SA6 (continued).* Salmonella *in fresh broiler meat at slaughter, processing/cutting level and retail, 2012

Country	Description	Sample unit	Sample weight	2012		
				N	N pos	% pos
Portugal	Meat, at processing plant	Single	25 g	50	0	0
Romania	Meat, at processing plant	Batch	25 g	79	3	3.8
Slovenia	At processing plant	Batch	25 g	100	13	13.0
Spain	Meat, at processing plant	Single	25 g	74	9	12.2
Sweden	Meat, at cutting plant	Batch	-	792	0	0
At retail						
Austria	Food sample, domestic production	Single	25 g	56	2	3.6
	Food sample, imported	Single	25 g	79	10	12.7
Belgium		Batch	25 g	406	20	4.9
Estonia	Meat, European Union	Single	25 g	142	2	1.4
	Meat	Single	25 g	75	0	0
Germany	Meat	Single	25 g	553	16	2.9
Hungary	Meat	Single	25 g	328	96	29.3
Latvia		Single	25 g	180	16	8.9
Netherlands		Single	25 g	564	37	6.6
Portugal	Meat	Batch	25 g	100	0	0
Romania	Meat	Batch	25 g	46	1	2.2
Slovakia	Meat	Batch	25 g	42	4	9.5
Spain	Meat	Single	25 g	89	2	2.2
Iceland	Neck skin, neck skin of whole chicken	Single	25 g	117	0	0
	Skinned loins	Single	90 ml	117	0	0
	Wings with skin	Single	90 ml	117	0	0
Sampling level not stated						
Poland	Meat	Batch	25 g	2,879	176	6.1
	Neck skin	Batch	25 g	60	18	30.0
	Meat	Single	25 g	3,785	325	8.6
	Neck skin	Single	25 g	1,333	25	1.9
EU Total	**Total**			**51,093**	**2,113**	**4.1**
	Single			**21,271**	**1,179**	**5.5**
	Batch			**29,822**	**934**	**3.1**

Note: Only investigations covering 25 or more samples are included.

Figure SA5.* Salmonella *in fresh broiler meat (single samples), prevalence and 95 % confidence interval in 13 Member States, 2004–2012

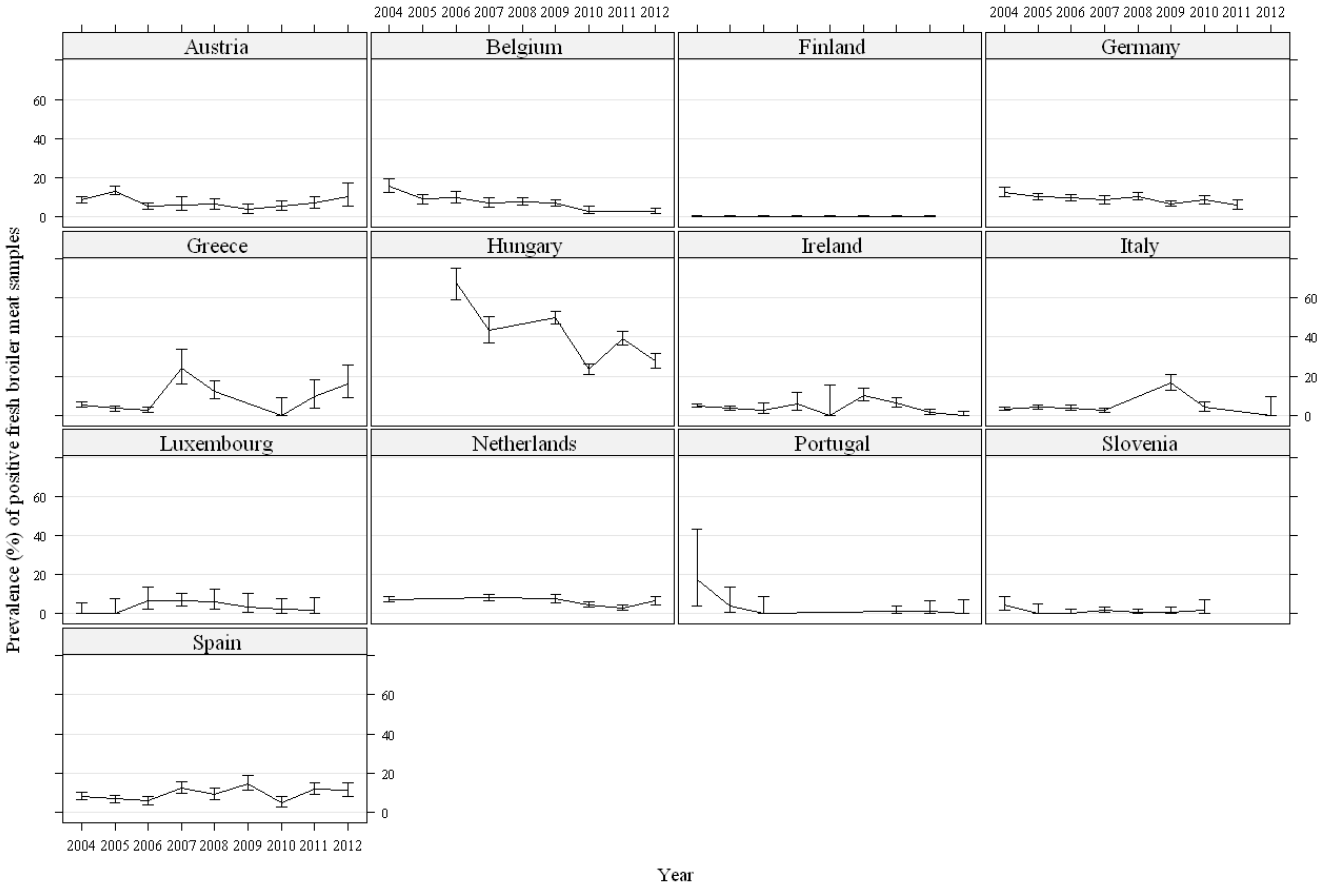


Figure SA6.* Salmonella *in fresh broiler meat (batches), prevalence and 95 % confidence interval in five Member States, 2004–2012

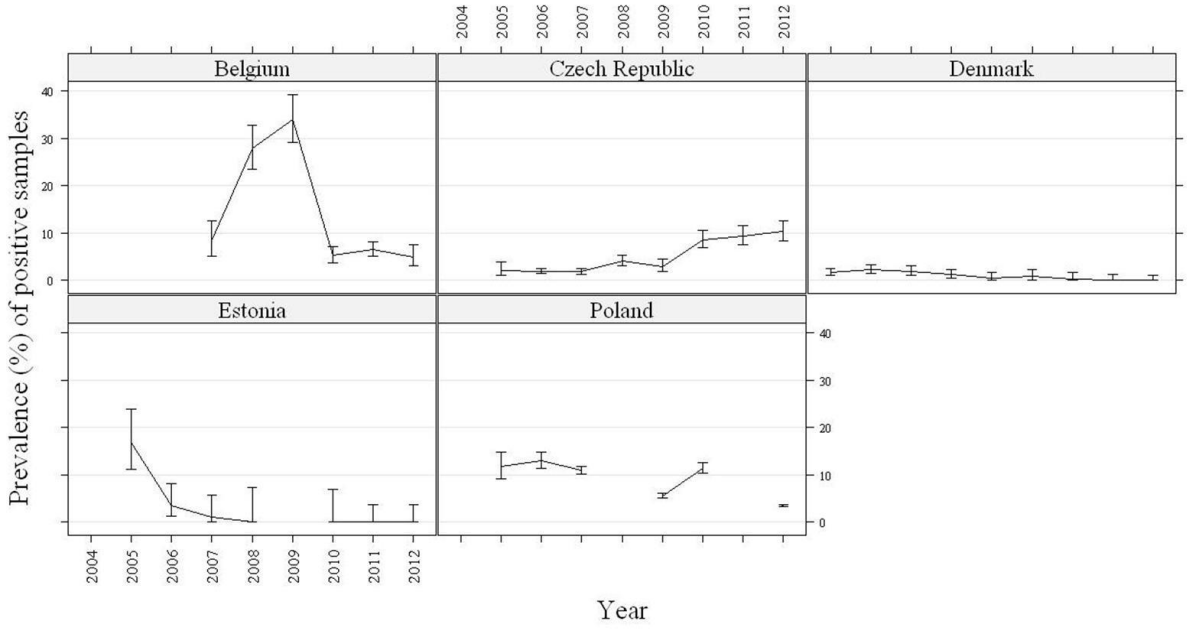
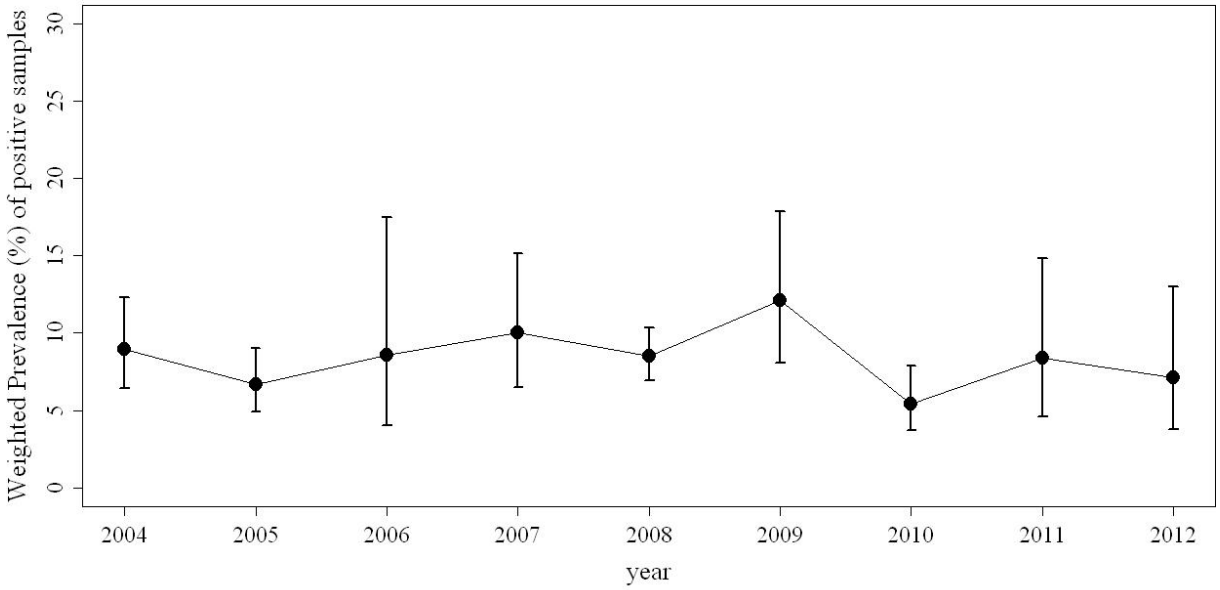


Figure SA7. Weighted prevalence[1] and 95 % confidence interval[2] of* Salmonella*-positive broiler meat samples[3], overall for 13 Member States[4], 2004–2012



1. The MS group prevalence is estimated using weights. The MS specific weight is the ratio between the slaughter broiler population size and the number of tested samples per MS per year. Slaughtered numbers of broilers were reported by MSs in the framework of the 2008 baseline survey in broiler flocks and broiler carcases, and supplemented with EUROSTAT data from 2008. Batch-based data excluded.
2. Vertical bars indicate the exact binomial 95 % confidence interval.
3. Combined data (samples taken at slaughter, at processing/cutting plant or at retail) have been used to calculate the percentage of *Salmonella*-positive fresh broiler meat samples. Batch based data excluded.
4. Include only MSs that reported data for at least six years: Austria, Belgium, Finland, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovenia and Spain.

Table SA7.* Salmonella *in ready-to-eat broiler meat product samples, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
At processing									
Belgium	Broiler meat products - cooked, ready-to-eat[1]	Batch	25/200 g	45	0	0	45	0	0
Bulgaria	Broiler meat products - cooked, ready-to-eat	Batch	25 g	667	0	0	1,640	0	0
Czech Republic	Broiler meat products - cooked, ready-to-eat	Batch	25 g	175	0	0	176	0	0
Germany	Broiler meat products - cooked, ready-to-eat, domestic production	Single	25 g	25	0	0	29	0	0
Greece	Broiler meat products - cooked, ready-to-eat	Single	25 g	-	-	-	125	1	0.8
Hungary	Broiler meat products - cooked, ready-to-eat	Single	25 g	85	0	0	172	0	0
Ireland	Broiler meat products	Single	25 g	-	-	-	80	0	0
	Broiler meat products - cooked, ready-to-eat	Single	25 g	-	-	-	112	0	0
Poland	Broiler meat products - cooked, ready-to-eat	Batch	25 g	55	0	0	-	-	-
	Broiler meat products - cooked, ready-to-eat	Single	25 g	103	0	0	888	0	0
	Broiler meat products - cooked, ready-to-eat	Single	500 g	186	0	0	-	-	-
Spain	Broiler meat products - cooked, ready-to-eat	Single	25 g	-	-	-	39	0	0
At retail									
Belgium	Broiler meat products - cooked, ready-to-eat	Batch	25 g	47	0	0	-	-	-
Bulgaria	Broiler meat products - cooked, ready-to-eat	Batch	25 g	-	-	-	155	0	0
Estonia	Broiler meat products - cooked, ready-to-eat	Single	25 g	-	-	-	41	0	0
Germany	Broiler meat products - cooked, ready-to-eat, domestic production	Single	25 g	225	0	0	153	0	0
Hungary	Broiler meat products - cooked, ready-to-eat	Single	25 g	132	0	0	96	0	0
Ireland	Broiler meat products - cooked, ready-to-eat, domestic production	Single	25 g	58	0	0	-	-	-
	Broiler meat products - cooked, ready-to-eat, imported	Single	25 g	111	0	0	-	-	-
	Broiler meat products	Single	25 g	-	-	-	59	0	0
	Broiler meat products - cooked, ready-to-eat	Single	25 g	-	-	-	512	0	0

Table continued overleaf.

Table SA7 (continued). Salmonella in ready-to-eat broiler meat product samples, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Latvia	Broiler meat products - cooked, ready-to-eat	Single	25 g	125	0	0	130	0	0
Slovakia	Broiler meat products - cooked, ready-to-eat	Batch	25 g	-	-	-	37	0	0
Spain	Broiler meat products - raw and intended to be eaten raw	Single	25 g	42	0	0	-	-	-
	Broiler meat products - cooked, ready-to-eat	Single	25 g	-	-	-	95	1	1.1
United Kingdom	Broiler meat products - cooked, ready-to-eat	Single	25 g	-	-	-	75	1	1.3
Sampling level not stated									
Ireland	Broiler meat products, imported	Single	25 g	82	0	0	-	-	-
Poland	Broiler meat products - cooked, ready-to-eat	Single	25 g	510	0	0	-	-	-
Sweden	Broiler meat products	Single	-	-	-	-	43	0	0
Total (2012: 9 MSs, 2011: 13 MSs)	**Total**			**2,673**	**0**	**0**	**4,702**	**3**	**<0.1**
	Single			**1,684**	**0**	**0**	**2,649**	**3**	**0.1**
	Batch			**989**	**0**	**0**	**2,053**	**0**	**0**

Note: Only investigations covering 25 or more samples are included.

1. Sample weight was 25 g in 2012 and 200 g in 2011.

Turkey meat and products thereof

Eleven MSs reported test results for *Salmonella* in fresh turkey meat; the results of investigations including more than 25 units are presented in Table SA8. In total, 6,412 samples were tested (50 % batch samples and 50 % single samples) with overall 4.4 % of the units testing positive. These overall results were comparable with the 2011 reported data.

At slaughterhouse, three MSs and one non-MS (Finland, Lithuania, Sweden and Iceland) found no positive samples, while in the remaining four MSs, the proportion of positive samples ranged from 9.3 % to 13.1 %. At processing or cutting plant level, Poland conducted several investigations comprising a very high number of samples (in total 2,354 batches and 707 single samples), in which the proportions of *Salmonella* positive samples ranged from 1.0 % to 8.1 %. At retail, no positive samples were found in the Netherlands and Portugal. In the four other MSs reporting results from single samples at the retail level, the proportions of positive samples ranged from 2.2 % to 12.7 %.

Four MSs reported results from sampling turkey meat products. In total, 737 samples were tested, none of which was found to be positive. In 2011 *Salmonella* was detected in 0.6 % of samples (four samples in total obtained in three different MSs), see Table SA9.

For further information see Level 3 Tables.

Table SA8. Salmonella *in fresh turkey meat, 2011–2012*

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
At slaughterhouse									
Czech Republic	Neck skin	Batch	25 g	270	25	9.3	350	10	2.9
Finland	Neck skin	Batch	10 x 15 g	65	0	0	-	-	-
Germany	Neck skin, domestic production	Slaughter batch	25 g	352	46	13.1	-	-	-
Hungary	Neck skin	Single	25 g	192	22	11.5	286	43	15.0
Lithuania	Neck skin	Batch	-	31	0	0	-	-	-
Poland	Neck skin	Batch	25 g	55	7	12.7	-	-	-
	Neck skin	Single	25 g	420	46	11.0	1,295	83	6.4
Sweden	Neck skin	Single	-	450	0	0	1,046	0	0
Iceland	Neck skin	Batch	25 g	67	0	0	63	0	0
At processing or cutting plant									
Bulgaria	At processing plant	Batch	25 g	-	-	-	70	0	0
Finland	At cutting plant	Single	25 g	-	-	-	298	0	0
Hungary	Meat, at processing plant	Single	25 g	281	13	4.6	296	38	12.8
Italy	Domestic production, at processing plant	Single	25 g	-	-	-	116	16	13.8
Poland	Meat, at processing plant	Batch	25 g	1,633	17	1.0	-	-	-
	Neck skin, at processing plant	Batch	25 g	640	8	1.3	-	-	-
	Meat, at processing plant	Single	25 g	472	38	8.1	453	14	3.1
	Neck skin, at processing plant	Single	200 g	235	3	1.3	-	-	-
	Meat, at cutting plant	Batch	25 g	81	0	0	-	-	-
Sweden	Meat, at cutting plant	Batch	-	48	0	0	-	-	-
At retail									
Austria	Food sample, domestic production	Single	25 g	62	7	11.3	33	3	9.1
Estonia	Food sample, European Union	Single	25 g	45	1	2.2	-	-	-
Germany	Meat, domestic production	Single	25 g	751	25	3.3	-	-	-
Hungary	Meat	Single	25 g	102	13	12.7	34	3	8.8
Netherlands	Food sample	Single	25 g	71	0	0	123	1	0.8
Portugal	Food sample	Batch	25 g	25	0	0	-	-	-
Sampling level not stated									
Poland	Meat	Single	25 g	131	10	7.6	-	-	-
Total (2012: 11 MSs, 2011: 9 MSs)	**Total**			**6,412**	**281**	**4.4**	**4,400**	**211**	**4.8**
	Single			**3,212**	**178**	**5.5**	**3,980**	**201**	**5.1**
	Batch			**3,200**	**103**	**3.2**	**420**	**10**	**2.4**

Note: Only investigations covering 25 or more samples are included.

Table SA9.* Salmonella *in ready-to-eat turkey meat product samples, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
At processing									
Hungary	Turkey meat products - cooked, ready-to-eat	Single	25 g	92	0	0	196	1	0.5
Ireland	Turkey meat products - cooked, ready-to-eat	Single	25 g	-	-	-	53	0	0
Poland	Turkey meat products - cooked, ready-to-eat	Batch	25 g	129	0	0	-	-	-
At retail									
Germany	Turkey meat products - cooked, ready-to-eat, domestic production	Single	25 g	105	0	0	126	1	0.8
Hungary	Turkey meat products - cooked, ready-to-eat	Single	25 g	220	0	0	110	0	0
Ireland	Turkey meat products - cooked, ready-to-eat	Single	25 g	-	-	-	75	0	0
Netherlands	Turkey meat products - cooked, ready-to-eat	Single	25 g	-	-	-	34	2	5.9
Portugal	Turkey meat products - cooked, ready-to-eat	Batch	25 g	105	0	0	-	-	-
Sampling level not stated									
Italy	Meat from turkey - meat products, domestic production	Single	25 g	-	-	-	31	0	0
Poland	Turkey meat products - cooked, ready-to-eat	Single	25 g	86	0	0	-	-	-
Total (2012: 4 MSs, 2011: 5 MSs)	**Total**			**737**	**0**	**0**	**625**	**4**	**0.6**
	Single			**503**	**0**	**0**	**625**	**4**	**0.6**
	Batch			**234**	**0**	**0**	**0**	**0**	**0**

Note: Only investigations covering 25 or more samples are included.

Eggs and egg products

According to EU legislation, starting from 1 January 2009, eggs shall not be used for direct human consumption as table eggs unless they originate from a commercial flock of laying hens subject to a national *Salmonella* control programme. Eggs originating from flocks with unknown *Salmonella* status, that are suspected of being infected or known to be infected with *S.* Enteritidis or *S.* Typhimurium, or which were identified as the source of infection in a specific human food-borne outbreak, may be placed on the market only if treated in a manner that guarantees the elimination of all *Salmonella* serovars of public health significance and marked in a way that easily distinguishes them from table eggs before being placed on the market (Regulation (EC) No 1237/2007)[16]. These provisions, together with the mandatory *Salmonella* control programmes in flocks of laying hens, implementing a final annual *Salmonella* reduction target for laying hen flocks (Regulation (EC) No 517/2011)[17], are believed to have contributed to the reduction in *Salmonella* contaminated laying hens in the EU.

In 2012, 16 MSs reported data from investigations in table eggs with 25 or more samples. The findings are presented in Table SA10. In total 0.1 % of the 18,843 tested units were found to be *Salmonella* positive, with detection of at least one positive unit in 11 of the 29 listed investigations. The proportion of positive units ranged from 0 to 7.0 %. The highest proportion of positive samples was found in a relatively small investigation (43 single samples) of Italian eggs tested during processing. As in 2011, approximately 60 % of the investigations were carried out on single samples and 0.1 % of the 11,523 units tested were found to be *Salmonella* positive. Of the 7,320 batches, 0.1 % tested positive. The majority of the tested eggs were sampled at retail, where Germany and the Netherlands carried out some large investigations including 6,464 single samples and 3,734 batches, respectively. Germany also tested a large number of samples obtained at the processing plant level (1,645 samples in total), including separate investigations of shell, white and yolk, where no samples tested positive. Only Poland tested table eggs at the farm level and found one positive sample in an investigation of 378 batches, and no positive samples when testing 112 single samples.

It should be noted that what constituted a batch or single sample varied in terms of weight (25–500 g) and content among the MSs. This may have an impact on the results from the investigations and should be kept in mind when comparing the results.

For further information see Level 3 Tables.

[16] Commission Regulation (EC) No 1237/2007 of 23 October 2007 amending Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Decision 2006/696/EC as regards the placing on the market of eggs from *Salmonella* infected flocks of laying hens. OJ L 280, 24.10.2007, p 5–9.

[17] Commission Regulation (EU) No 517/2011 of 25 May 2011 implementing Regulation (EC) No 2160/2003 of the European Parliament and of the Council as regards a Union target for the reduction of the prevalence of certain *Salmonella* serotypes in laying hens of *Gallus gallus* and amending Regulation (EC) No 2160/2003 and Commission Regulation (EU) No 200/2010. OJ L 138, 26.5.2011, p. 45–51.

Table SA10. Salmonella *in table egg samples, 2012*

Country	Description	Sample unit	Sample weight	2012		
				N	N pos	% pos
At farm						
Poland		Batch	25 g	378	1	0.3
		Single	25 g	112	0	0
At packing center/processing plant						
Bulgaria	At packing centre	Batch	-	2,372	1	<0.1
Germany	Shell, at processing plant, domestic production	Single	25 g	223	0	0
	White, at processing plant, domestic production	Single	25 g	27	0	0
	Yolk, at processing plant, domestic production	Single	25 g	223	0	0
	At processing plant, domestic production	Single	25 g	1,645	0	0
Italy	At processing, domestic production	Single	25 g	43	3	7.0
Poland	At packing centre	Batch	25 g	204	1	0.5
	At packing centre	Single	25 g	44	0	0
	At processing	Single	500 g	139	0	0
Portugal	At packing centre	Batch	-	30	0	0
Romania	At packing centre	Batch	25 g	318	0	0
Spain	At packing centre	Single	25 g	240	5	2.1
At retail						
Austria	Domestic production	Single	300 g	51	0	0
Belgium		Batch	25 g	118	0	0
Bulgaria		Batch	-	57	0	0
Germany	Eggs - table eggs - shell, domestic production	Single	25 g	605	0	0
	Eggs - table eggs - white, domestic production	Single	25 g	64	0	0
	Eggs - table eggs - yolk, domestic production	Single	25 g	641	0	0
	Eggs - table eggs, domestic production	Single	25 g	6,464	5	<0.1
Hungary		Single	10 eggs	655	0	0
Latvia		Single	25 g	90	1	1.1
Lithuania	Eggs - table eggs - whole	Batch	-	38	0	0
Netherlands		Batch	25 g	3,734	2	<0.1
Romania		Batch	25 g	39	1	2.6
Slovakia		Batch	25 g	32	0	0
		Single	25 g	257	8	3.1
Spain		Single	25 g	265	17	6.4
Total (16 MSs)	**Total**			**18,843**	**28**	**0.1**
	Single			**11,523**	**17**	**0.1**
	Batch			**7,320**	**6**	**<0.1**

Note: Only investigations covering 25 or more samples are included.

Pig meat and products thereof

Most of the national monitoring programmes for *Salmonella* in pig meat and products thereof are based on sampling at the slaughterhouse and/or processing or cutting plants. At the slaughterhouse, sampling is often carried out by means of swabbing an area of the carcase, varying from 300 cm^2 (Iceland and Poland) to 1,400 cm^2 (Estonia, Finland and Sweden).

In 2012, 19 MSs and 2 non-MSs reported data on *Salmonella* in fresh pig meat from investigations with 25 or more samples. The occurrence of *Salmonella* in these food samples at different levels in the production line is presented in Table SA11. In total, 85,000 units were tested in the EU, of which 0.7 % tested positive. As for fresh broiler meat, there was a substantial increase in the number of samples compared with 2011 (52,868 samples, of which 0.7 % were found to be *Salmonella* positive). No *Salmonella* was detected in 18 of the 46 investigations and the overall proportion of positive samples in the investigations ranged from 0 to 17.5 %. The highest proportion of positive samples was found at processing plants in Portugal in a relatively small investigation of 40 single samples. In total, 51,933 single samples were tested, of which 0.7 % were found to be positive. The proportion of positive samples in the 33,067 tested batch samples was 0.6 %.

At slaughterhouse some very large investigations were carried out by the Czech Republic, Finland, Poland and Sweden, yielding 0 or <1 % positive results. The highest levels of positive samples at slaughterhouse were found in Belgium (10.8 %) and Spain (7.8 %). At the processing level, Poland reported the largest investigation comprising 10,503 batch samples, of which 1.1 % tested positive for *Salmonella*. A relatively large proportion of samples were found to be positive in a Portuguese investigation (17.5 %) based on a smaller number of samples (40 single samples). At the retail level, the proportion of *Salmonella*-positive samples in the investigations were generally low, ranging from 0 to 2.1 %.

Sixteen MSs reported results from investigations of RTE minced meat, meat preparations and meat products from pig meat which included more than 25 samples (Table SA12). The proportion of positive samples ranged from 0 to 9.4 %. Overall, 0.6 % of the 22,517 units tested positive for *Salmonella*; 12,096 of the tested units (54 %) were single samples, of which 0.4 % tested positive. Among the 10,421 batch samples, *Salmonella* was detetcted in 0.8 % of samples. Only Poland reported results from testing minced meat that was meant to be eaten raw; *Salmonella* was not detected in any of the 29 tested single samples. Overall, the highest prevalence (9.4 %) was found in a smaller investigation (85 single samples) of meat preparations intended to be eaten raw in Poland. In cooked RTE meat preparations or meat products, the highest proportion of positive samples was found in Portugal (3.3 % positive samples in each of two investigations at processing and at retail levels). Four MSs (Belgium, Cyprus, Germany and Hungary) reported results for fermented sausages, which in all four countries were tested at both processing and retail levels. Belgium and Cyprus found no positive samples, whereas in Germany and Hungary the proportion of positive samples ranged from 0.2 % to 1.7 %.

For further information see Level 3 Tables.

Table SA11.* Salmonella *in fresh pig meat, at slaughter, cutting/processing level and retail, 2012

Country	Description	Sample unit	Sample weight	2012		
				N	N pos	% pos
At slaughterhouse						
Belgium	Carcase swabs	Single	600 cm^2	535	58	10.8
Bulgaria	Carcase swabs	Batch	400 cm^2	1,122	5	0.4
Czech Republic	Carcase swabs	Batch	400 cm^2	5,941	43	0.7
Denmark[1]	Carcase swabs	Single	400 cm^2	18,655	136	1.2
Estonia	Carcase swabs	Single	1,400 cm^2	600	16	2.7
Finland	Carcase swabs	Single	1,400 cm^2	6,412	0	0
Hungary	Carcase swabs	Batch	400 cm^2	268	0	0
Latvia	Carcase swabs	Single	-	750	5	0.7
Lithuania	Meat	Batch	-	178	3	1.7
Poland	Carcase swabs	Batch	300/400 cm^2	9,100	17	0.2
	Meat	Batch	25 g	495	0	0
	Carcase swabs	Single	300/400 cm^2	7,951	18	0.2
Portugal	Carcase swabs	Single	-	431	9	2.1
Romania	Carcase swabs	Batch	-	447	1	0.2
	Meat	Batch	25 g	161	0	0
Spain	Meat	Single	25 g	206	16	7.8
Sweden	Carcase swabs	Single	1,400 cm^2	5,317	0	0
Iceland	Carcase swabs	Batch	300 cm^2	2,172	7	0.3
Norway	Carcase swabs	Single	-	3,066	0	0
At processing or cutting plant						
Belgium	Meat, at processing plant	Single	25 g	151	4	2.6
Bulgaria	Carcase swabs, at processing plant	Batch	25 g	191	0	0
Cyprus	Food sample, at processing plant	Single	10 g	305	0	0
Estonia	Meat, at processing plant	Single	25 g	32	0	0
	Meat, at cutting plant	Single	25 g	248	0	0
Finland	Meat, at cutting plant	Single	25 g	1,464	0	0
Germany	Meat	Single	25 g	736	37	5.0
Hungary	Meat, at processing plant	Single	25 g	249	2	0.8
Italy	At processing plant, domestic production	Single	25 g	35	1	2.9
	Food sample, at processing plant, domestic production	Single	25 g	41	2	4.9
Poland	Meat	Batch	10/25 g	10,503	114	1.1
	Meat	Single	25 g	775	12	1.5
	Carcase swabs, at cutting plant	Single	400 cm^2	497	0	0
	Meat, at cutting plant	Single	25 g	74	0	0
Portugal	Meat, at processing plant	Single	25 g	40	7	17.5
Romania	Meat, at processing plant	Batch	25 g	172	3	1.7

Table continued overleaf.

Table SA11 (continued).* Salmonella *in fresh pig meat, at slaughter, cutting/processing level and retail, 2012

Country	Description	Sample unit	Sample weight	2012		
				N	N pos	% pos
At retail						0
Bulgaria	Meat	Single	10 g	90	1	1.1
France	Meat	Single	25 g	334	7	2.1
Germany	Meat	Single	25 g	1,875	29	1.5
Hungary	Meat	Batch	25 g	146	2	1.4
Italy	Food sample, domestic production	Single	25 g	27	0	0
Netherlands	Food sample	Single	25 g	967	14	1.4
Romania	Meat	Batch	25 g	112	0	0
Sampling level not stated						
Poland	Carcase swabs	Batch	25 g/400 cm^2	1,676	0	0
	Meat	Batch	10/25 g	2,555	0	0
	Carcase swabs	Single	400 cm^2/ unspecified	3,031	14	0.5
	Meat	Single	10/25 g	105	0	0
Total (19 MSs)	**Total**			**85,000**	**576**	**0.7**
	Single			**51,933**	**388**	**0.7**
	Batch			**33,067**	**188**	**0.6**

Note: Only investigations covering 25 or more samples are included.

1. Most of the Danish samples were pooled samples, and a single-carcase prevalence was calculated. Both the loss of sensitivity and the probability of more than one sample being positive in each pool were taken into consideration. A conversion factor was determined on the basis of comparative studies. Therefore, the adjusted prevalence is 1.2 %.

Table SA12.* Salmonella *in ready-to-eat minced meat, meat preparations and meat products from pig meat, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
At processing									
Belgium	Pig meat products - fermented sausages	Batch	25 g	41	0	0	-	-	-
	Pig meat products - raw ham	Batch	25 g	42	0	0	-	-	-
	Pig meat products - cooked, ready-to-eat	Batch	200 g	-	-	-	41	0	0
Bulgaria	Pig meat preparation - intended to be eaten raw	Batch	25 g	170	0	0	380	0	0
	Pig meat products - cooked, ready-to-eat	Batch	25 g	941	0	0	3,019	0	0
Cyprus	Pig meat products - cooked, ready-to-eat	Single	25 g	275	0	0	275	0	0
	Pig meat products - fermented sausages	Single	25 g	125	0	0	125	0	0
Czech Republic	Pig meat products - cooked, ready-to-eat	Batch	25 g	159	0	0	350	0	0
	Pig minced meat - intended to be eaten raw	Batch	25 g	-	-	-	140	0	0
Estonia	Pig meat products - cooked, ready-to-eat	Single	25 g	86	0	0	123	0	0
Germany	Pig meat products - cooked, ready-to-eat, domestic production	Single	25 g	73	0	0	54	0	0
	Pig meat products - fermented sausages, domestic production	Single	25 g	233	4	1.7	214	2	0.9
Greece	Pig meat products - cooked, ready-to-eat	Single	25 g	85	0	0	65	5	7.7
Hungary	Pig meat products - cooked, ready-to-eat	Single	25 g	101	0	0	190	0	0
	Pig meat products - fermented sausages	Single	25 g	529	2	0.4	538	8	1.5
	Pig meat products - raw ham	Single	25 g	174	1	0.6	174	1	0.6
Ireland	Pig meat products	Single	25 g	-	-	-	109	2	1.8
	Pig meat products - cooked, ready-to-eat	Single	25 g	-	-	-	188	0	0
Italy	Pig meat products, domestic production	Single	25 g	766	9	3.8	984	1	0.1
Poland	Pig meat preparation - intended to be eaten raw	Batch	25 g	1,669	2	0.1	-	-	-
	Pig meat preparation - intended to be eaten raw	Single	10/25 g	695	9	1.4	-	-	-
	Pig meat products - cooked, ready-to-eat	Batch	25/325 g	1,675	11	0.7	-	-	-
	Pig meat products - cooked, ready-to-eat	Single	10/25/500 g	4,245	1	0.4	-	-	-
	Pig meat products - raw and intended to be eaten raw	Batch	25 g	240	5	2.1	-	-	-
	Pig minced meat - intended to be eaten raw	Single	200 g	29	0	0	-	-	-

Table continued overleaf.

Table SA12 (continued).* Salmonella *in ready-to-eat minced meat, meat preparations and meat products from pig meat, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Portugal	Pig meat products - cooked, ready-to-eat	Batch	10/25 g	105	1	2.5	-	-	-
	Pig meat products - cooked, ready-to-eat	Single	25 g	60	2	3.3	105	5	4.8
Romania	Pig meat products - cooked, ready-to-eat	Batch	25 g	153	2	1.3	109	0	0
Slovakia	Pig meat products - cooked, ready-to-eat	Batch	25 g	79	0	0	-	-	-
	Pig meat products - unspecified, ready-to-eat	Batch	25 g	-	-	-	37	0	0
Spain	Pig meat products - raw and intended to be eaten raw	Single	25 g/unspecified	357	6	2.0	-	-	-
	Pig meat products, at cutting plant	Single	-	-	-	-	74	2	2.7
At retail									
Austria	Pig meat products - cooked, ready-to-eat	Single	10 g	83	0	0	-	-	-
Belgium	Pig meat products - fermented sausages	Batch	25 g	38	0	0	-	-	-
	Pig meat products - raw ham	Batch	25 g	46	0	0	-	-	-
	Pig meat products - cooked, ready-to-eat	Batch	200 g	-	-	-	38	0	0
Bulgaria	Pig meat products - cooked, ready-to-eat	Batch	25 g	215	0	0	225	0	0
	Pig meat products - cooked, ready-to-eat	Single	10 g	40	0	0	-	-	-
	Pig meat preparation - intended to be eaten raw	Batch	25 g	-	-	-	205	0	0
Cyprus	Pig meat products - fermented sausages	Single	-	35	0	0	35	0	0
Czech Republic	Pig meat preparation - intended to be eaten raw	Batch	25 g	27	0	0	41	0	0
	Pig meat products - cooked, ready-to-eat	Batch	25 g	74	0	0	83	0	0
Germany	Pig meat products - cooked, ready-to-eat, domestic production	Single	25 g	422	0	0	591	1	0.2
	Pig meat products - fermented sausages, domestic production	Single	25 g	619	5	0.8	658	3	0.5
Hungary	Pig meat products - cooked, ready-to-eat	Single	25 g	128	1	0.8	100	0	0
	Pig meat products - fermented sausages	Single	25 g	571	1	0.2	197	1	0.5
	Pig meat products - raw ham	Single	25 g	132	0	0	51	0	0
Ireland	Pig meat products - cooked, ready-to-eat	Single	25 g	-	-	-	402	0	0
Italy	Pig meat products, domestic production	Single	25 g	217	0	0	1,249	10	0.8
Latvia	Pig meat products - cooked, ready-to-eat	Single	25 g	55	0	0	-	-	-
Luxembourg	Pig meat products - cooked, ready-to-eat	Single	25 g	-	-	-	140	0	0

Table continued overleaf.

Table SA12 (continued).* Salmonella *in ready-to-eat minced meat, meat preparations and meat products from pig meat, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Netherlands	Pig meat products - cooked, ready-to-eat	Single	25 g	-	-	-	591	3	0.5
Portugal	Pig meat products - cooked, ready-to-eat	Batch	25 g	430	14	3.3	-	-	-
	Pig meat products - unspecified, ready-to-eat	Batch	25 g	-	-	-	360	7	1.9
Romania	Pig meat products - cooked, ready-to-eat	Batch	25 g	-	-	-	169	1	0.6
Slovakia	Pig meat products - cooked, ready-to-eat	Batch	25 g	47	0	0	-	-	-
	Pig meat products - cooked, ready-to-eat	Single	25 g	65	1	1.5	-	-	-
Spain	Pig meat products - raw and intended to be eaten raw	Single	25 g	158	3	1.9	-	-	-
Sampling level not stated									
Austria	Pig meat products - cooked, ready-to-eat, domestic production	Single	10 g	-	-	-	508	2	0.4
Italy	Pig meat products, domestic production	Single	25 g	-	-	-	2,116	43	2.0
Poland	Pig meat preparation - intended to be eaten raw	Batch	25 g	1,400	50	3.6	-	-	-
	Pig meat preparation - intended to be eaten raw	Single	25 g	85	8	9.4	-	-	-
	Pig meat products - cooked, ready-to-eat	Batch	25 g	2,870	0	0	-	-	-
	Pig meat products - cooked, ready-to-eat	Single	25 g	1,653	0	0	-	-	-
Sweden	Pig meat products	Single	-	-	-	-	38	0	0
Total (2012: 16 MSs, 2011: 18 MSs)	**Total**			**22,517**	**138**	**0.6**	**15,091**	**97**	**0.6**
	Single			**12,096**	**53**	**0.4**	**9,894**	**89**	**0.9**
	Batch			**10,421**	**85**	**0.8**	**5,197**	**8**	**0.2**

Note: Only investigations covering 25 or more samples are included.

Bovine meat and products thereof

Seventeen MSs and one non-MS reported results from testing of fresh bovine meat based on more than 25 samples. The overall proportion of positive samples of the 47,279 samples of bovine meat tested, in EU MSs, was 0.2 % (Table SA13). This number was similar to the number of samples from fresh broiler meat and pig meat and the number of tested samples increased considerably compared with 2011 (25,497 samples), but the overall proportion of positive samples remained at a comparable level (0.2 % in 2012 and 0.3 % in 2011).

In 21 of the 37 reported investigations *Salmonella* was not detected. The highest proportion of positive samples was found at the slaughterhouse level in Spain, where 11.6 % of 189 single samples tested positive in 2012, compared with 8.0 % of 112 samples in 2011. In Portugal, *Salmonella* was detected in 2.0 % of 450 single samples obtained at slaughter, and in Hungary, 1.0 % and 1.1 % of single samples tested *Salmonella* positive at the processing and retail levels, respectively. In the remaining 11 investigations with positive results, *Salmonella* was found in less than 1 % of the tested units.

Nine MSs reported results of *Salmonella* testing of RTE minced meat, meat preparations and meat products from bovine meat based on more than 25 samples. In the tested 2,244 samples, *Salmonella* was detected in 0.6 % of the samples (Table SA14). In 13 of 17 investigations *Salmonella* was not detected in any samples. A relatively high occurrence of *Salmonella* (20.0 %) was found in a small investigation (25 single samples) of fermented sausages in Cyprus, whereas the proportion of *Salmonella*-positive units in the three other investigations with *Salmonella* findings ranged from 0.8 % to 3.7 %.

For further information see Level 3 Tables.

Table SA13.* Salmonella *in fresh bovine meat, at slaughter, cutting/processing level and retail, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
At slaughterhouse									
Belgium	Carcase swabs	Batch	1600 cm^2	-	-	-	649	3	0.5
Bulgaria	Carcase swabs	Batch	400 cm^2	366	0	0	-	-	-
	Meat	Slaughter batch	25 g	-	-	-	415	0	0
Czech Republic	Carcase swabs[1]	Batch	100/400 cm^2	4,699	10	0.2	4,644	20	0.4
Denmark	Carcase swabs[2]	Single	400 cm^2	5,315	9	0.3	7,635	22	0.3
Estonia	Carcase swabs	Single	1400 cm^2	207	0	0	250	0	0
Finland	Carcase swabs	Single	1400 cm^2	3,058	0	0	3,151	0	0
Hungary	Carcase swabs	Batch	400 cm^2	259	1	0.4	-	-	-
	Carcase swabs	Single	-	-	-	-	168	0	0
Lithuania	Meat	Batch	-	78	0	0	-	-	-
Poland	Carcase swabs	Batch	400 cm^2	3,885	5	0.1	-	-	-
	Meat	Batch	25 g	335	0	0	-	-	-
	Carcase swabs	Single	400 cm^2	3,996	3	<0.1	-	-	-
Portugal	Carcase swabs	Single	-	450	9	2.0	-	-	-
Romania	Carcase swabs	Batch	100 cm^2/ unspecified	277	0	0	226	2	0.9
	Meat	Batch	25 g	48	0	0	46	0	0
Slovakia	Meat	Batch	25 g	-	-	-	73	0	0
Spain	Meat	Single	25 g	189	22	11.6	112	9	8.0
Sweden	Carcase swabs	Single	1400 cm^2	3,375	0	0	3,432	1	<0.1
Norway	Carcase swabs	Single	-	2,857	0	0	1,799	0	0
At processing or cutting plant									
Bulgaria	Carcase swabs, at processing plant	Batch	25 g	25	0	0	-	-	-
	Meat	Slaughter batch	25 g	-	-	-	415	0	0
Cyprus	At processing plant	Single	10 g	60	0	0	60	0	0
Estonia	Meat, at processing plant	Single	25 g	-	-	-	38	0	0
	Meat, at cutting plant	Single	25 g	138	0	0	122	0	0
Finland	Meat, at cutting plant	Single	25 g	2,110	0	0	1,872	1	<0.1
Hungary	Meat, at processing plant	Single	25 g	103	1	1.0	150	3	2.0

Table continued overleaf.

Table SA13 (continued).* Salmonella *in fresh bovine meat, at slaughter, cutting/processing level and retail, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Ireland	Meat, at processing plant	Single	25 g	-	-	-	71	0	0
Italy	At processing plant, domestic production	Single	25 g	61	0	0	81	0	0
Poland	Meat, at processing plant	Batch	25 g	9,709	6	<0.1	-	-	-
	Carcase swabs, at processing plant	Single	400 cm^2	53	0	0	-	-	-
	Meat, at processing plant	Single	10/25 g	939	0	0	-	-	-
	Carcase swabs, at cutting plant	Single	400 cm^2	99	0	0	-	-	-
	Meat, at cutting plant	Single	10/25/125 g	1,800	2	0.1	-	-	-
Portugal	Meat, at processing plant	Single	25 g	30	0	0	48	0	0
Romania	Meat, at cutting plant	Batch	25 g	-	-	-	28	0	0
At retail									
Bulgaria	Meat	Batch	25 g	-	-	-	28	0	0
France	Meat	Single	25 g	247	2	0.8	-	-	-
Germany	Meat, domestic production	Single	25 g	747	2	0.3	524	0	0
Greece		Single	25 g	-	-	-	35	0	0
Hungary	Meat	Single	25 g	177	2	1.1	63	0	0
Italy	Domestic production	Single	25 g	26	0	0	84	0	0
Netherlands		Single	25 g	649	6	0.9	756	1	0.1
Portugal		Single	25 g	-	-	-	75	2	2.7
Spain	Meat	Single	25 g	40	0	0	114	1	0.9
Sampling level not stated									
Poland	Meat	Batch	10/25 g	2,600	15	0.6	-	-	-
	Carcase swabs	Single	400 cm^2	1,089	1	<0.1	327	0	0
	Meat	Single	10 g	40	0	0	-	-	-
Sweden	Meat	Single	-	-	-	-	29	0	0
Total (2012: 17 MSs, 2011: 19 MSs)	**Total**			**47,279**	**96**	**0.2**	**25,497**	**66**	**0.3**
	Single			**24,998**	**59**	**0.2**	**19,197**	**40**	**0.2**
	Batch			**22,281**	**37**	**0.2**	**6,300**	**26**	**0.4**

Note: Only investigations covering 25 or more samples are included.

1. Sample weight was 400 cm^2 in 2012 and 100 cm^2 in 2011.
2. In 2012, most of the Danish samples were pooled samples, and a single-carcase prevalence was calculated. Both the loss of sensitivity and the probability of more than one sample being positive in each pool were taken into consideration. A conversion factor was determined on the basis of comparative studies. Therefore, the adjusted prevalence is 0.3 %.

Table SA14.* Salmonella *in ready-to-eat minced meat, meat preparations and meat products from bovine meat, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
At processing									
Belgium	Bovine meat preparation - intended to be eaten raw	Batch	200 g	-	-	-	26	0	0
Bulgaria	Bovine meat products - cooked, ready-to-eat[1]	Batch	25 g/ unspecified	136	0	0	25	0	0
	Bovine minced meat - intended to be eaten raw	Batch	25 g	410	0	0	165	0	0
Cyprus	Bovine meat products - fermented sausages	Single	25 g	25	5	20.0	25	5	20.0
Ireland	Bovine meat products	Single	25 g	-	-	-	152	0	0
	Bovine meat products - cooked, ready-to-eat	Single	25 g	-	-	-	132	0	0
Luxembourg	Bovine minced meat - intended to be eaten raw	Single	25 g	35	0	0	43	0	0
Poland	Bovine meat products - cooked, ready-to-eat	Batch	25 g	153	5	3.3	-	-	-
	Bovine meat products - cooked, ready-to-eat	Single	25 g	93	0	0	-	-	-
	Bovine minced meat - intended to be eaten raw	Batch	25 g	241	2	0.8	-	-	-
	Bovine minced meat - intended to be eaten raw	Single	25 g	229	0	0	-	-	-
At retail						0			
Belgium	Bovine meat preparation - intended to be eaten raw[2]	Batch	25/100 g	284	0	0	49	0	0
	Bovine minced meat - intended to be eaten raw[3]	Batch	25/150 g	44	0	0	43	0	0
Germany	Bovine meat products - cooked, ready-to-eat, domestic production	Single	25 g	31	0	0	50	0	0
	Bovine meat products - fermented sausages, domestic production	Single	25 g	36	0	0	29	0	0
Hungary	Bovine meat products - cooked, ready-to-eat	Single	25 g	37	0	0	-	-	-
Ireland	Bovine meat products - cooked, ready-to-eat	Single	25 g	-	-	-	192	0	0
Luxembourg	Bovine minced meat - intended to be eaten raw	Single	25 g	235	0	0	106	0	0
Netherlands	Bovine meat products - cooked, ready-to-eat	Single	25 g	-	-	-	38	1	2.6
	Bovine minced meat - intended to be eaten raw	Single	25 g	78	0	0	-	-	-
Spain	Bovine meat products - raw and intended to be eaten raw	Single	25 g	27	1	3.7	-	-	-

Table continued overleaf.

Table SA14 (continued).* Salmonella *in ready-to-eat minced meat, meat preparations and meat products from bovine meat, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Sampling level not stated									
Italy	Bovine meat preparation - intended to be eaten raw	Single	25 g	-	-	-	220	27	12.3
Poland	Bovine meat products - cooked, ready-to-eat	Batch	25 g	150	0	0	-	-	-
Total (2012: 9 MSs, 2011: 8 MSs)	**Total**			**2,244**	**13**	**0.6**	**1,295**	**33**	**2.5**
	Single			**826**	**6**	**0.7**	**987**	**33**	**3.3**
	Batch			**1,418**	**7**	**0**	**308**	**0**	**0**

Note: Only investigations covering 25 or more samples are included.

1. Sample weight was unspecified in 2012 and 25 g in 2011.
2. Sample weight was 25 g in 2012 and 100 g in 2011.
3. Sample weight was 25 g in 2012 and 150 g in 2011.

Salmonella in other foodstuffs

Twenty-one MSs reported results of investigations in other foodstuffs (Table SA15). The largest group of samples were from vegetables, where *Salmonella* was detected in nine of the 20 reported investigations. The highest prevalence of positive samples was found in a small Danish investigation of leafy greens originating within the EU, where *Salmonella* was detected in three of 33 samples (9.1 %). In the remaining eight investigations, where one or more samples were found to be *Salmonella* positive, the proportion of positive samples ranged from <0.1 % to 1.2 %. *Salmonella* was not detected in any of the 11 reported investigations of fruit; however, in two of the six investigations of samples originating from both fruits and vegetables, *Salmonella* was detected in 1.7 % and 0.3 % of the tested units, respectively.

In the four reported investigations of sprouted seed, *Salmonella* was found in one of the tested samples, and in none of the 44 samples of dried seed (one investigation).

In eight of the 18 reported investigations of *Salmonella* in spices and herbs, one or more samples were found to be *Salmonella* positive. The highest proportions of positive samples were found in a Danish investigation of imported fresh herbs and spices (9.4 % of 60 batches) and in a Dutch investigation of dried herbs and spices (10.5 % of 277 batches).

Salmonella was not detected in any of the relatively few tested nuts and nut products (two investigations in two different MSs).

Salmonella was isolated from one or more samples in four of the 13 investigations of egg products. In Spain, *Salmonella* was found in 5.5 % of the 55 unspecified samples of egg products, but also in 5.5 % of the 91 tested samples of RTE egg products. *Salmonella* was also detected in one of 27 samples of dried egg products in Hungary and in 1.6 % of batches of egg products tested at the processing plant level in Poland.

In the six MSs reporting test results for *Salmonella* in live bivalve molluscs, the proportion of positive samples ranged from 0 to 3.0 %.

For further information see Level 3 Tables.

Table SA15. Salmonella *in other foodstuffs, 2011–2012*

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Fruit									
Belgium	At processing plant	Batch	200 g	-	-	-	45	0	0
	Whole, at retail[1]	Batch	15/100 g	160	0	0	46	0	0
Bulgaria	Pre-cut, ready-to-eat, at retail[2]	Batch	250/25 g	181	0	0	30	0	0
Denmark	Whole, at retail, imported	Batch	5x100 g	92	0	0	-	-	-
France	Pre-cut, ready-to-eat, at retail	Single	25 g	-	-	-	1,240	0	0
Italy	At retail, domestic production	Single	25 g	39	0	0	35	0	0
Netherlands	Pre-cut, ready-to-eat, at retail	Single	25 g	132	0	0	-	-	-
Poland	Fresh fruits	Single	25 g	26	0	0	-	-	-
Portugal	Pre-cut, ready-to-eat, at retail	Batch	25 g	100	0	0	-	-	-
Romania	Pre-cut, ready-to-eat, at catering	Batch	25 g	38	0	0	165	0	0
	Pre-cut, ready-to-eat, at retail	Batch	25 g	65	0	0	85	0	0
	Pre-cut, ready-to-eat, at processing plant	Batch	25 g	-	-	-	68	0	0
United Kingdom	Products, dried, at retail, non EU	Single	25 g	175	0	0	-	-	-
	Pre-cut, ready-to-eat, at retail	Single	25 g	306	0	0	-	-	-
Vegetables									
Belgium	At retail[3]	Batch	25/150 g	359	0	0	443	2	0.5
Bulgaria	Pre-cut, ready-to-eat, at retail[4]	Batch	Unspecified/25 g	592	0	0	41	0	0
Czech Republic	Pre-cut, ready-to-eat, at retail	Batch	25 g	-	-	-	33	0	0
Denmark	Leaves, at retail, European Union	Batch	500 g	33	3	9.1	-	-	-
	Non-pre-cut, at retail, European Union	Batch	500 g	86	0	0	-	-	-
	Non-pre-cut, at retail, non EU	Batch	500 g	64	0	0	-	-	-
Germany	At processing plant, domestic production	Single	25 g	153	1	0.7	150	0	0
	At retail, domestic production	Single	25 g	1,159	1	<0.1	1,076	6	0.6

Table continued overleaf.

Table SA15 (continued).* Salmonella *in other foodstuffs, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Hungary	Pre-cut, ready-to-eat, at catering	Single	25 g	85	1	1.2	-	-	-
	Pre-cut, ready-to-eat, at retail	Single	25 g	133	1	0.8	92	0	0
Italy	At retail, domestic production	Single	25 g	224	1	0.4	737	0	0
	At catering, domestic production	Batch	25 g	-	-	-	87	0	0
	At processing plant, domestic production	Single	25 g	-	-	-	224	0	0
	Unspecified, domestic production	Single	25 g	-	-	-	50	0	0
Lithuania	Pre-cut, ready-to-eat, at retail	Batch	-	46	0	0	-	-	-
Netherlands	Pre-cut, ready-to-eat, at retail	Single	25 g	666	4	0.6	-	-	-
Poland	Fresh vegetables	Single	25 g	437	1	0.2	-	-	-
Portugal	Pre-cut, ready-to-eat, at retail	Single	25 g	-	-	-	80	0	0
Romania	Pre-cut, ready-to-eat, at catering	Batch	25 g	50	0	0	-	-	-
	Pre-cut, ready-to-eat, at retail	Batch	25 g	96	0	0	-	-	-
	Non-pre-cut, at processing plant	Single	25 g	26	0	0	-	-	-
	Pre-cut, ready-to-eat, at processing plant	Single	25 g	-	-	-	47	0	0
	Pre-cut, ready-to-eat, at catering	Single	25 g	136	0	0	-	-	-
	Pre-cut, ready-to-eat, at retail	Batch	25 g	-	-	-	53	0	0
	Pre-cut, ready-to-eat, at retail	Single	25 g	184	1	0.5	43	0	0
	Pre-cut, ready-to-eat, at retail, European Union	Single	25 g	95	0	0	28	0	0
	Unspecified	Single	25 g	-	-	-	202	0	0
	Unspecified	Single	-	51	0	0	106	0	0

Table continued overleaf.

Table SA15 (continued).* Salmonella *in other foodstuffs, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Fruits and vegetables									
Austria	Domestic production, at retail	Single	25 g	35	0	0	-	-	-
	Imported, at border control	Single	25 g	32	0	0	-	-	-
	Imported, at retail	Single	25 g	35	0	0	-	-	-
Belgium	Pre-cut, at retail[5]	Batch	25/200 g	60	1	1.7	60	0	0
	Pre-cut, at processing plant	Batch	200 g	-	-	-	31	0	0
Denmark	Non EU, non-pre-cut, at retail	Batch	500 g	-	-	-	217	1	0.5
Ireland	At retail	Single	25 g	-	-	-	502	0	0
	Pre-cut, ready-to-eat, at retail	Single	25 g	-	-	-	186	0	0
	Products, at retail	Single	25 g	-	-	-	415	0	0
Italy	Domestic production, products, unspecified	Single	25 g	-	-	-	30	0	0
Poland	Products, at processing plant	Single	25 g	108	0	0	-	-	-
Slovenia	Imported, products, unspecified	Single	25 g	-	-	-	30	0	0
Spain	Pre-cut, ready-to-eat	Single	-	614	2	0.3	-	-	-
Seed, dried									
United Kingdom	At retail, non EU	Single	25 g	44	0	0	-	-	-
Seed, sprouted									
Czech Republic	Ready-to-eat, at processing plant	Batch	25 g	35	0	0	-	-	-
	Non-ready-to-eat, at processing plant	Batch	25 g	-	-	-	39	0	0
Finland	At retail	Single	25 g	-	-	-	60	0	0
Germany	At processing plant, domestic production	Single	25 g	35	0	0	-	-	-
	At retail, domestic production	Single	25 g	206	1	0.5	166	0	0
Hungary	Ready-to-eat, at retail	Single	25 g	56	0	0	52	0	0

Table continued overleaf.

Table SA15 (continued).* Salmonella *in other foodstuffs, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Spices and herbs									
Austria	At retail, domestic production	Single	25 g	43	0	0	96	0	0
	At retail, imported	Single	25 g	35	1	2.9	36	0	0
Belgium	Dried, at processing plant	Batch	100 g	-	-	-	59	2	3.4
	Dried, at retail[6]	Batch	25/100 g	59	0	0	59	0	0
	Fresh, at retail	Batch	25 g	88	0	0	-	-	-
Denmark	Fresh	Batch	500 g	26	0	0	-	-	-
	Fresh, imported	Batch	500 g	60	3	9.4	-	-	-
	Fresh, at retail, non EU	Batch	500 g	-	-	-	69	4	5.8
Finland	Fresh, at retail	Single	25 g	-	-	-	84	0	0
Germany	At processing plant, domestic production	Single	25 g	160	1	0.6	128	0	0
	At retail, domestic production	Single	25 g	661	3	0.5	499	0	0
Hungary	Dried, at retail	Single	25 g	222	0	0	-	-	-
	Dried	Single	25 g	-	-	-	127	1	0.8
Ireland	At retail	Single	25 g	-	-	-	164	1	0.6
Italy	At retail, domestic production	Single	25 g	34	0	0	25	2	8.0
Netherlands	Dried	Batch	25 g	277	29	10.5	-	-	-
	Fresh	Batch	25 g	31	2	6.5	-	-	-
Poland	Unspecified	Single	25 g	224	2	0.9	-	-	-
Romania	At processing plant	Batch	25 g	77	0	0	-	-	-
Slovakia	At retail	Batch	25 g	27	0	0	26	0	0
	Dried, at processing plant	Single	25 g	25	0	0	-	-	-
	Dried, at retail	Batch	25 g	40	0	0	-	-	-
	Dried, at retail	Single	25 g	-	-	-	30	0	0
Slovenia	Dried, at retail	Single	25 g	-	-	-	40	0	0
United Kingdom	Dried, at retail, non EU	Single	100 g	31	1	3.2	-	-	-

Table continued overleaf.

Table SA15 (continued).* Salmonella *in other foodstuffs, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Nuts and nut products									
Hungary	Dried, unspecified	Single	25 g	85	0	0	-	-	-
United Kingdom	Dried, at retail, non EU	Single	100 g	63	0	0	-	-	-
Egg products									
Austria	Non-ready-to-eat, at retail, domestic production	Single	25 g	39	0	0	-	-	-
	Non-ready-to-eat, at retail, imported	Single	25 g	27	0	0	-	-	-
Belgium	At processing plant[7]	Batch	25/500 g	114	0	0	111	0	0
Bulgaria	At processing plant[4]	Batch	Unspecified/25 g	800	0	0	640	0	0
Germany	At processing plant, domestic production	Single	25 g	45	0	0	45	0	0
	At retail, domestic production	Single	25 g	179	0	0	226	0	0
Hungary	At processing plant	Single	25 g	72	0	0	-	-	-
	Dried, unspecified	Single	25 g	27	1	3.7	29	0	0
	Liquid, at processing plant	Single	25 ml	-	-	-	48	0	0
	Liquid, unspecified	Single	25 ml	66	0	0	-	-	-
Ireland	Ready-to-eat, at retail	Single	25 g	-	-	-	143	0	0
Italy	At processing plant, domestic production	Single	25 g	-	-	-	35	0	0
	At retail, domestic production	Single	25 g	-	-	-	130	0	0
	Unspecified	Single	25 g	-	-	-	56	0	0
Poland	At processing plant	Batch	25 g	125	2	1.6	-	-	-
	At processing plant	Single	25 g	52	0	0	827	1	0.1
Spain	Unspecified	Single	25 g	55	3	5.5	101	0	0
	Ready-to-eat	Single	25 g	91	5	5.5	-	-	-

Table continued overleaf.

Table SA15 (continued).* Salmonella *in other foodstuffs, 2011–2012

Country	Description	Sample unit	Sample weight	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Live bivalve molluscs									
Belgium	Unspecified, at retail	Batch	25 g	92	1	1.1	87	2	2.3
Bulgaria	Unspecified, at retail, non EU	Batch	25 g	83	0	0	105	0	0
Greece	Unspecified, at processing plant	Single	25 g	953	6	0.6	-	-	-
	Unspecified, at retail	Single	25 g	-	-	-	45	0	0
Netherlands	Mussels, at retail	Single	25 g	-	-	-	52	2	3.8
	Oysters, at retail	Single	25 g	-	-	-	75	1	1.3
Portugal	At retail	Batch	25 g	165	5	3.0	60	0	0
	Unspecified, at processing plant	Batch/single[8]	25 g	33	1	3.0	100	0	0
Spain	Unspecified, at retail	Single	25 g	306	5	1.6	647	9	1.4
Total (2012: 21 MSs, 2011: 20 MSs)				**12,841**	**89**	**0.7**	**11,998**	**34**	**0.3**

Note: Only investigations covering 25 or more samples are included.

1. Sample weight was 15 g in 2012 and 100 g in 2011.
2. Sample weight was 250 g in 2012 and 25 g in 2011.
3. Sample weight was 25 g in 2012 and 150 g in 2011.
4. Sample weight was unspecified in 2012 and 25 g in 2011.
5. Sample weight was 25 g in 2012 and 200 g in 2011.
6. Sample weight was 25 g in 2012 and 100 g in 2011.
7. Sample weight was 25 g in 2012 and 500 g in 2011.
8. Sample unit was 'batch' in 2012 and 'single' in 2011.

3.1.3. *Salmonella* in animals

EU MSs have compulsory or voluntary *Salmonella* control or monitoring programmes in place for a number of farm animal species. An overview of the countries which reported data on *Salmonella* in animals for 2012 is presented in Table SA16. In the following chapter, data tables on breeders of *Gallus gallus*, laying hens, broilers, breeding turkeys and fattening turkeys also include results from investigations with sample sizes below 25; for other animal species, only results based on 25 or more units tested are presented. Results from industry own-control programmes, HACCP sampling, suspect sampling, selective sampling and clinical investigations have been excluded owing to difficulties in interpreting the data. These data are, however, presented in the Level 3 Tables.

Table SA16. Overview of countries reporting data for* Salmonella *in animals, 2011–2012

Data	Total number of reporting MSs	Countries
Gallus gallus (no further sampling level)	2012 - 1	**MS:** IT **Non-MS:** NO
	2011 - 3	**MSs:** IT, PT, RO **Non-MS:** NO
Breeders of *Gallus gallus*	2012 - 25	**All MSs** except LU, MT **Non-MSs:** CH, IS, NO
	2011 - 25	**All MSs** except LU, MT **Non-MSs:** CH, IS, NO
Laying hens	2012 - 27	**All MSs** **Non-MSs:** CH, IS, NO
	2011 - 27	**All MSs** **Non-MSs:** CH, IS, NO
Broilers	2012 - 27	**All MSs** **Non-MSs:** CH, IS, NO
	2011 - 27	**All MSs** **Non-MSs:** CH, IS, NO
Turkeys	2012 - 24	**All MSs** except LU, LV, MT **Non-MSs:** CH, IS, NO
	2011 - 25	**All MSs** except LU, MT **Non-MSs:** CH, IS, NO
Ducks	2012 - 10	**MSs:** BE, DE, DK, HU, IT, LV, PL, SE, SK, UK **Non-MSs:** IS, NO
	2011 - 11	**MSs:** BE, CY, DE, DK, IT, LV, PL, PT, SE, SK, UK **Non-MSs:** IS, NO
Geese	2012 - 6	**MSs:** DE, HU, IT, PL, SE, SK **Non-MS:** NO
	2011 - 6	**MSs:** DE, IT, LV, PL, SE, SK **Non-MS:** NO
Other poultry[1]	2012 - 15	**All MSs** except AT, BG, CY, CZ, FI, LT, LU, MT, NL,SE, SI, UK **Non MS**: NO
	2011 - 14	**MSs:** BE, BG, CY, DK, EE, ES, IE, IT, LV, PL, PT, RO, SK, UK

Table continued overleaf.

Table SA16 (continued). Overview of countries reporting data for* Salmonella *in animals, 2011–2012

Data	Total number of reporting MSs	Countries
Pigs	2012 - 17	**All MSs** except AT, CY, CZ, DK, FR, LT, LU, MT, PT, SI **Non-MSs:** CH, IS, NO
	2011 - 18	**All MSs** except AT, BE, CY, CZ, FR, LT, LU, MT, SI **Non-MSs:** CH, IS, NO
Cattle	2012 - 17	**All MSs** except AT, BE, CY, CZ, DK, FR, LT, MT, RO, SI **Non-MSs:** CH, NO
	2011 - 18	**All MSs** except AT, BE, CZ, DK, FR, LT, MT, RO, SI **Non-MSs:** CH, NO
Sheep and goats	2012 - 16	**All MSs** except AT, BE, CY, CZ, DK, FI, FR, LT, MT, PL, SI **Non-MSs:** CH, NO
	2011 - 13	**MSs:** BG, DE, EE, GR, IE, IT, LV, NL, PT, RO, SE, SK, UK **Non-MSs:** CH, NO
Other animal species	2012 - 15	**MSs:** except AT, BE, BG, CY, CZ, ES, FI, FR, LU, MT, PT, SI **Non-MSs:** CH, NO
	2011 - 18	**All MSs** except AT, BE, CZ, FI, FR, HU, LU, MT, SI **Non-MSs:** CH, NO

Note: The overview table includes all data reported by MSs and non-MSs.

1. This category includes doves, guinea fowl, partridges, peafowl, pheasants, pigeons, quails, other poultry and poultry unspecified.

To protect human health against *Salmonella* infections transmissible between animals and humans, EU Regulation (EC) No 2160/2003[18] obliges MSs to set up national control programmes for *Salmonella* serovars in poultry and pigs deemed to be of particular importance for public health. The animal populations which are currently targeted include breeding flocks, laying hens, broilers of *Gallus gallus* and breeding and fattening turkeys. The national control programmes are established to achieve EU reduction targets to decrease the *Salmonella* prevalence in those animal populations at the primary production level.

Poultry production lines involve a breeding pyramid so that genetic improvement, which mainly takes place through selection at the top of the production pyramid, can be rapidly distributed among commercial poultry populations. The top of the pyramid comprises elite flocks, great grandparent flocks and grandparent flocks, with parent flocks in the middle, and production flocks at the bottom of the pyramid. Hereafter in this report, elite flocks, great grandparent flocks, grandparent flocks and parent flocks are generically referred to as breeding flocks.

In poultry, *Salmonella* may be transmitted both horizontally and vertically. The relevance of *Salmonella* infection in breeding flocks is mainly related to the potential for vertical transmission to production flocks, and the impact of the vertical route of transmission is amplified by the pyramidal structure of the egg and broiler production sectors, contamination of hatcheries and trade in grandparent, parent and commercial stock and hatching eggs.

The national control programmes may vary to some extent between MSs owing to their different circumstances, while aiming to achieve the same goal. National control programmes have to be approved by the EC. The results of the programmes have to be reported to the EC and EFSA as part of the annual zoonoses report.

Breeding flocks of *Gallus gallus*

The year 2012 was the sixth year in which MSs were obliged to implement *Salmonella* control programmes in breeding flocks of *Gallus gallus* in accordance with Regulation (EC) No 2160/2003 and Regulation (EC)

[18] Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Regulation of 17 November 2003 on the control of salmonella and other specified food-borne zoonotic agents. OJ L 325, 12.12.2003, p. 1–15.

No 200/2010[19]. The control programmes for breeding flocks aim to meet a reduction target of 1 % or less of positive flocks for the following serovars: *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and *S.* Hadar, including monophasic *S.* Typhimurium. The target was set for all commercial-scale adult breeding flocks, during the production period, comprising at least 250 birds. However, MSs with fewer than 100 breeding flocks would attain the target if only one adult breeding flock remained positive.

The minimum requirements for *Salmonella* detection in breeding flocks, laid down in Regulation (EC) No 2160/2003, include sampling three times during the rearing period and every two to three weeks during the production (laying) period. Test results have to be reported, as well as any relevant additional information, on a yearly basis to the EC and EFSA as part of the annual report on trends and sources of zoonoses and zoonotic agents. A flock is reported positive if one or more of the samples have been found positive.

In 2012, control programmes approved by the Commission were implemented in all MSs. In total, 25 MSs and three non-MSs reported 2012 data within the framework of the programme. This is because two MSs, Luxembourg and Malta, do not have breeding flocks of *Gallus gallus*.

The total *Salmonella* prevalence data for *Gallus gallus* breeding flocks during the production period in 2012 are presented in Table SA17.

The trends in prevalence of the five target serovars (*S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and *S.* Hadar), at EU level and at MS level, are shown in Figures SA8 and SA9, respectively. The prevalence of the five target serovars and the target for *Gallus gallus* breeding flocks during the production period for MSs and non-MSs in 2012 are shown in Figure SA10. The geographical distribution of prevalence by MS is presented in Figure SA11.

Overall during 2012, *Salmonella* was found in 3.0 % of breeding flocks in the EU at some stage during the production period, compared with 1.9 % in 2011. The prevalence of the five targeted *Salmonella* serovars in adult breeding flocks tested under the mandatory *Salmonella* control programmes was 0.6 % in 2012, which was equal to 2011 and a decrease compared with 2010 (0.7 %) at the EU level (Table SA17 and Figure SA8).

In total, 19 MSs and 3 non-MSs met the target of 1 % set for 2012. The MSs that failed to meet the target were Austria, Cyprus, the Czech Republic, Greece, Hungary and Poland, with the highest flock prevalence of 8.6 % reported by Cyprus (Figure SA10). Of these MSs, Cyprus, Hungary and Poland also did not meet the target in 2011. A total of 11 MSs and two non-MSs reported no positive flocks for the target serovars.

Figure SA9 presents the trends in prevalence of the five target serovars for the 24 MSs and two non-MSs which reported data for all six years. The results show that 11 MSs and one non-MSs maintained a prevalence below the 1 % threshold in the last four to five years. Of these, four MSs (Estonia, Finland, Latvia and Lithuania), plus Norway, did not report any positive results in all six years. Poland never met the target until 2012. Besides fluctuations around the 1 % prevalence threshold in previous reporting years, compared with 2011, six MSs reported an increase and seven MSs a decrease. The remaining 12 MSs reported an unchanged zero or very low (0.1 % to 1 %) prevalence.

The most commonly reported target serovar in breeding flocks of *Gallus gallus* in 2012 was *S.* Enteritidis (0.2 %), which was the most common serovar in most MSs and reported by 11 MSs. The next most commonly reported target serovar was *S.* Infantis (0.095 %), reported by six MSs. Also *S.* Typhimurium was reported in breeding flocks by six MSs (0.045 %). Monophasic *S.* Typhimurium, which is counted as a target serovar, was reported in 2012 in three breeding flocks of *Gallus gallus*, one in France and two in Cyprus. A total of 15 MSs reported findings of *Salmonella* serovars other than the five target ones, generally at low levels. Cyprus and Italy reported the highest prevalence (10.3 % and 16.4 %, respectively) of flocks testing positive for serovars other than the targeted ones, and in 12 MSs, the prevalence of non-targeted serovars was higher than that of the target serovars (Table SA17).

[19] Commission Regulation (EC) No 200/2010 of 10 March 2010 implementing Regulation (EC) No 2160/2003 of the European Parliament and of the Council as regards a Union target for the reduction of the prevalence of *Salmonella* serotypes in adult breeding flocks of *Gallus gallus*. OJ L 61, 11.3.2010, p. 1–9.

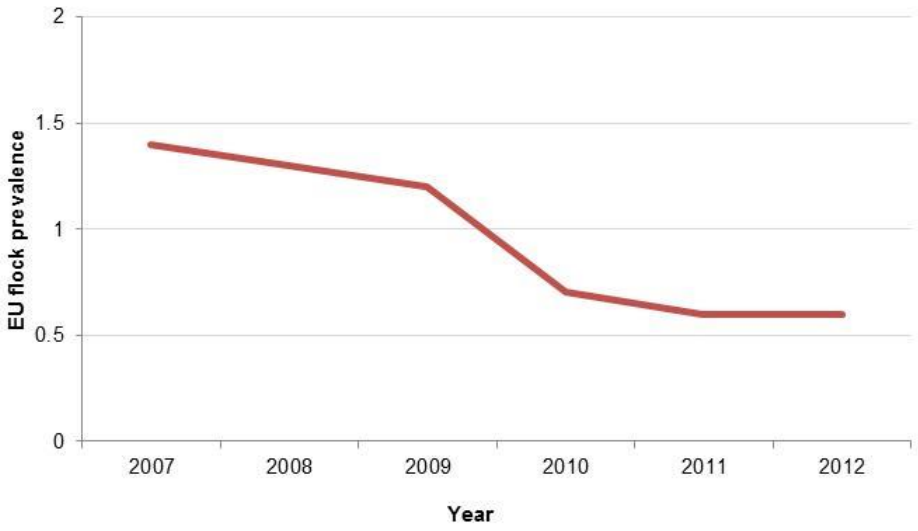
Table SA17.* Salmonella *in breeding flocks of* Gallus gallus *during the production period (all types of breeding flocks, flock-based data) in countries running control programmes in accordance with Regulation (EC) No 2160/2003, 2012

Country	N	% positive							
		pos (all)	5 target serovars[1]	*S.* Enteritidis	*S.* Typhimurium	*S.* Infantis	*S.* Virchow	*S.* Hadar	Other serovars, non-typeable, and unspecified
Austria	128	3.9	1.6	1.6	0	0	0	0	2.3
Belgium	557	2.5	0.2	0.2	0	0	0	0	2.3
Bulgaria	127	1.6	0.8	0	0.8	0	0	0	0.8
Cyprus	58	19.0	8.6	3.4	0	1.7	0	0	10.3
Czech Republic	642	3.6	1.2	1.1	0	0.2	0	0	2.3
Denmark	196	0	0	0	0	0	0	0	0
Estonia	19	0	0	0	0	0	0	0	0
Finland	165	0	0	0	0	0	0	0	0
France [2]	2,338	-	0.1	0	<0.1	0	0	0	-
Germany	682	2.6	0.3	0.1	0.1	0	0	0	2.3
Greece	256	5.1	1.2	0.4	0.4	0	0	0.4	4.3
Hungary	671	4.2	1.3	0.3	0	1.0	0	0	2.8
Ireland	326	0	0	0	0	0	0	0	0
Italy	1,111	16.3	0.5	<0.1	0	0.4	0	0	16.4
Latvia	30	0	0	0	0	0	0	0	0
Lithuania	71	0	0	0	0	0	0	0	0
Netherlands	1,108	0.8	0.7	0.7	0	0	0	0	<0.1
Poland	1,519	2.5	2.0	1.6	0	0.3	<0.1	0.1	0.5
Portugal	531	2.1	0	0	0	0	0	0	2.1
Romania	364	7.4	0	0	0	0	0	0	7.4
Slovakia	151	0	0	0	0	0	0	0	0
Slovenia	144	0	0	0	0	0	0	0	0
Spain	1,635	2.9	0.1	<0.1	<0.1	0	0	0	2.8
Sweden	143	0	0	0	0	0	0	0	0
United Kingdom	1,473	0.8	0	0	0	0	0	0	0.8
EU Total	**14,445**	**3.0**	**0.6**	**0.2**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**2.6**
Iceland	35	0	0	0	0	0	0	0	0
Norway	156	0	0	0	0	0	0	0	0
Switzerland	47	2.1	2.1	2.1	0	0	0	0	0

Note: Luxembourg and Malta do not have breeding flocks of *Gallus gallus*.
Data presented include sample size <25.

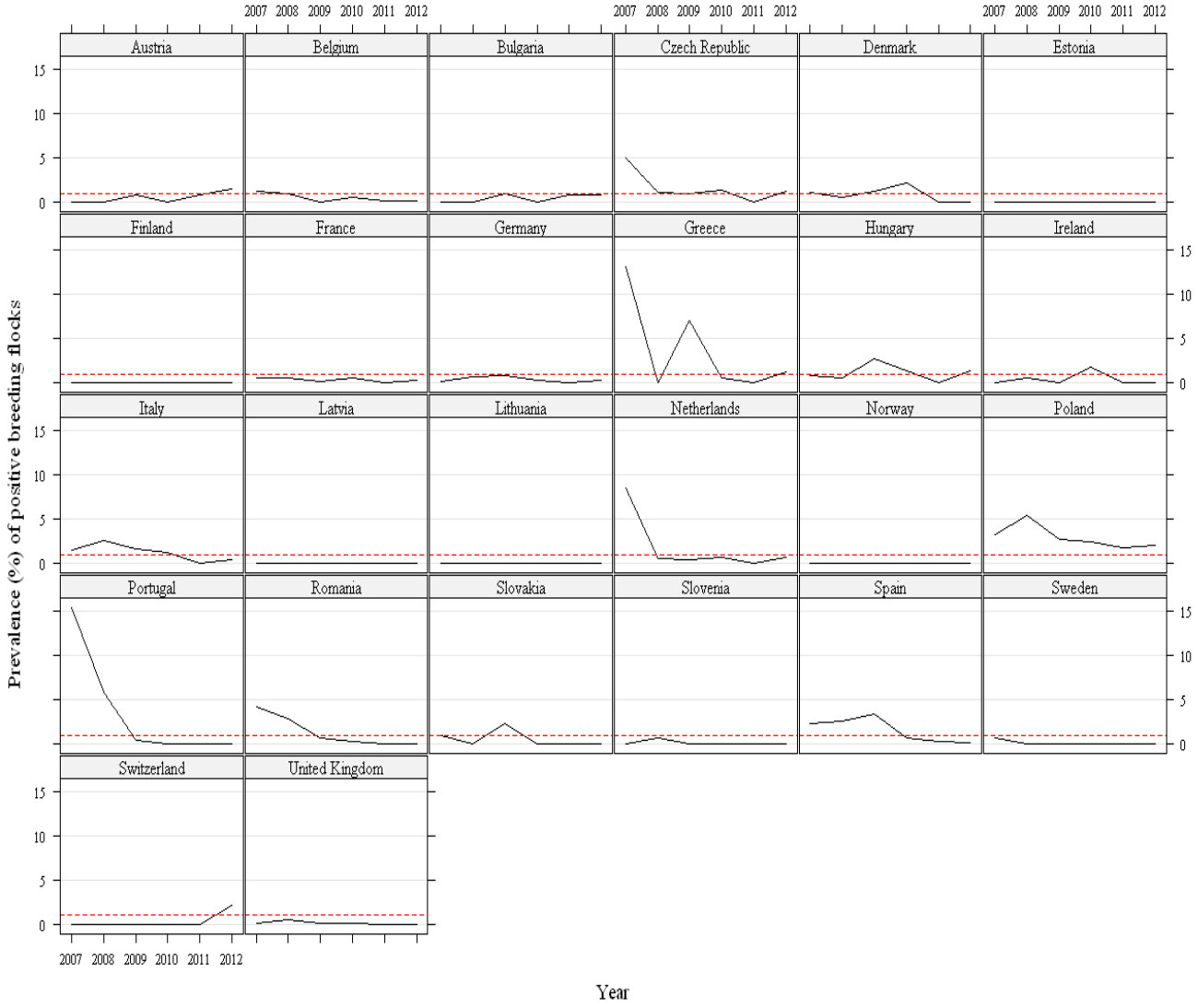
1. *S.* Enteritidis, *S.* Typhimurium including monophasic *S.* Typhimurium, *S.* Infantis, *S.* Virchow, *S.* Hadar.
2. France did not provide data on non-target serovars.

Figure SA8. Prevalence of S. Enteritidis, S. Typhimurium, S. Infantis, S. Virchow and S. Hadar-positive breeding flocks of* Gallus gallus *during production in the EU[1], 2007–2012



1. No data from Luxembourg and Malta as they have no breeding flocks of *Gallus gallus.*

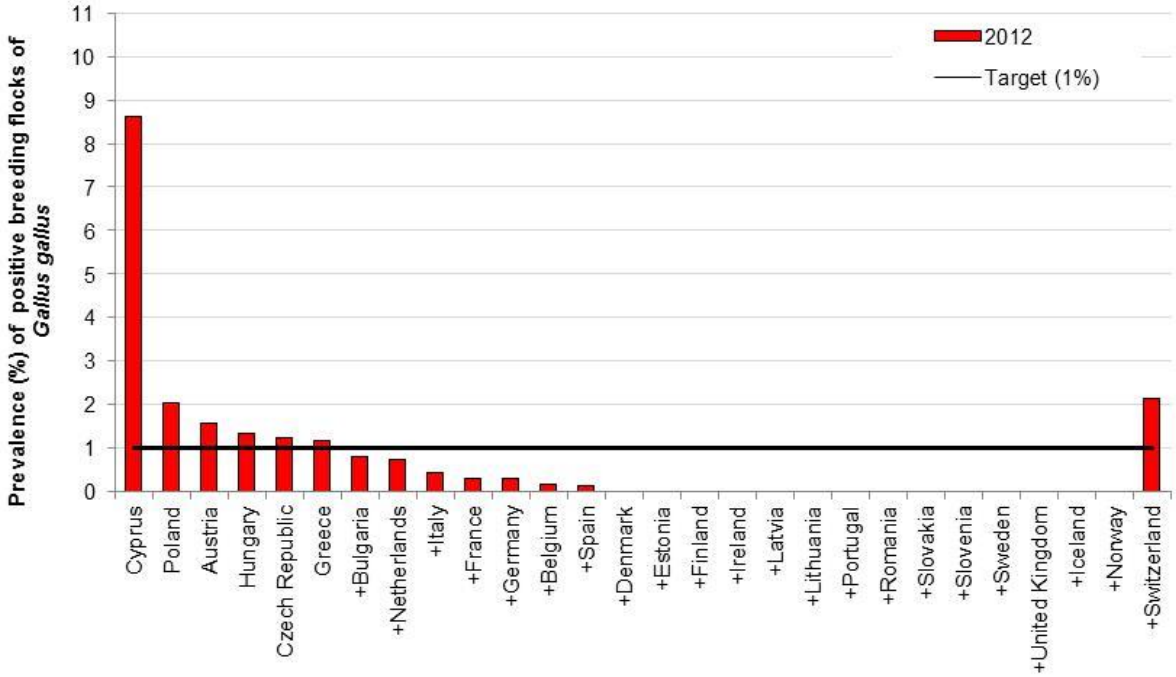
Figure SA9. Prevalence of S. Enteritidis, S. Typhimurium, S. Infantis, S. Virchow and S. Hadar-positive breeding flocks of* Gallus gallus *during the production period in 24 Member States, Norway and Switzerland[1], 2007–2012



Note: The dashed line indicates the EU *Salmonella* targets of 1 %.

1. No data from Luxembourg and Malta as they have no breeding flocks of *Gallus gallus*. Cyprus is not included because fewer than 100 adult breeding flocks were tested for some years (before 2011) and one positive flock was reported leading to a proportion of positives higher than 1 %. Based on Regulation (EC) No 1003/2005 (Art. 1, point 1), Cyprus met the EU target for these years. In 2011 and 2012, Cyprus tested five flocks positive out of, respectively, 50 and 58 flocks, and consequently did not meet the target. Iceland was not included because data were reported only from 2011 onwards. Switzerland tested fewer than 100 adult breeding flocks and reported one positive flock leading to a proportion of positives higher than 1 %. Based on Regulation (EC) No 1003/2005 (Art. 1, point 1), Switzerland met the EU target.

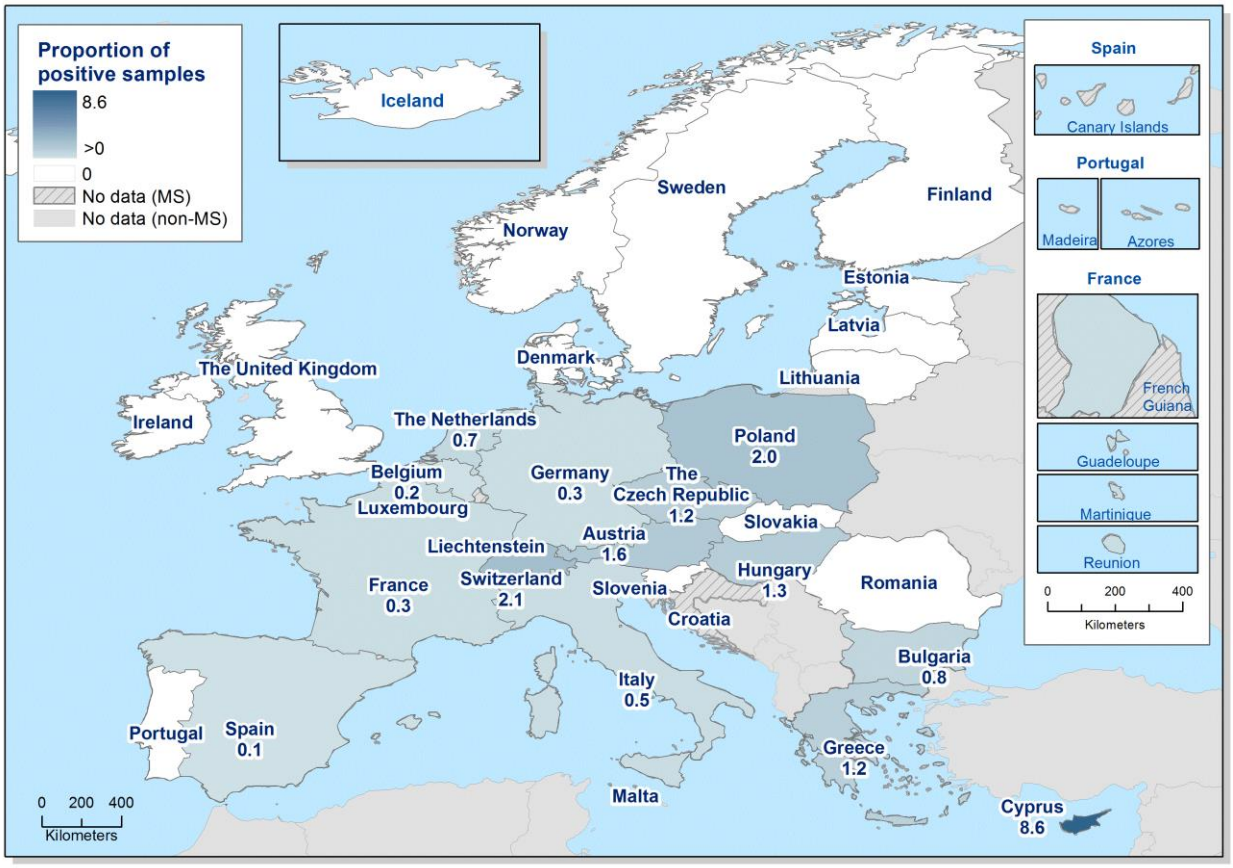
Figure SA10. Prevalence of S. Enteritidis, S. Typhimurium, S. Infantis, S. Virchow and S. Hadar-positive breeding flocks of* Gallus gallus *during the production period and target for Member States[1], Iceland, Norway and Switzerland, 2012



Note: Nineteen MSs and three non-MSs met the target in 2012, indicated with a '+'.

1. No data from Luxembourg and Malta as they have no breeding flocks of *Gallus gallus*. Switzerland tested less than 100 adult breeding flocks and reported one positive flock leading to a proportion of positives higher than 1 %. Based on the Regulation (EC) No 1003/2005 (Art. 1, point 1), Switzerland met the EU target.

Figure SA11. Prevalence of the five target serovars (S. Enteritidis, S. Typhimurium, S. Infantis, S. Virchow and S. Hadar)-positive breeding flocks of Gallus gallus during the production period[1], 2012



1. No breeding flocks of *Gallus gallus* in Luxembourg, Malta, French Guiana, Guadeloupe, Martinique and Reunion. These MSs are indicated by 'No data (MS)'.

Laying hen flocks

From 2008, MSs have implemented *Salmonella* control programmes for *S*. Enteritidis and *S*. Typhimurium in laying hen flocks of *Gallus gallus* providing eggs intended for human consumption in accordance with Regulation (EC) No 2160/2003. The control programmes consist of measures for prevention, detection and control of *Salmonella* at all relevant stages of the primary production of eggs, in order to reduce the prevalence of *Salmonella* and the risk to public health.

In 2011, a final annual *Salmonella* reduction target for laying hen flocks of *Gallus gallus* came into force. This target was an extension of the transitional target implemented in the period 2008–2010. The EU definitive target for laying hens is defined in Regulation (EC) No 517/2011 as an annual minimum percentage of reduction in the number of adult laying hen flocks (i.e. in the production period) remaining positive for *S*. Enteritidis and/or *S*. Typhimurium by the end of the previous year. The annual targets are proportionate, depending on the prevalence in the preceding year, but the final EU target is defined as a maximum percentage of flocks remaining positive at 2 %. However, MSs with fewer than 50 flocks of adult laying hens would attain the target if only one adult flock remained positive.

Minimum sampling requirements laid down in Regulation (EC) No 2160/2003 include sampling flocks twice during the rearing period (day-old chicks and at the end of the rearing period before moving to the laying unit), as well as sampling every 15th week during the production period, starting at a flock-age between 22 and 26 weeks. Test results have to be reported, as well as any relevant additional information, on a yearly basis to the EC and EFSA as part of the annual report on trends in and sources of zoonoses and zoonotic agents. A flock is reported as positive if one or more samples are positive during the production period. However, only flocks testing positive for *S.* Typhimurium and/or *S.* Enteritidis during the production period are taken into consideration when assessing whether MSs meet the target. Any reporting of monophasic *S*. Typhimurium is included within the *S*. Typhimurium total and as such is counted as a target serovar.

Regulation (EC) No 517/2011 setting the definitive target for laying hens has simplified the reporting of results of *Salmonella* testing programmes in adult laying hens; the reporting should include the results from all samples taken under the testing programme by both food business operators and competent authorities. As flocks may test positive at different stages and ages of their lifespan, positive flocks must be counted and reported only once during the production period (flock level prevalence), irrespective of the number of sampling and testing operations.

In 2012, all MSs had control programmes approved by the EC. In total, 27 MSs and three non-MSs reported data within the framework of the laying hen flock programme for 2012. The prevalence of *Salmonella* spp. and of the two serovars (*S.* Enteritidis and *S.* Typhimurium) targeted in the control programmes for laying hen flocks during the production period are presented in Table SA18. The trends in prevalence of the two target serovars, at EU level and at MS level, are shown in Figures SA12 and SA13, respectively. The prevalence of *S.* Enteritidis and *S.* Typhimurium and the target for production flocks of laying hens, for MSs and non-MSs, in 2012, are shown in Figure SA14. The geographical distribution of prevalence by MS is presented in Figure SA15.

Overall, 24 MSs and 3 non-MSs met their 2012 reduction targets. Three MSs did not achieve the reduction in *Salmonella* prevalence (Belgium, Cyprus and Luxembourg). The prevalence of the two target serovars in laying hen flocks tested under the mandatory control programmes was 1.3 % (Table SA18). The most common of the target serovars in laying hen flocks was *S*. Enteritidis (1.0 % compared with 0.3 % *S*. Typhimurium), which was the most common serovar in all MSs reporting positive findings for the target serovars, except for Finland, France and Italy, where *S*. Typhimurium was the most common serovar. Finland detected only *S*. Typhimurium in three flocks and no other serovars were isolated.

Eleven MSs and three non-MSs reported no flocks positive with *S.* Enteritidis and/or *S.* Typhimurium or very low prevalence, whereas Cyprus and Malta reported the highest prevalence (13.7 % and 6.1 %, respectively) (Table SA18). Monophasic *S*. Typhimurium was detected only in Denmark (one flock), France (three flocks), Italy (five flocks) and Spain (one flock).

The reported EU level prevalence of adult laying hen flocks positive with *S.* Enteritidis and/or *S.* Typhimurium decreased further to 1.3 % from 1.5 % in 2011 (Figure SA12). This indicates that progress is still being made in combating these *Salmonella* serovars. At MS level the prevalence declined in 17 MSs compared with 2011 while seven MSs reported a slight increase in their prevalence from 2011 to 2012 and Cyprus reported a more substantial increase (Figure SA13).

In 2012, the EU level prevalence of adult laying hen flocks positive with *Salmonella* spp. was 3.5 %, compared with 4.2 % in 2011. Estonia, Ireland and Lithuania were the only MSs reporting no positive flocks, and Latvia and Sweden detected only serovars other than the two target ones. Eighteen MSs reported flocks positive for serovars other than the two target ones at very low to high levels, and in 12 of them, the prevalence of these serovars was higher than the prevalence of the target serovars. Iceland, Norway and Switzerland reported no *Salmonella* spp.-positive flocks.

Table SA18.* Salmonella *in laying hen flocks of* Gallus gallus *during the production period (flock-based data) in countries running control programmes, 2012

Country	N	Target (production period)	% positive				
			pos (all)	S. Enteriditis and/or S. Typhimurium[1]	S. Enteritidis	S. Typhimurium[1]	Other serovars, non-typeable, and unspecified
Austria	2,740	2.0	2.2	0.7	0.5	0.3	1.4
Belgium	764	2.0	4.7	2.2	2.0	0.3	2.1
Bulgaria	252	2.0	6.0	1.6	1.6	0	4.4
Cyprus	51	5.2	39.2	13.7	7.8	5.9	25.5
Czech Republic	392	2.4	2.0	1.5	1.5	0	0.5
Denmark	359	2.0	0.8	0.6	0.3	0	0.3
Estonia	38	7.7	0	0	0	0	0
Finland	704	2.0	0.4	0.4	0	0.4	0
France	4,026	2.0	1.4	1.4	0.6	0.8	0
Germany	5,474	2.0	1.6	1.0	0.8	0.2	0.6
Greece	454	2.0	5.7	1.1	0.9	0.2	4.6
Hungary	1,134	2.7	5.3	1.6	1.6	0	3.7
Ireland	186	2.0	0	0	0	0	0
Italy	2,772	2.0	7.1	1.7	0.1	1.4	5.7
Latvia	50	2.0	6.0	0	0	0	6.0
Lithuania	24	2.0	0	0	0	0	0
Luxembourg	222	2.0	4.5	3.6	3.6	0	0.9
Malta	66	7.9	50.0	6.1	6.1	0	-
Netherlands	2,346	2.0	1.5	1.5	1.3	0.2	0
Poland	2,358	3.3	4.3	2.8	2.7	0.2	0
Portugal	364	2.0	6.3	1.1	1.1	0	5.8
Romania	497	2.0	15.5	1.4	1.2	0.2	14.1
Slovakia	387	2.0	1.8	1.8	1.8	0	0
Slovenia	161	2.0	1.2	0.6	0.6	0	0.6
Spain	1,943	2.5	11.8	2.2	1.9	0.3	9.6
Sweden	626	2.0	0.3	0	0	0	0.3
United Kingdom	4,042	2.0	0.8	<0.1	<0.1	<0.1	0.8
EU Total	**32,432**		**3.5**	**1.3**	**1.0**	**0.3**	**2.0**
Iceland	19	-	0	0	0	0	0
Norway	738	2.0	0	0	0	0	0
Switzerland	756	2.0	0	0	0	0	0

Note: Target (production period) is calculated from the prevalence reported in 2011.
Data presented include sample size <25.

1. *S*. Typhimurium includes monophasic *S*. Typhimurium.

Figure SA12. Prevalence of S. Enteritidis and/or S. Typhimurium-positive laying hen flocks of* Gallus gallus *during the production period in the EU, 2008–2012

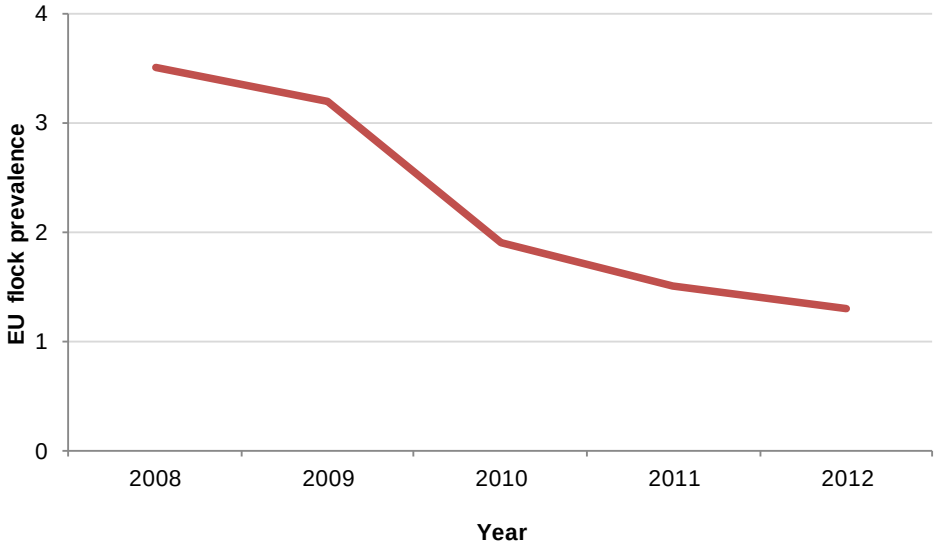
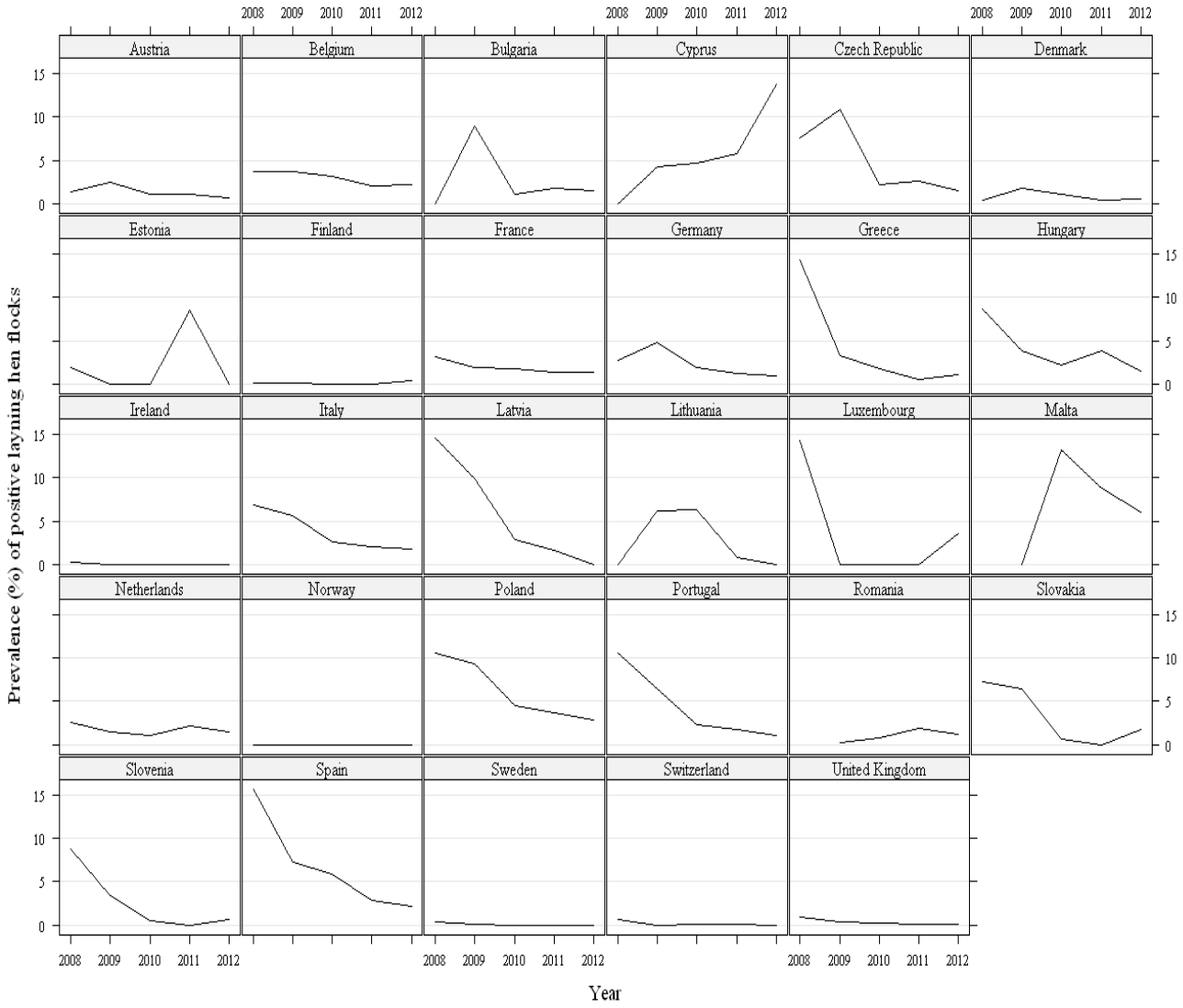
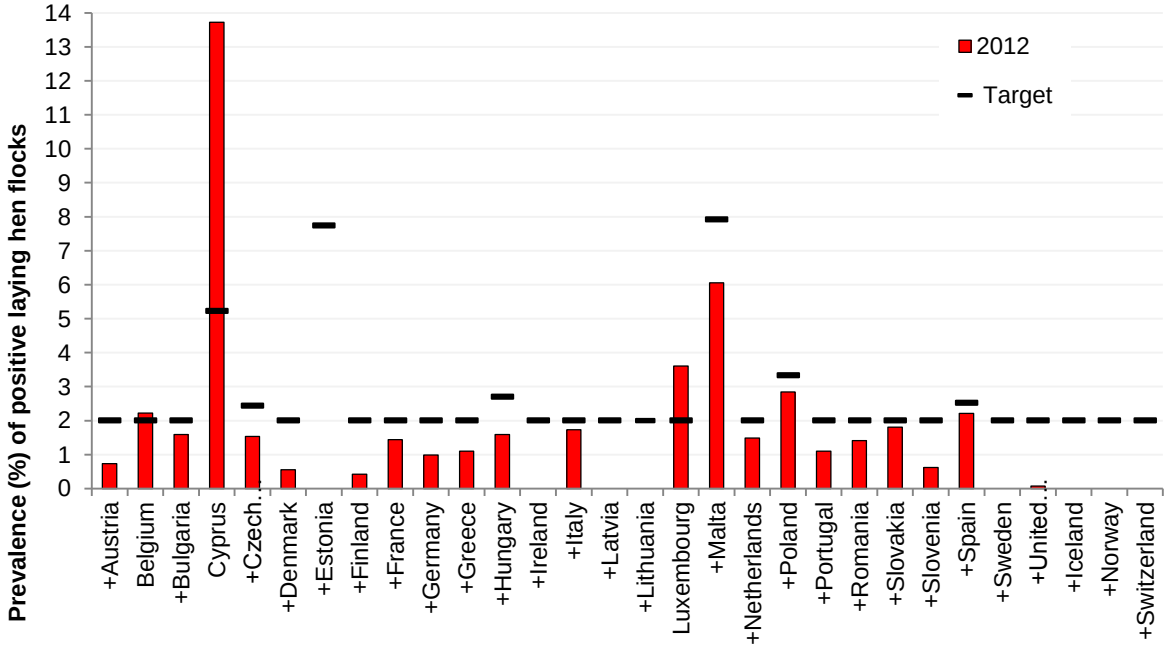


Figure SA13. Prevalence of S. Enteritidis and/or S. Typhimurium-positive laying hen flocks of* Gallus gallus *during the production period in Member States, Norway and Switzerland[1], 2008–2012



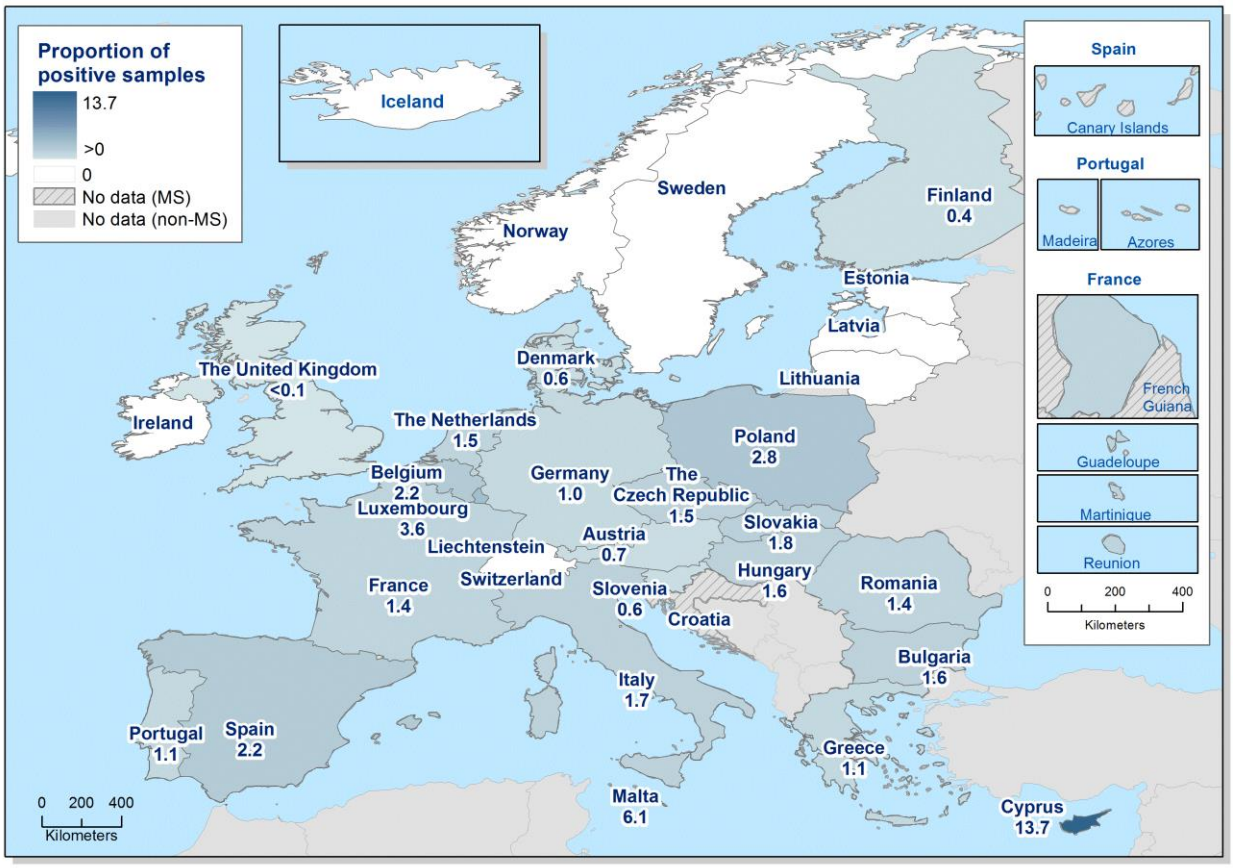
1. Iceland was not included because data were reported only from 2011 onwards.

Figure SA14. Prevalence of S. Enteritidis and/or S. Typhimurium-positive laying hen flocks of Gallus gallus during the production period and targets for Member States, Iceland, Norway and Switzerland, 2012



Note: MSs are ordered alphabetically. Twenty-four MSs and three non-MSs met the 2012 targets, indicated with a '+'.

Figure SA15. Prevalence of the two target serovars (S. Enteritidis and/or S. Typhimurium)-positive laying hen flocks of* Gallus gallus *during the production period, 2012



Broiler flocks

Since 2009 MSs have been obliged to implement national control programmes for *Salmonella* in broiler flocks in accordance with Regulation (EC) No 2160/2003. The Regulation requires that effective measures are taken to prevent, detect and control *Salmonella* at all relevant stages of production, processing and distribution, particularly in primary production, in order to reduce *Salmonella* prevalence and the risk to public health.

In 2012 a final annual *Salmonella* reduction target for broiler flocks came into force. This target was an extension of the transitional target implemented in the period 2009–2011. The EU definitive target for broiler flocks is defined in Regulation (EC) No 200/2012[20] as a maximum percentage of broiler flocks remaining positive for the target serovars *S.* Enteritidis and/or *S*. Typhimurium (including monophasic *S*. Typhimurium) of 1 % or less. Minimum detection requirements in broiler flocks laid down in the Regulation include the sampling of flocks within the three weeks before the birds are moved to the slaughterhouse, taking at least two pairs of boot/sock swabs per flock. Test results have to be reported as Food Chain Information to slaughterhouses and to EFSA and EC, along with any relevant additional information, on a yearly basis as part of the annual report on trends in and sources of zoonoses and zoonotic agents. Positive flocks have to be counted and reported once only (flock level prevalence), irrespective of the number of sampling and testing operations.

In 2012 all MSs had control programmes approved by the EC. Twenty-seven MSs and three non-MSs reported data on broiler flocks before slaughter. The prevalence of *Salmonella* spp. and of the two serovars (*S.* Enteritidis and *S.* Typhimurium) targeted in the national control programmes for broilers are presented in Table SA19. The trends in prevalence of the two target serovars, at EU level and at MS level, are shown in Figures SA16 and SA17, respectively. The prevalence of *S.* Enteritidis and *S.* Typhimurium and the target for broiler flocks for MSs and non-MSs, in 2012, are shown in Figure SA18. The geographical distribution of prevalence by MS is presented in Figure SA19.

In 2012, as in 2011, 24 MSs and 3 non-MSs met the target of 1 % or less of broiler flocks positive for *S.* Enteritidis and/or *S*. Typhimurium (Figure SA18). Three MSs (the Czech Republic, Luxembourg and Slovakia) did not achieve the 2012 *Salmonella* reduction target. Overall in 2012, the MSs reported 0.3 % of positive flocks for the two target serovars (Table SA19). Nine MSs and three non-MS reported no findings for the two target serovars, while 18 MSs reported prevalence of the two serovars ranging from <0.1 % to 4.6 %. Monophasic *S*. Typhimurium was detected in Belgium, France, Italy, Spain and the United Kingdom in three flocks, 27 flocks, one flock, three flocks and one flock, respectively.

The reported prevalence of *S.* Enteritidis and *S.* Typhimurium in the EU was the same as in 2011, after a decline from 0.7 % in 2009 to 0.4 % in 2010 and to 0.3 % in 2011 (Figure SA16). A decreasing trend in the reported prevalence has been observed in 10 MSs (Figure SA17) compared with 2011, whereas prevalence slightly increased in six MSs. The remaining 11 MSs reported an unchanged zero or very low (0.1 % to 1 %) prevalence.

In 2012, the EU level prevalence of broiler flocks positive with *Salmonella* spp. was 3.2 %, which was equal to 2011. Estonia, Finland, Latvia and Lithuania were the only MSs reporting no positive flocks, and Bulgaria, Cyprus, Greece, Ireland and Slovenia reported only serovars other than the two target ones. Nineteen MSs reported positive findings for serovars other than *S*. Enteritidis and *S*. Typhimurium with a prevalence that ranged from 0 % to 43.8 % and this was, in most cases, higher than the prevalence of the target serovars.

[20] Commission Regulation (EC) No 200/2012 of 8 March 2012 concerning a Union target for the reduction of *Salmonella enteritidis* and *Salmonella typhimurium* in flocks of broilers, as provided for in Regulation (EC) No 2160/2003 of the European Parliament and of the Council. OJ L 71, 9.3.2012, p. 31–36.

Table SA19.* Salmonella *in broiler flocks of* Gallus gallus *before slaughter (flock-based data) in countries running control programmes, 2012

Country	N	% positive				
		pos (all)	*S.* Enteriditis and/or *S.* Typhimurium[1]	*S.* Enteritidis	*S.* Typhimurium[1]	Other serovars, non-typeable, and unspecified
Austria	3,510	3.2	0.7	0.6	<0.1	2.6
Belgium	8,739	3.4	0.6	0.2	0.4	2.9
Bulgaria	220	2.3	0	0	0	2.3
Cyprus	16	43.8	0	0	0	43.8
Czech Republic	5,145	6.8	4.6	4.6	0	2.2
Denmark	3,342	0.8	0.2	0	0.2	0.6
Estonia	504	0	0	0	0	0
Finland	3,200	0	0	0	0	0
France [2]	64,563	0.5	0.5	0.1	0.4	0
Germany	15,393	2.6	0.1	<0.1	<0.1	2.5
Greece	6,485	0.3	0	0	0	0.4
Hungary	7,433	20.5	0.4	0.2	0.2	20.2
Ireland	54	3.7	0	0	0	3.7
Italy	18,721	11.0	<0.1	0	<0.1	11.0
Latvia	563	0	0	0	0	0
Lithuania	180	0	0	0	0	0
Luxembourg	132	3.8	2.3	2.3	0	1.5
Malta [3]	581	24.3	0.3	0.2	0.2	-
Netherlands	13,928	7.7	0.3	<0.1	0.2	7.5
Poland	31,182	0.4	0.3	0.3	0	0.2
Portugal	10,929	1.2	0.2	0.2	0	1.0
Romania	7,720	10.1	<0.1	<0.1	<0.1	10.0
Slovakia	2,297	1.1	1.1	1.1	0	0
Slovenia	2,202	2.2	0	0	0	2.2
Spain	29,548	2.2	<0.1	<0.1	<0.1	2.2
Sweden	2,977	<0.1	<0.1	0	<0.1	0
United Kingdom	37,946	1.8	<0.1	0	<0.1	1.8
EU Total	**277,510**	**3.2**	**0.3**	**0.2**	**0.1**	**2.8**
Iceland	657	1.5	0	0	0	1.5
Norway	4,720	0	0	0	0	0
Switzerland	504	1.0	0	0	0	1.0

Note: Data presented include sample size <25.

1. *S.* Typhimurium includes monophasic *S.* Typhimurium.
2. French 2012 data for broiler flocks include also data for turkey fattening flocks.

Figure SA16. Prevalence of S. Enteritidis and/or S. Typhimurium-positive broiler flocks of* Gallus gallus *during the production period in the EU, 2009–2012

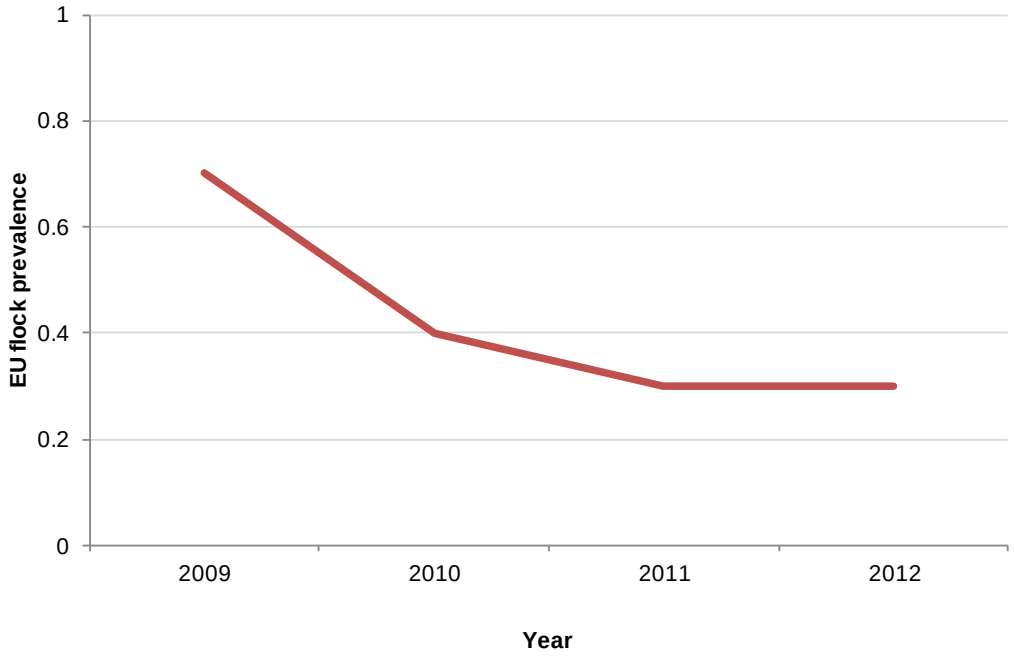
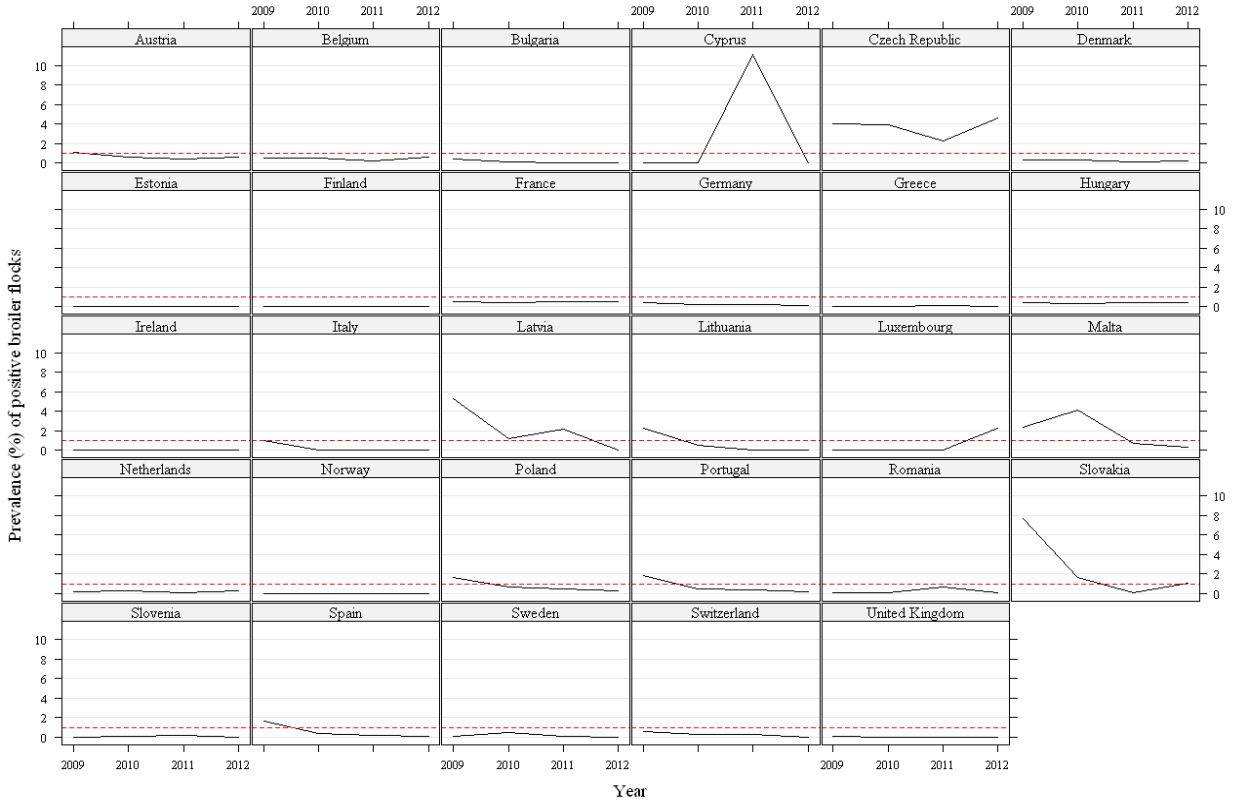


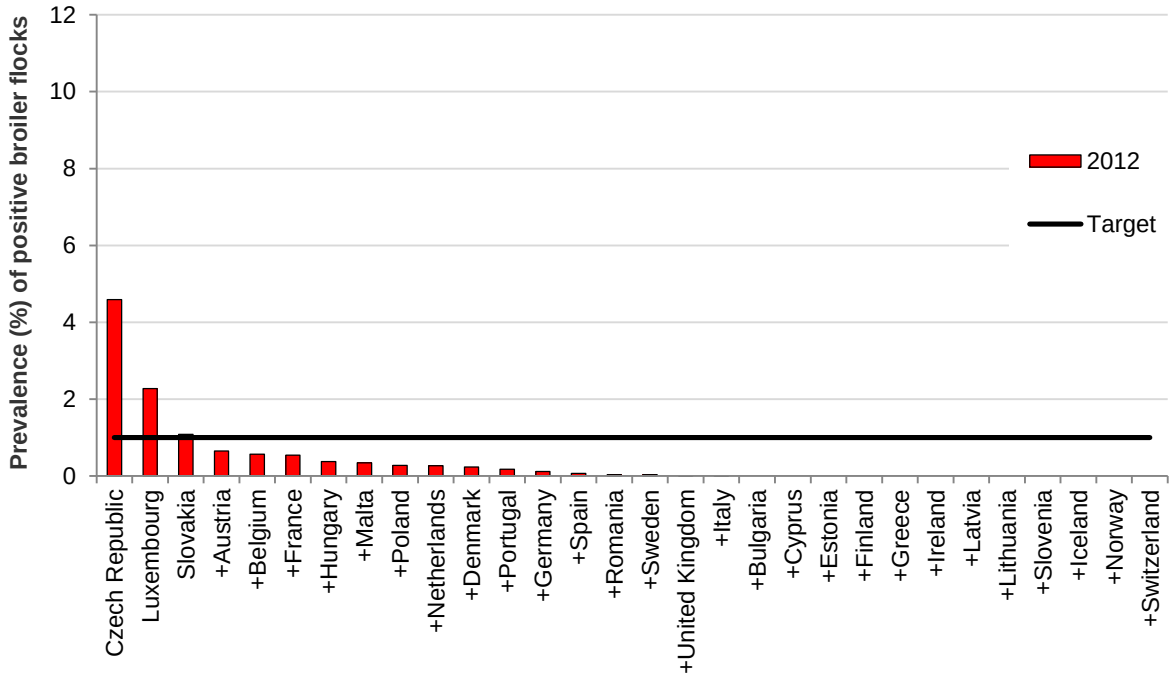
Figure SA17. Prevalence of S. Enteritidis and/or S. Typhimurium-positive broiler flocks of* Gallus gallus *before slaughter in Member States, Norway and Switzerland[1], 2009–2012



Note: The dashed line indicates the EU *Salmonella* target of 1 %.

1. Iceland was not included because data were reported only from 2011 onwards.

Figure SA18. Prevalence of S. Enteritidis and/or S. Typhimurium-positive broiler flocks of* Gallus gallus *before slaughter and target for Member States, Iceland, Norway and Switzerland, 2012



Note: In 2012, 24 MSs and 3 non-MSs met the target, indicated with a '+'.

Figure SA19. Prevalence of the two target serovars (S. Enteritidis and/or S. Typhimurium)-positive broiler flocks of* Gallus gallus *before slaughter, 2012

Breeding and fattening turkeys

The mandatory national control programme for *Salmonella* in breeding and fattening turkeys came into effect on 1 January 2010 and has been implemented to comply with Regulation (EC) No 2160/2003 and Regulations (EC) No 584/2008[21] and 213/2009[22]. All flocks of 250 or more breeding turkeys and 500 or more fattening turkeys are to be included in the national control programme unless exempt in Regulation (EC) No 2160/2003 under Article 1.3, that is, birds produced for private domestic consumption, or where there is a direct supply of small quantities of products to the final consumer or to local retail establishments directly supplying the primary products to the final consumer. A target for the reduction of *S.* Enteritidis and/or *S.* Typhimurium in turkey flocks is set by Regulation (EC) No 584/2008, according to which no more than 1 % of adult breeding turkey flocks and fattening turkey flocks are to remain positive for *S.* Enteritidis and/or *S.* Typhimurium by 31 December 2012. For MSs with fewer than 100 flocks of adult breeding or fattening turkeys, the EU target is that no more than one flock of adult breeding or fattening turkeys may remain positive by 31 December 2012.

For **breeding turkeys**, samples for the detection of *Salmonella* should be taken by the operator from rearing turkey breeding flocks at one day of age, at four weeks of age and two weeks before moving to the laying phase or laying unit. In adult breeding flocks, samples shall be taken at least every three weeks during the laying period at the holding or at the hatchery. The samples in adult breeding flocks shall be taken in

[21] Commission Regulation (EC) No 584/2008 of 20 June 2008 implementing Regulation (EC) No 2160/2003 of the European Parliament and of the Council as regards a Community target for the reduction of the prevalence of *Salmonella enteritidis* and *Salmonella typhimurium* in turkeys. OJ L 162, 21.6.2008, p. 3–8.

[22] Commission Regulation (EC) No 213/2009 of 18 March 2009 amending Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Regulation (EC) No 1003/2005 as regards the control and testing of *Salmonella* in breeding flocks of *Gallus gallus* and turkeys. OJ L 73, 19.3.2009, p. 5–11.

accordance with the provisions laid down in point 2.2.2 of the Annex to Regulation (EC) No 1003/2005[23]. Official control samples are required to be taken from all flocks on 10 % of holdings with at least 250 adult breeding turkeys between 30 and 45 weeks of age but including in any case all holdings in which *S.* Enteritidis and/or *S.* Typhimurium were detected during the previous 12 months and all holdings with elite, great grandparent and grandparent breeding turkeys; this sampling may also take place at the hatchery.

For **fattening turkeys,** samples must be taken by the operator within the three weeks before the birds are moved to the slaughterhouse. The results remain valid for up to six weeks after sampling. The samples in fattening turkey flocks shall be taken in accordance with the provisions laid down in point 2 of the Annex to Regulation (EC) No 584/2008. In addition, each year up to 2013, official control samples are to be taken from all flocks on 10 % of holdings with at least 500 fattening turkeys.

Any reporting of monophasic *S*. Typhimurium was included within the *S*. Typhimurium total and was counted as a target serovar. The prevalence of *Salmonella* spp. and of the two serovars targeted in the control programmes are presented in Tables SA20 and SA21 for breeding and fattening flocks, respectively. The trends in prevalence of the two target serovars, at EU level and at MS level, for breeding and fattening turkeys are respectively shown in Figures SA20, SA21, SA24 and SA25. The prevalence of *S.* Enteritidis and *S.* Typhimurium and the target for flocks of breeding and of fattening turkeys, for MSs and non-MSs, in 2012, are shown in Figures SA22 and SA26, respectively. The geographical distribution of prevalence by MS is presented for flocks of breeding turkeys in Figure SA23 and for flocks of fattening turkeys in Figure SA27. All results are presented at flock level. A flock was reported as positive if one or more samples were positive for *S*. Typhimurium and/or *S*. Enteritidis.

Fourteen MSs and two non-MSs reported data from *Salmonella* testing in adult **turkey breeding flocks** in 2012 (Table SA20), which was similar to that reported in 2011. Data show that 88.1 % of the 2,076 turkey breeding flocks at EU level were reported by France, Germany, Hungary, Italy and the United Kingdom, whereas few flocks were reported by the other countries. In total, 13 MSs and two non-MS met the target prevalence of *S.* Enteritidis and/or *S.* Typhimurium set for adult turkey breeding flocks in 2012, whereas Poland did not meet this target (Figures SA21 and SA22), compared with 2011 when all 14 reporting MSs and two non-MS met their 2011 target. With the exception of France and Poland, countries did not detect the two target serovars. Compared with 2011, an increase was observed for France (0.3 % in 2011 to 0.5 % in 2012) and Poland (0 % in 2011 to 6.1 % in 2012), and mostly *S.* Typhimurium was isolated by these two MSs in 2012. Monophasic *S*. Typhimurium was detected in two flocks in France. In Hungary the prevalence decreased from 0.8 % in 2011 to 0 % in 2012 (Figure SA21). Overall, the EU level prevalence for the target serovars was 0.5 % (Figure SA20), which is slightly higher than in 2011 (0.2 %).

Six MSs reported *Salmonella* spp. in their turkey breeding flocks and the overall EU prevalence of *Salmonella* was 4.6 %, which was at a higher level than in 2011 (3.5 %). Hungary, Italy, Spain and the United Kingdom reported only serovars other than the two targeted ones.

In addition, 22 MSs and 3 non-MSs provided data from **turkey fattening flocks** before slaughter (Table SA21) and findings were similar to those reported in 2011. In 2012, 21 MSs and three non-MSs met their 2012 reduction targets set for fattening turkeys (Figures SA25 and SA26), which was similar to that reported in 2011. Spain did not meet the target in 2012, but reported a relatively low prevalence (1.5 %). Ten MSs reported *S.* Enteritidis and/or *S.* Typhimurium infection; the overall prevalence at EU level was 0.4 %, which is comparable to the prevalence in 2011 (0.5 %) (Figure SA24).

Compared with 2011, a decreasing trend in the reported target prevalence was observed in seven MSs (Figure SA25), whereas prevalence slightly increased in four MSs. The remaining 12 MSs reported an unchanged zero or very low (0.1 % to 1 %) prevalence. Monophasic *S*. Typhimurium was detected in 12 flocks in Italy and in one flock in the United Kingdom.

[23] Commission Regulation (EC) No 1003/2005 of 30 June 2005 implementing Regulation (EC) No 2160/2003 as regards a Community target for the reduction of the prevalence of certain salmonella serotypes in breeding flocks of *Gallus gallus* and amending Regulation (EC) No 2160/2003. OJ L 170, 1.7.2005, p. 12–17.

In 2012, the EU level prevalence of turkey fattening flocks positive with *Salmonella* spp. was 14.6 %, which is an increase compared with 2011, when prevalence was 10.1 %. In 2012, Bulgaria, Denmark, Greece, Latvia, Lithuania, Romania, Slovakia and Sweden were the only MSs reporting no positive flocks. Belgium, Cyprus, Ireland, the Netherlands and Slovenia, reported only serovars other than the targeted ones, as did Switzerland. In addition, nine MSs reported serovars other than the targeted ones with a prevalence higher than the prevalence reported for the target serovars.

Table SA20.* Salmonella *in breeding flocks of turkeys (adults, flock-based data) in countries running control programmes, 2012

Country	N	% positive				
		pos (all)	*S.* Enteriditis and/or *S.* Typhimurium[1]	*S.* Enteritidis	*S.* Typhimurium[1]	Other serovars, non-typeable, and unspecified
Bulgaria	2	0	0	0	0	0
Czech Republic	18	0	0	0	0	0
Finland	8	0	0	0	0	0
France	912	0.5	0.5	0.1	0.4	0
Germany	196	0	0	0	0	0
Greece	5	0	0	0	0	0
Hungary	124	12.9	0	0	0	12.9
Ireland	6	0	0	0	0	0
Italy	323	18.9	0	0	0	18.9
Poland	99	6.1	6.1	1.0	5.1	0
Slovakia	49	0	0	0	0	0
Spain	57	5.3	0	0	0	5.3
Sweden	4	0	0	0	0	0
United Kingdom	273	1.8	0	0	0	1.8
EU Total (14 MSs)	**2,076**	**4.6**	**0.5**	**<0.1**	**0.4**	**4.1**
Iceland	2	0	0	0	0	0
Norway	13	0	0	0	0	0

Note: Data presented include sample size <25.

1. *S.* Typhimurium includes monophasic *S.* Typhimurium.

Figure SA20. Prevalence of S. Enteritidis and/or S. Typhimurium-positive breeding flocks of turkeys during the production period, in the EU, 2010–2012

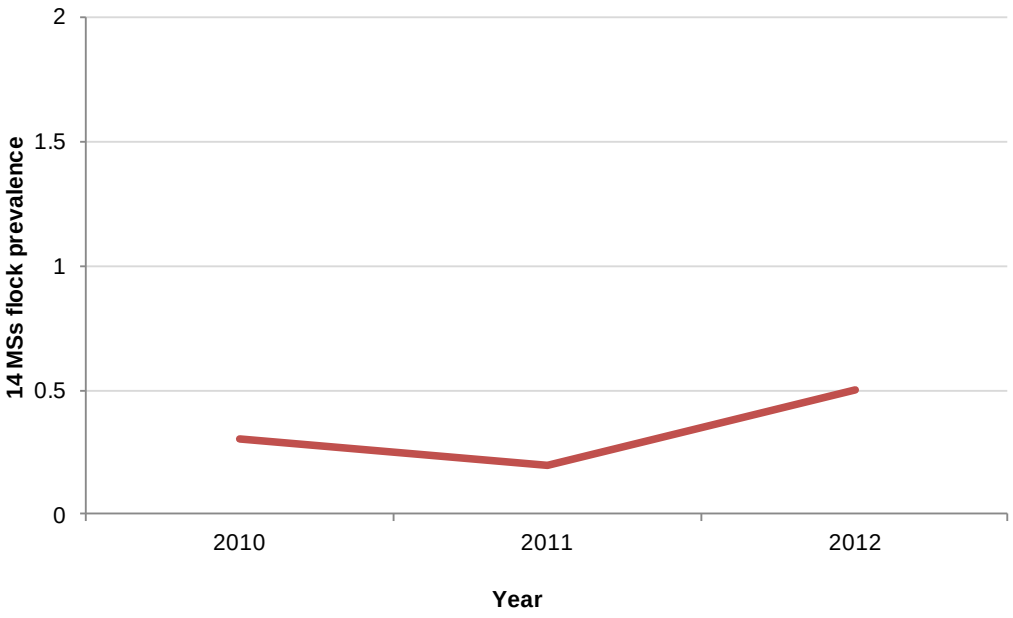
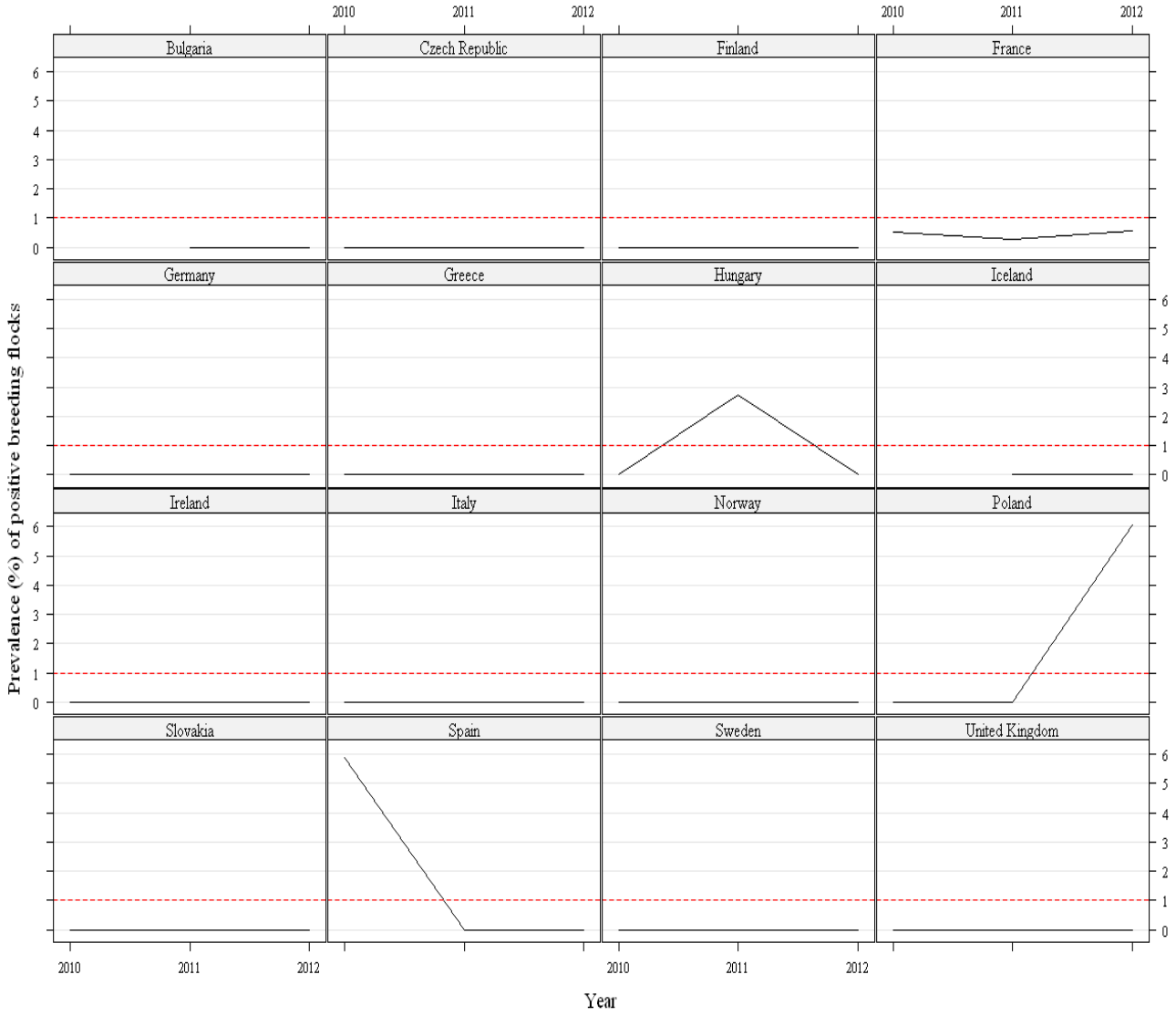
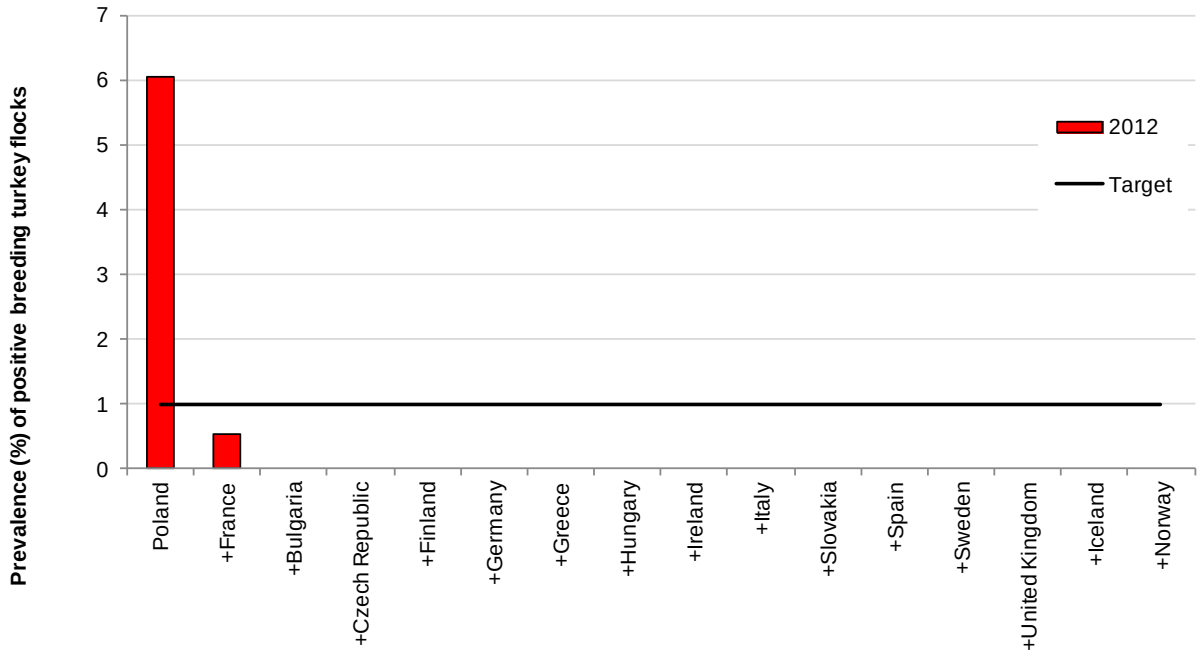


Figure SA21. Prevalence of S. Enteritidis and/or S. Typhimurium-positive breeding flocks of turkeys during the production period in 14 Member States, Iceland and Norway, 2010–2012



Note: The dashed line indicates the EU *Salmonella* target of 1 %.

Figure SA22. Prevalence of S. Enteritidis and/or S. Typhimurium-positive breeding flocks of turkeys during the production period and target for Member States, Iceland and Norway, 2012



Note: In 2012, 13 MSs and 2 non-MSs met the target, indicated with a '+'.

Figure SA23. Prevalence of the two target serovars (S. Enteritidis and/or S. Typhimurium)-positive breeding flocks of turkeys during the production period, 2012

Table SA21.* Salmonella *in fattening flocks of turkeys before slaughter (flock-based data) in countries running control programmes, 2012

Country	N	% positive				
		pos (all)	S. Enteriditis and/or S. Typhimurium[1]	S. Enteritidis	S. Typhimurium[1]	Other serovars, non-typeable, and unspecified
Austria	375	9.6	0.5	0.3	0.3	9.1
Belgium	163	0.6	0	0	0	0.6
Bulgaria	1	0	0	0	0	0
Cyprus	11	9.1	0	0	0	9.1
Czech Republic	266	7.5	0.4	0.4	0	7.1
Denmark	23	0	0	0	0	0
Finland	342	0.3	0.3	0	0.3	0
France [2]	-	-	-	-	-	-
Germany	3,643	1.3	0.5	0	0.5	0.9
Greece	46	0	0	0	0	0
Hungary	3,189	44.2	0.3	0.2	<0.1	43.9
Ireland	19	15.8	0	0	0	15.8
Italy	5,369	23.0	0.3	0	0.3	23.7
Lithuania	24	0	0	0	0	0
Netherlands	241	4.1	0	0	0	4.1
Poland	5,230	2.5	0.3	<0.1	0.2	2.2
Portugal	833	1.0	0.1	0.1	0	0.8
Romania	154	0	0	0	0	0
Slovakia	8	0	0	0	0	0
Slovenia	129	3.1	0	0	0	3.1
Spain	2,117	15.4	1.5	<0.1	1.5	13.8
Sweden	139	0	0	0	0	0
United Kingdom	3,558	15.6	<0.1	0	<0.1	15.5
EU Total	**25,880**	**14.6**	**0.4**	**<0.1**	**0.3**	**14.3**
Iceland	28	0	0	0	0	0
Norway	216	0	0	0	0	0
Switzerland	27	3.7	0	0	0	3.7

Note: Data presented include sample size <25.

1. *S.* Typhimurium includes monophasic *S.* Typhimurium.
2. French 2012 data for turkey fattening flocks are included in the broiler flocks data (Table SA19).

Figure SA24. Prevalence of S. Enteritidis and/or S. Typhimurium-positive fattening flocks of turkeys, in the EU, 2010–2012

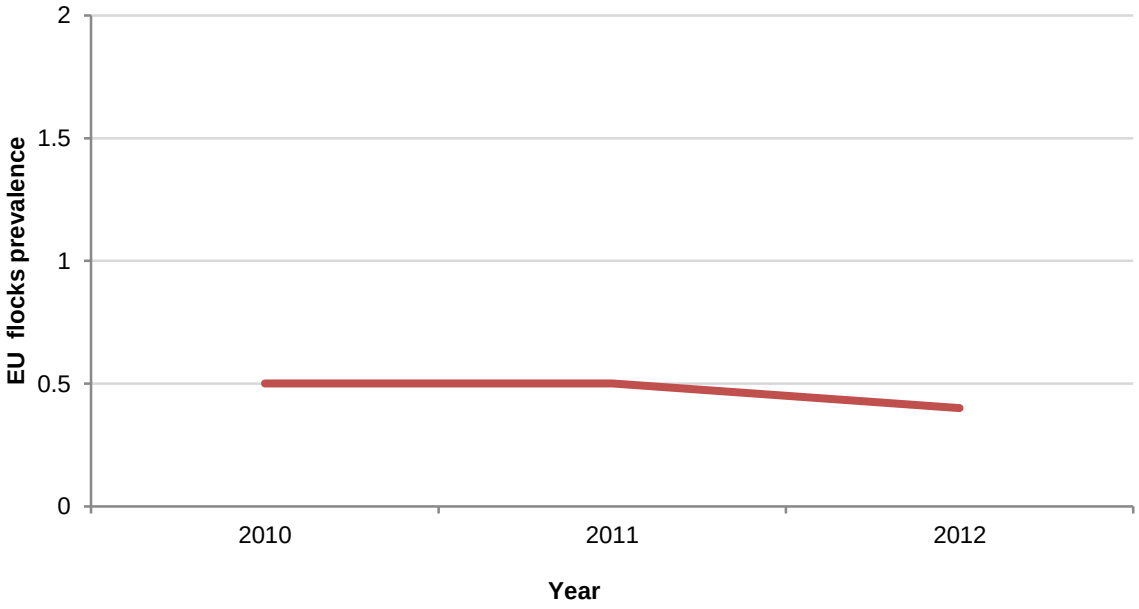


Figure SA25. Prevalence of S. Enteritidis and/or S. Typhimurium-positive fattening flocks of turkeys in 24 Member States, Iceland, Norway and Switzerland, 2009–2012

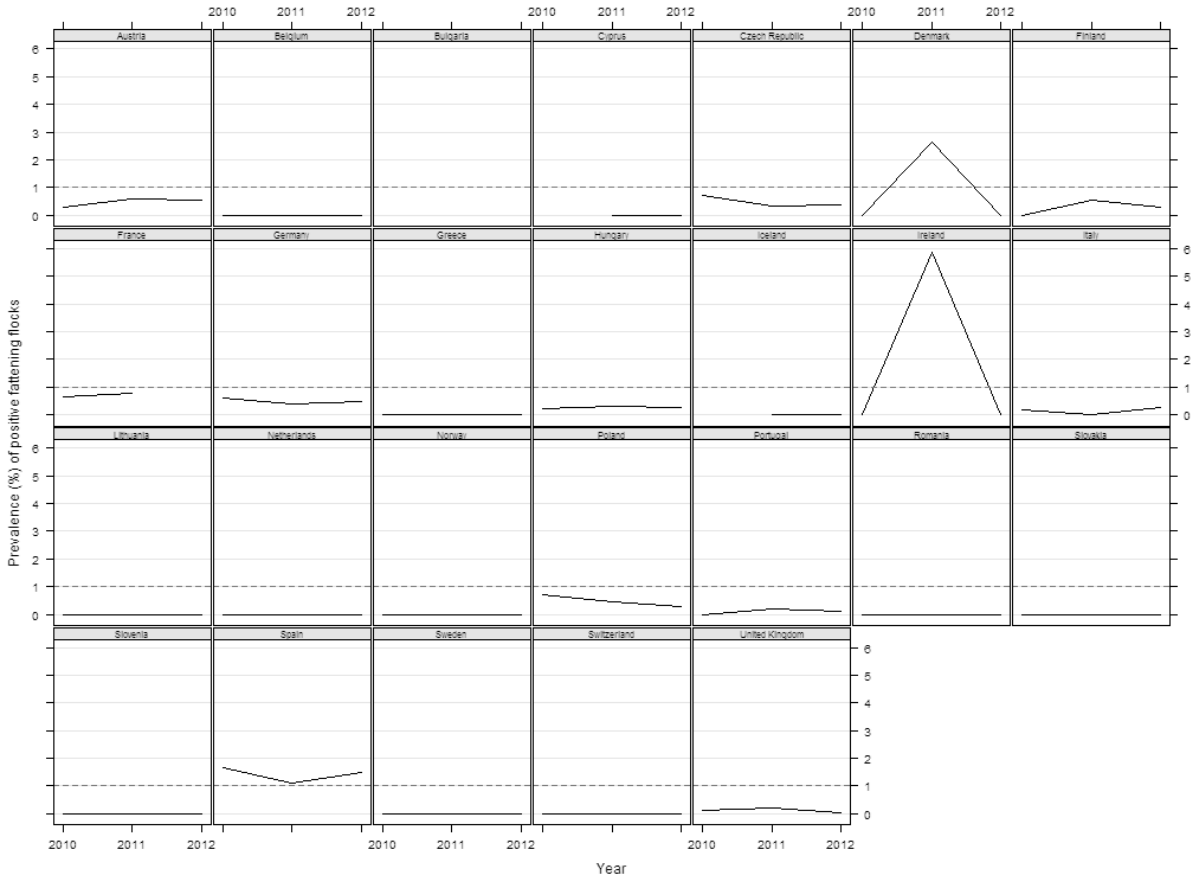
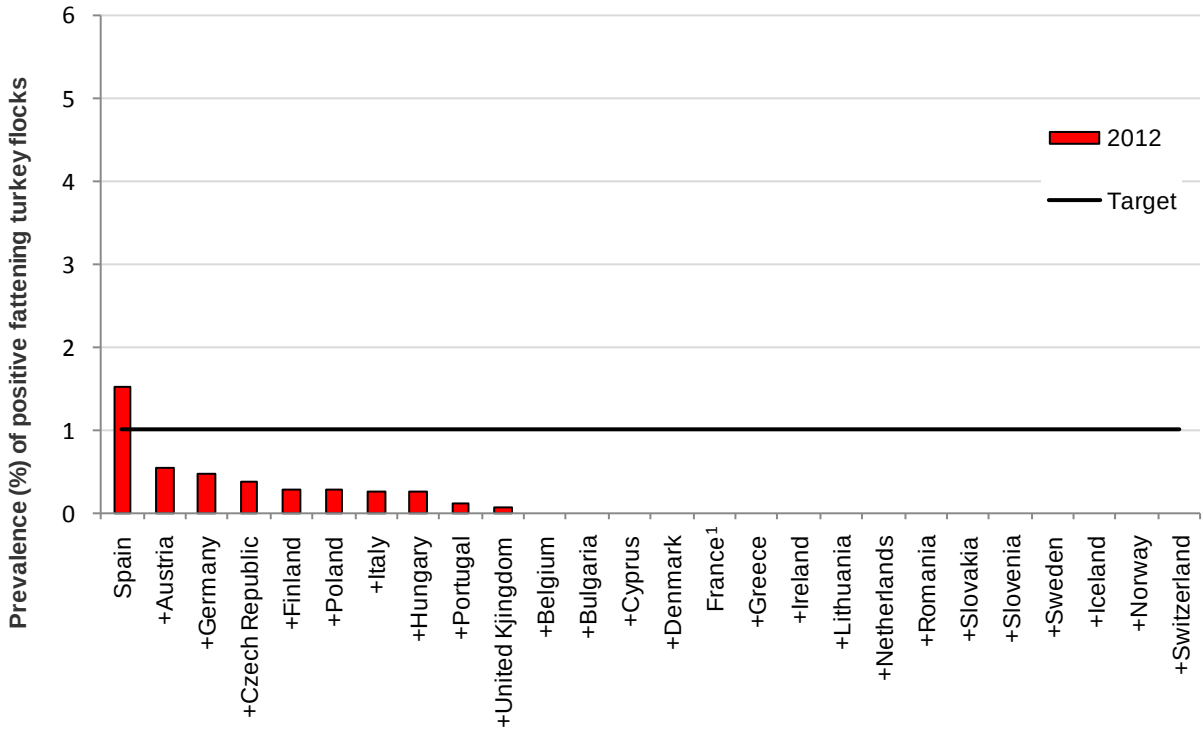


Figure SA26. Prevalence of S. Enteritidis and/or S. Typhimurium-positive fattening flocks of turkeys and target for Member States, Iceland, Norway and Switzerland, 2012



Note: In 2012, 21 MSs and 3 non-MSs met the target, indicated with a '+'.

1. French 2012 data for turkey fattening flocks are included in the broiler flocks data (Table SA19).

Figure SA27. Prevalence of the two target serovars (S. Enteritidis and/or S. Typhimurium)-positive fattening flocks of turkeys, 2012

Ducks and geese

In 2011 and 2012, three MSs reported *Salmonella* monitoring data in duck flocks (Table SA22) from investigations with at least 25 samples. Poland submitted information from a large number of investigations. Owing to differences in sampled types of flocks (breeding or meat production flocks), sampling strategy and sample type, prevalences are not comparable across MSs. Iceland and Norway did not detect any *Salmonella* in duck flocks.

In 2012, three MSs reported *Salmonella* monitoring data in geese flocks (Table SA22) from investigations with at least 25 samples, two of which (Germany and Poland) also submitted such data in 2011. Poland submitted large numbers of investigations. Owing to differences in sampled types of flocks (breeding or meat production flocks), sampling strategy and sample type, prevalences are not comparable across MSs.

Table SA22. Salmonella *in flocks of ducks and geese (flock-based data), 2011–2012*

Country	Description	2012			Description	2011		
		N	% positive			N	% positive	
			pos (all)	S. Enteriditis and/or S. Typhimurium[1]			pos (all)	S. Enteriditis and/or S. Typhimurium[1]
Ducks								
Denmark	Meat production flocks (rearing period) sampled at farm, environmental samples (boot swabs), control and eradication programmes, official sampling and objective sampling	96	49.0	3.1	Meat production flocks (rearing period) sampled at farm, environmental samples (boot swabs), control and eradication programmes, official sampling and objective sampling	95	57.9	1.1
Germany	At farm, domestic production, animal samples, official sampling	46	6.5	2.2	At farm, domestic production, animal samples, surveillance, official sampling	57	3.5	0
Poland	Meat production flocks sampled at farm, animal samples (caecum), industry sampling	1,006	2.5	1.5	Breeding flocks sampled at farm, environmental samples, surveillance, industry sampling	768	6.0	2.5
	Meat production flocks, environmental samples, industry sampling	352	9.7	5.7	Breeding flocks, environmental samples (boot swabs), official and industry sampling, objective sampling	29	20.7	6.9
Total ducks (3 MSs in 2012)		**1,148**	**7.3**	**2.7**		**949**	**11.5**	**2.3**
Iceland	-	-	-	-	Meat production flocks, animal samples (faeces), industry sampling, census	26	0	0
Norway	Meat production flocks sampled at farm, domestic production, animal samples (faeces) control and eradication programmes, official and industry sampling, census	68	0	0	Meat production flocks, environmental samples (boot swabs and dust), official and industry sampling, census	67	0	0

Table continued overleaf

***Table SA22 (continued). Salmonella* in flocks of ducks and geese (flock-based data), 2011–2012**

Country	Description	2012			Description	2011		
		N	% positive			N	% positive	
			pos (all)	S. Enteriditis and/or S. Typhimurium[1]			pos (all)	S. Enteriditis and/or S. Typhimurium[1]
Geese								
Germany	At farm, domestic production, animal samples, official sampling	55	5.5	3.6	At farm, domestic production, animal samples, surveillance, official sampling	51	0	0
Poland	Breeding flocks sampled at farm, animal samples (caecum), industry sampling, convenience sampling	2,143	4.9	3.7	Breeding flocks sampled at farm, environmental samples, surveillance, industry sampling	1,231	7.8	5.4
	Meat production flocks, animal samples (caecum), industry sampling	74	12.2	8.1	Meat production flocks, environmental samples, official and industry sampling, objective sampling	309	4.5	2.9
Sweden	Meat production flocks sampled before slaughter at farm, domestic production, environmental samples (boot swabs), control and eradication programmes, official and industry sampling, census	25	4.0	4.0	-	-	-	-
Total geese (3 MSs in 2012)		**2,297**	**5.2**	**3.8**		**1,591**	**6.9**	**4.7**

Note: Only investigations covering 25 or more samples are included.

1. *S.* Typhimurium includes monophasic *S.* Typhimurium.

Pigs

Data on the prevalence of *Salmonella* from the bacteriological monitoring of pigs from investigations with at least 25 samples were reported by 10 MSs and one non-MS in 2011, and by seven MSs and one non-MS in 2012 (Table SA26). The number of reported tested animals was much larger for the year 2012, and this was, in major part, due to the reporting by Germany and by the Netherlands. Consequently, overall animal level *Salmonella* prevalence data are unlikely to be comparable between the reporting 2011 (1.2 %) and 2012 (5.5 %) data. At the herd or batch level, the overall *Salmonella* prevalence was 15.2 % in 2011 and 17.5 % in 2012.

Investigations were reported from both breeding and fattening pigs (or unspecified) and from the sampling stages; at farm, at the slaughterhouse or unspecified. Sample types reported were faeces, lymph nodes or were unspecified.

Data on the prevalence of *Salmonella* at farm level ranged at the herd level from 0.2 % to 28.8 % in 2011 and from 0 % to 33.1 % in 2012. At animal level the ranges were from 4.9 % to 100 % in 2011 and from 1.4 % to 36.4 % in 2012. At slaughter, data on the batch prevalence of *Salmonella* were 35.5 % in 2011 and 29.4 % in 2012. At animal level the ranges were from <0.1 % to 25.0 % in 2011 and from <0.1 % to 9.7 % in 2012.

Finland, Sweden and Norway reported no positive findings or very low numbers of positive results.

Table SA23. Salmonella *in pigs from bacteriological monitoring programmes, 2011–2012*

Country	Description	Sampling stage	2012		2011	
			N	% positive	N	% positive
Bulgaria	Herd (fattening), batch, lymph nodes	Farm	-	-	170	11.2
Estonia	Herd (unspecified), faeces	Farm	66	19.7	53	17.0
	Animal (fattening), lymph nodes	Slaughter	144	9.7	145	3.4
Finland	Herd (breeding), faeces	Farm	68	0	540	0.2
	Herd (unspecified), faeces	Farm	90	0	-	-
	Animal (breeding), lymph nodes	Slaughter	3,168	<0.1	3,106	<0.1
	Animal (fattening), lymph nodes	Slaughter	3,257	<0.1	3,179	0.1
Germany	Herd (breeding)	Farm	49	24.5	73	28.8
	Animal (breeding)	Farm	375	34.4	-	-
	Herd (fattening)	Farm	329	26.7	1,601	14.4
	Animal (fattening)	Farm	3,517	9.2	-	-
	Herd (unspecified)	Farm	1,711	14.4	996	19.4
	Animal (unspecified)	Farm	21,183	7.7	-	-
Hungary	Animal (unspecified)	Unspecified	-	-	45	100
Italy	Animal (unspecified)	Farm	187	36.4	82	4.9
	Animal (unspecified)	Slaughter	-	-	40	25.0
Netherlands	Herd (unspecified), faeces	Farm	148	33.1	-	-
	Animal (unspecified)	Farm	2,943	1.4	-	-
Portugal	Animal (breeding)	Farm	-	-	32	37.5
	Animal (fattening)	Farm	-	-	209	8.1
	Animal (unspecified)	Unspecified	-	-	35	2.9
Romania	Animal (unspecified)	Farm	-	-	41	100
Spain	Slaughter batch (fattening), faeces (2012), lymph nodes (2011)	Slaughter	163	29.4	231	35.5
Sweden	Animal (breeding), lymph nodes	Slaughter	2,231	<0.1	2,313	0.2
	Animal (fattening), lymph nodes	Slaughter	3,070	<0.1	3,379	<0.1
Total (7 MSs in 2012)	**Total**		**42,699**	**6.3**	**16,270**	**4.3**
	Animal		**40,075**	**5.5**	**12,606**	**1.2**
	Batch/Herd/holding		**2,624**	**17.5**	**3,664**	**15.2**
Norway	Herd (breeding), faeces	Farm	94	0	98	0
	Animal, lymph nodes	Slaughter	3,059	<0.1	2,305	<0.1
	Animals, lymph nodes	Slaughter	3,066	0	2,212	0

Note: Only investigations covering 25 or more samples are included.

Cattle

Data on the prevalence of *Salmonella* from the bacteriological monitoring of cattle from investigations with at least 25 samples were reported by seven MSs and one non-MS in 2011, and by eight MSs and one non-MS in 2012 (Table SA24). The numbers of reported tested animals and herds were much larger for the year 2012 and this was, in major part, due to the reporting by Germany. Consequently, overall *Salmonella* prevalence data are not comparable between the reporting 2011 (2.3 % for animals and 7.1 % for herd or batch level) and 2012 (2.3 % for animals and 3.8 % for herd or batch level) data.

Investigations were reported from breeding animals, from dairy cows or calves, or unspecified, and were from at farm or at the slaughterhouse. Used sample types were faeces, lymph nodes, organ or tissue samples, carcase swabs, or were unspecified.

Data on the prevalence of *Salmonella* at farm level ranged, at the herd level, from 0.8 % to 16.4 % in 2011 and from 0 % to 15.0 % in 2012. At animal level the ranges were from 0 % to 4.7 % in 2011 and from 0 % to 4.0 % in 2012. At slaughter, data on the batch prevalence of *Salmonella* were 5.4 % in 2011 and 6.2 % in 2012. At animal level the ranges were from <0.1 % to 2.2 % in 2011 and from <0.1 % to 0.9 % in 2012.

Bulgaria, Finland, Sweden, and Norway reported no positive findings or very low numbers of positive results.

Table SA24. Salmonella *in cattle from bacteriological monitoring programmes, 2011–2012*

Country	Description	Sampling stage	2012		2011	
			N	% positive	N	% positive
Bulgaria	Animal (adult cattle over two years), faeces	Farm	53	0	-	-
Estonia	Herd, faeces	Farm	162	3.7	181	4.4
Finland	Herd (breeding bulls), faeces	Farm	131	0	132	0.8
	Animal (unspecified), lymph nodes	Slaughter	3,154	<0.1	3,126	<0.1
Germany	Animal (calves under 1 year)	Farm	8,663	1.9	-	-
	Herd (calves under 1 year)	Farm	877	4.8	777	5.5
	Animal (dairy cows)	Farm	14,749	4.0	-	-
	Herd (dairy cows)	Farm	180	15.0	171	16.4
	Animal	Farm	103,270	2.2	-	-
	Herd	Farm	5,693	2.8	1,456	7.2
Italy	Herd (dairy cows and heifers)	Farm	294	14.3	-	-
	Animal	Farm	107	0	1,151	2.2
	Animal	Slaughter	651	0.9	833	2.2
Netherlands	Animal (adult cattle over 2 years), organ/tissue	Farm	2,851	3.1	6,033	4.7
	Animal, faeces	Farm	1,662	4.0	-	-
	Holding (calves under 1 year), faeces	Farm	-	-	175	14.3
Spain	Slaughter batch (young cattle, 1-2 years), faeces	Slaughter	146	6.2	239	5.4
Sweden	Animal, lymph nodes	Slaughter	3,364	0.2	3,372	0.1
Total	**Total**		**146,007**	**2.4**	**17,646**	**3.2**
	Animal		**138,524**	**2.3**	**14,515**	**2.3**
	Batch/Herd/holding		**7,483**	**3.8**	**3,131**	**7.1**
Norway	Animal, carcase swabs	Slaughter	2,857	0	1,799	0
	Animal, lymph nodes	Slaughter	2,849	<0.1	2,246	0.4

Note: Only investigations covering 25 or more samples are included.

Other animal species

Salmonella was also detected in other animals (21 MSs and 1 non-MS).

For further information on reported data, refer to the Level 3 Tables.

3.1.4. *Salmonella* in feedingstuffs

Data on *Salmonella* in feedingstuffs collected by MSs are generated from different targeted surveillance programmes as well as from unbiased reporting of random sampling of domestic and imported feedingstuffs. The presentation of single sample and batch-based data from the different monitoring systems has therefore been summarised and includes both domestic and imported feedingstuffs. Owing to differences in monitoring and reporting strategies, data are not necessarily comparable between MSs or reporting years. There are also very large differences in the number of samples tested among MSs, which can limit comparisons between investigations.

An overview of the countries which reported data on *Salmonella* in feed for 2012 is presented in Table SA1. In the following sections, only results based on 25 or more units tested are presented. Results from industry own-check programmes and sampling, as well as specified suspect sampling or selective sampling have also been excluded owing to difficulties with the interpretation of data. These data are, however, presented in the Level 3 Tables.

Table SA25 presents the EU proportion of *Salmonella*-positive samples in animal- and vegetable-derived feed material reported by MSs in 2012. The numbers of reported tested sampling units were much smaller for the year 2012 than in 2011. Consequently, overall *Salmonella* contamination data are not comparable between the reporting in 2011 and 2012. In feed material from fish meal, *Salmonella* was detected in 3.8 % of batches tested (1.5 % in 2011). More single samples were tested in 2012 than in 2011, and 4.5 % were contaminated with *Salmonella*. In feed material derived from land animals, results have been described according to origin. The highest level of *Salmonella* contamination in 2012 (2.2 %) was reported in meat and bone meal, while in 2011 this was in feed other than meat and bone meal or dairy products. The lowest contamination (0.3 % in batches) was detected in feed other than meat and bone meal or dairy products. In meat and bone meal *Salmonella* contamination is to be considered only an indicator, and it does not pose any risk to animals because meat and bone meal is still prohibited for feeding food-producing animals, although it is used in pet foods. In cereals and oil seeds and products thereof, overall reported *Salmonella* contamination percentages were low to very low, as in 2011.

In compound feedingstuffs, the finished feed for animals, the proportion of *Salmonella*-positive findings in 2012 ranged among the reporting MSs from no positive findings to 2.9 % in cattle feed when single samples were tested, and from no positive findings to 6.5 % in MSs sampling cattle feed at batch level. In compound pig feed *Salmonella* findings ranged from no positive findings to 2.3 % in single samples, and from 0.3 % positive findings to 4.0 % at batch level. In poultry compound feed data were reported only from sampling of batches and the proportion *Salmonella*-contaminated batches varied from 0.1 % to 4.4 % (Table SA26).

As in the previous years, the Netherlands reported large numbers of units tested at batch level for all three categories of compound feedingstuffs and reported very low proportions of *Salmonella* contamination.

Among the reporting MSs, Spain accounted for the highest proportion of *Salmonella*-contaminated compound feedingstuffs (for cattle; 6.5 %), at the batch level. Poland reported the highest contamination of pig feed (4.0 % batches) and Belgium the highest contamination of poultry feed batches; 4.4 %. It should be highlighted that the reported proportions of positive samples might not always be representative of feedingstuffs on the national markets, as some reports might reflect intensive sampling of high-risk products.

For more information on reported data, refer to the Level 3 Tables.

Table SA25. Salmonella *in animal and vegetable derived feed material, 2012*

EU Totals		2012		
		Sample unit	N	% pos
Fish meal		Batch	523	3.8
		Single	648	4.5
Feed material of land animal origin	Meat and bone meal	Batch	1,184	1.9
		Single	186	2.2
	Dairy product	Batch	384	0
		Single	-	-
	Other	Batch	308	0.3
		Single	841	1.8
Cereals		Batch	1,039	0.6
		Single	2,233	0.2
Oil seeds and products		Batch	1,949	1.5
		Single	4,195	3.1

Note: Only investigations covering 25 or more samples are included.

Table SA26. Salmonella *in compound feedingstuffs, 2012*

Feedingstuff	2012		
	Sample unit	N	% pos
Cattle feed			
Germany	Single	345	2.0
Ireland	Single	70	0
Netherlands	Batch	1,111	0.2
Poland	Batch	137	0
	Single	128	0.8
Spain	Batch	46	6.5
Total cattle feed (5 MSs)	**Single**	**543**	**1.5**
	Batch	**1,294**	**0.4**
Pig feed			
Belgium	Batch	89	1.1
France	Single	86	2.3
Germany	Single	646	0.9
Hungary	Batch	175	0.6
Ireland	Single	25	0
Netherlands	Batch	2,080	0.3
Poland	Batch	502	0.4
	Batch	25	4.0
Romania	Batch	67	3.0
Total pig feed (9 MSs)	**Single**	**757**	**1.1**
	Batch	**2,938**	**0.4**
Poultry feed			
Belgium	Batch	90	4.4
Hungary	Batch	52	3.8
Netherlands	Batch	4,361	0.1
Poland	Batch	558	0.2
Total poultry feed (4 MSs)	**Batch**	**5,061**	**0.2**

Note: Only investigations covering 25 or more samples are included.

3.1.5. Discussion

Salmonellosis in humans continued to decrease in 2012. Significant decreasing five-year trends were observed in 15 MSs and two non-MSs as well as in the EU as a whole, representing a decrease of 43,546 cases (32 %) in 2012 when compared with the case numbers reported in 2008. Salmonellosis is nonetheless the second most common zoonosis in humans in the EU, with 1,531 foodborne outbreaks reported in 2012 involving 12,000 affected persons. The EU case-fatality rate was 0.14 % and 61 deaths due to non-typhoidal salmonellosis were reported in the EU in 2012.

The salmonellosis notification rates for human cases of infection vary between the Member States, reflecting differences in, for example, disease prevalence in the domestic animal population, the proportion of travel-associated cases and the quality and coverage of the surveillance system. One example of the latter is that countries reporting the lowest notification rate for salmonellosis had the highest proportion of hospitalisation, which may indicate that the surveillance systems in these countries is focusing on diagnosis of the most severe cases.

No trend analysis for separate *Salmonella* serovars was included in this year's report but the trends observed in 2007–2011 continued in 2012. Reported human case numbers of *S*. Enteritidis decreased, but monophasic *S*. Typhimurium 1,4,[5],12:i:- increased (possibly a reporting bias) as did *S*. Infantis. A multi-country outbreak of *S.* Stanley, affecting several MSs and linked to the turkey production chain, resulted in this serovar becoming the fifth most commonly reported in 2012. Large outbreaks in individual countries were also reflected in the top 10 serovar list, e.g. *S*. Thompson in the Netherlands.

The continuing decrease in the numbers of salmonellosis cases in humans is likely to be mainly related to the successful *Salmonella* control programmes in fowl (*Gallus gallus*) populations that are in place in EU MSs and that have particularly resulted in a lower occurrence of *Salmonella* in eggs, though other control measures might also have contributed to the reduction. The majority of MSs met their *Salmonella* reduction targets for breeding flocks, laying hens and broilers of *Gallus gallus* and for turkey flocks in 2012. The EU level prevalence of the target serovars, including *S*. Enteritidis, was further reduced in laying hens of *Gallus gallus* and for turkey fattening flocks to respectively 1.3 % and 0.4 %. In breeding flocks of *Gallus gallus* and in broiler flocks the EU level prevalence remained at 0.6 % and 0.3 %, respectively, whereas in turkey breeding flocks the overall prevalence for the two target serovars was 0.5 %. All these results indicate that MSs continued to invest in *Salmonella* control and this work is yielding further positive results. It is noteworthy that, compared with 2011, the 2012 EU level prevalence of flocks positive with *Salmonella* spp. decreased in laying hens, remained the same in broilers, but increased in breeding flocks of *Gallus gallus*, in breeding turkeys and in fattening turkeys. In this context, the multi-country *S.* Stanley outbreak, which was highly likely due to contamination of the turkey production chain, serves as a reminder of the importance of acting upon any *Salmonella* serovar contamination in the food chain and monitoring to detect the emergence of new serovars or strains[24].

Reports on food-borne outbreaks caused by *Salmonella* within the EU have shown a reduction of 19 % from 2008 to 2012, but slightly increased since 2011. Important sources of food-borne *Salmonella* outbreaks in 2012 were eggs and egg products, cheese, and mixed foods.

As in 2011, monophasic *S.* Typhimurium was in third place in the top 10 list of the most commonly reported serovars in human cases in 2012. The BIOHAZ Panel concluded in its opinion[25] that monophasic *S.* Typhimurium appears to be of increasing importance in many MSs and has caused a substantial number of infections in both humans and animals bred for food. However, the agreed reporting guidelines since 2010 for more accurate identification of these strains may have partly contributed to the increased reports in 2011 and in 2012 in some MSs.

As regards findings in food, *Salmonella* was most often detected in fresh broiler and turkey meat. It was less often detected in pig or bovine meat and rarely in table eggs. The highest levels of non-compliance with *Salmonella* criteria generally occurred in foods of meat origin. Otherwise no major developments in occurrence were observed compared with previous years.

[24] European Food Safety Authority (EFSA) and European Centre for Disease Prevention and Control (ECDC), 2012. Multi-country outbreak of *Salmonella* Stanley infections Update. EFSA Journal 2012;10(9):2893, 16 pp. doi:10.2903/j.efsa.2012.2893

[25] EFSA Panel on Biological Hazards (BIOHAZ), 2010. Scientific Opinion on monitoring and assessment of the public health risk of '*Salmonella* Typhimurium-like' strains. EFSA Journal 2010;8(10):1826, 48 pp. doi:10.2903/j.efsa.2010.1826

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.2. *Campylobacter*

Campylobacteriosis in humans is caused mainly by thermotolerant *Campylobacter* spp. The infective dose of these bacteria is generally low. The species most commonly associated with human infection are *Campylobacter jejuni* (*C. jejuni*) followed by *C. coli*, and *C. lari*, but other *Campylobacter* species, including the non-thermophilic *C. fetus,* are also known to occasionally cause human infection.

The average incubation periods in humans range from two to five days. Patients may experience mild to severe symptoms, with common clinical symptoms including watery, sometimes bloody diarrhoea, abdominal pain, fever, headache and nausea. Usually infections are self-limiting and last only a few days. Extra-intestinal infections or post-infection complications such as reactive arthritis and neurological disorders can also occur. *C. jejuni* has become the most commonly recognised antecedent cause of Guillain–Barré syndrome, a polio-like form of paralysis that can result in respiratory failure and severe neurological dysfunction and even death.

Thermotolerant *Campylobacter* spp. are widespread in nature. The principal reservoirs are the alimentary tract of wild and domesticated birds and mammals. These bacteria are prevalent in food-producing animals such as poultry, cattle, pigs and sheep, in pets, including cats and dogs, in wild birds and in environmental water sources. Animals rarely succumb to disease caused by these organisms. However, *C. jejuni* is known to cause abortions in sheep. Lately, a highly virulent clone that causes outbreaks of ovine abortions has emerged in the United States and its zoonotic potential has recently been suggested[26].

Campylobacter can readily contaminate various foodstuffs, including meat, raw milk and dairy products, and, less frequently, fish and fishery products, mussels and fresh vegetables. Among sporadic human cases, contact with live poultry, consumption of poultry meat, drinking water from untreated water sources, and contact with pets and other animals have been identified as the major sources of infections. Cross-contamination during food preparation has also been described as an important transmission route. Raw milk and contaminated drinking water have been implicated in both small and large outbreaks.

Table CA1 presents the countries reporting data for 2012. Only the information reported on campylobacteriosis in humans and on *Campylobacter* in fresh broiler meat and in broilers is included in this report.

Table CA1. Overview of countries reporting data for* Campylobacter*, 2012

Data	Total number of reporting MSs	Countries
Human	27	**All MSs** **Non-MSs**: CH, IS, NO
Food	21	**All MSs** except CY, FI, GR, LT, LV, MT **Non-MSs**: CH, IS
Animal	20	**All MSs** except BE, BG, CY, CZ, FR, LT, MT **Non-MSs**: CH, IS, NO

Note: The overview table contains all data reported by MSs and non-MSs.

[26] Sahin O, Fitzgerald C, Stroika S, Zhao S, Sippy RJ, Kwan P, Plummer PJ, Han J, Yaeger MJ and Zhang Q, 2012. Molecular evidence for zoonotic transmission of an emergent, highly pathogenic *Campylobacter jejuni* clone in the United States. Journal of Clinical Microbiology, 50(3), 680-687.

3.2.1. Campylobacteriosis in humans

In 2012, *Campylobacter* continued to be the most commonly reported gastrointestinal bacterial pathogen in humans, in the EU, since 2005. The number of reported confirmed cases of human campylobacteriosis in the EU, in 2012, was 214,268, which was a decrease of 4.3 % compared with 2011. The EU notification rate was 55.49 per 100,000 population in 2012 (Table CA2).

The highest country-specific notification rates were observed in the Czech Republic (174 cases per 100,000), and Slovakia, Luxembourg and the United Kingdom (106-117 per 100,000 population), while the lowest rates were reported in Bulgaria, Latvia, Italy, Poland and Romania (<2 per 100,000). The proportion of domestic cases versus travel-associated varied markedly between countries, with the highest proportion of domestic cases (≥92 %) reported in the Czech Republic, Estonia, Germany, Hungary, Latvia, Malta, the Netherlands, Poland, Slovakia and Spain. The highest proportions of travel-associated cases were reported in the Nordic countries Finland, Iceland, Sweden and Norway (≥46 % of the cases) (Figure CA1).

There was a clear seasonal trend in confirmed campylobacteriosis cases, reported in the EU, in 2008-2012 and a significant increasing EU trend ($p = 0.001$ with linear regression) (Figure CA2). Significant increasing trends in campylobacteriosis from 2008 to 2012 were observed in 15 MSs: Austria, Belgium, Denmark, Estonia, France, Hungary, Ireland, Italy, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Slovakia and the United Kingdom.

Twelve MSs provided information on hospitalisation for some or all of their cases, which was three MSs more than those reporting in 2011. Despite this, information on hospitalisation covered only 9.7 % of all confirmed campylobacteriosis cases in 2012. The reason for this is that many MSs have surveillance systems for campylobacteriosis which are based on laboratory notifications where information on hospitalisation is not usually available. Of the cases where the information was provided, on average 47.7 % of cases were hospitalised. The highest hospitalisation rates (74-87 % of cases hospitalised) were reported in Cyprus, Latvia, Lithuania, Romania and the United Kingdom. Three of these countries also reported among the lowest notification rates of campylobacteriosis, which indicates that the surveillance systems in these countries primarily capture the more severe cases. The United Kingdom provided information on hospitalisation for only 7.5 % of its cases and the data may, therefore, be biased.

In 2012, 31 deaths due to campylobacteriosis were reported by 14 MSs, with the United Kingdom accounting for 20 of these. This results in an EU case-fatality rate of 0.03 % among the 111,464 confirmed cases for which this information was provided (52.0 % of all reported cases).

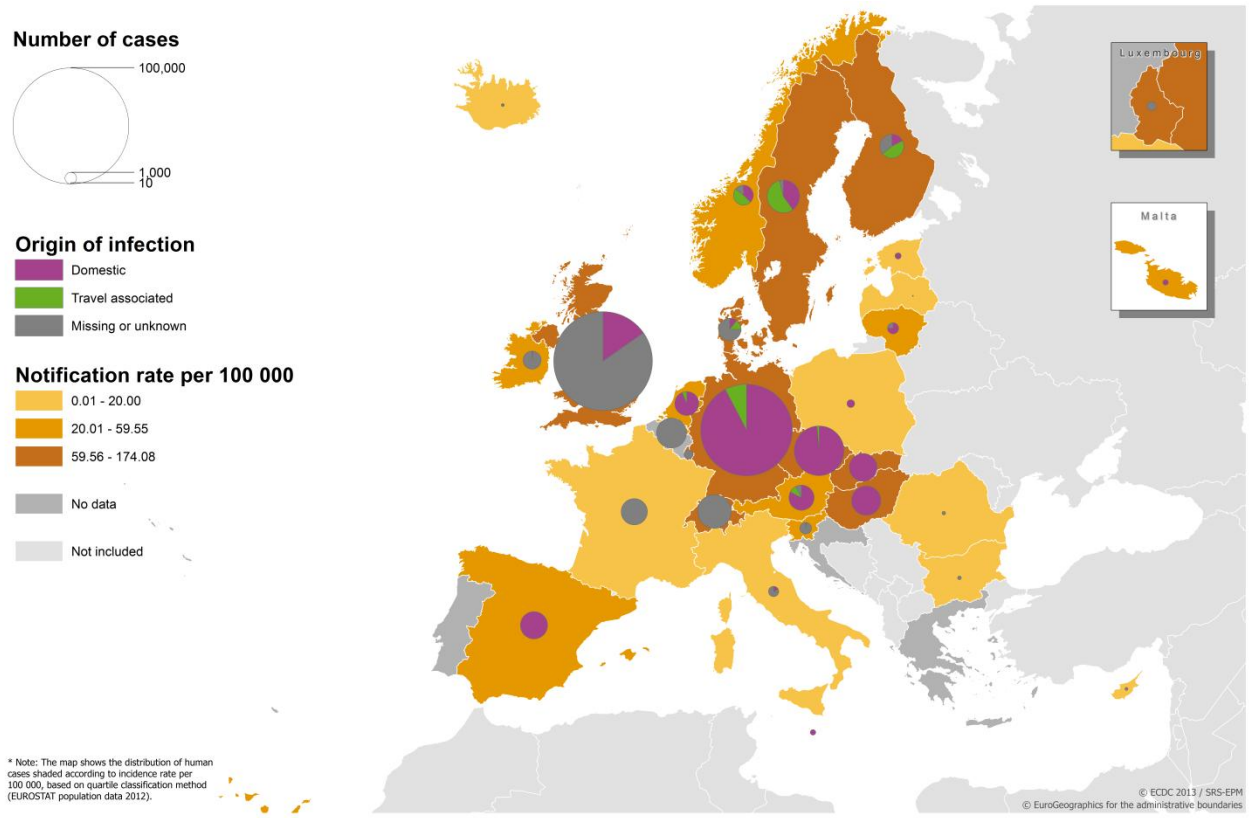
Species information was provided for 46.3 % of confirmed cases reported in the EU, Iceland and Norway. Of these 81.1 % were reported to be *C. jejuni*, 6.2 % *C. coli*, 0.2 % *C. lari,* 0.06 % *C. upsaliensis*, 0.01 % *C. fetus*. 'Other' *Campylobacter* species accounted for 12.4 % but the large majority of those cases were reported at the national level as '*C. jejuni/C. coli* not differentiated'.

Table CA2. Reported cases of human campylobacteriosis in 2008–2012 and notification rates for confirmed cases in the EU, 2012

Country	2012				2011	2010	2009	2008
	Report Type[1]	Cases	Confirmed Cases	Confirmed cases/ 100,000	Confirmed cases			
Austria	C	4,992	4,710	55.79	5,129	4,404	4,502	4,280
Belgium[2]	C	6,607	6,607	–	7,716	6,047	5,697	5,111
Bulgaria	A	97	97	1.32	73	6	26	19
Cyprus	C	68	68	7.89	62	55	37	23
Czech Republic	C	18,412	18,287	174.08	18,743	21,075	20,259	20,067
Denmark	C	3,720	3,720	66.66	4,060	4,037	3,353	3,470
Estonia	C	268	268	20.01	214	197	170	154
Finland	C	4,251	4,251	78.70	4,267	3,944	4,050	4,453
France[3]	C	5,079	5,079	38.89	5,538	4,324	3,956	3,424
Germany	C	62,880	62,504	76.54	70,812	65,110	62,787	64,731
Greece[4]	–	–	–	–	–	–	–	–
Hungary	C	6,384	6,367	65.10	6,121	7,180	6,579	5,516
Ireland	C	2,392	2,391	52.17	2,433	1,660	1,810	1,752
Italy	C	774	774	1.27	468	457	531	265
Latvia	C	8	8	0.39	7	1	0	0
Lithuania	C	917	917	30.49	1,124	1,095	812	762
Luxembourg	C	581	581	110.70	704	600	523	439
Malta	C	220	214	51.26	220	204	132	77
Netherlands[5]	C	4,248	4,248	48.83	4,408	4,322	3,782	3,341
Poland	C	431	431	1.12	354	367	359	270
Portugal[4]	–	–	–	–	–	–	–	–
Romania	C	92	92	0.43	149	175	254	2
Slovakia	C	5,844	5,704	105.55	4,565	4,476	3,813	3,064
Slovenia	C	983	983	47.83	998	1,022	952	898
Spain[6]	C	5,488	5,488	47.53	5,469	6,340	5,106	5,160
Sweden	C	7,901	7,901	83.32	8,214	8,001	7,178	7,692
United Kingdom	C	72,578	72,578	117.43	72,150	70,298	65,043	55,609
EU Total		**215,215**	**214,268**	**55.49**	**223,998**	**215,397**	**201,711**	**190,579**
Iceland	C	60	60	18.77	123	55	74	98
Liechtenstein	–	–	–	–	–	–	–	2
Norway	C	2,933	2,933	58.83	3,005	2,682	2,848	2,875
Switzerland[7]	C	8,432	8,432	105.49	7,963	6,611	7,803	7,559

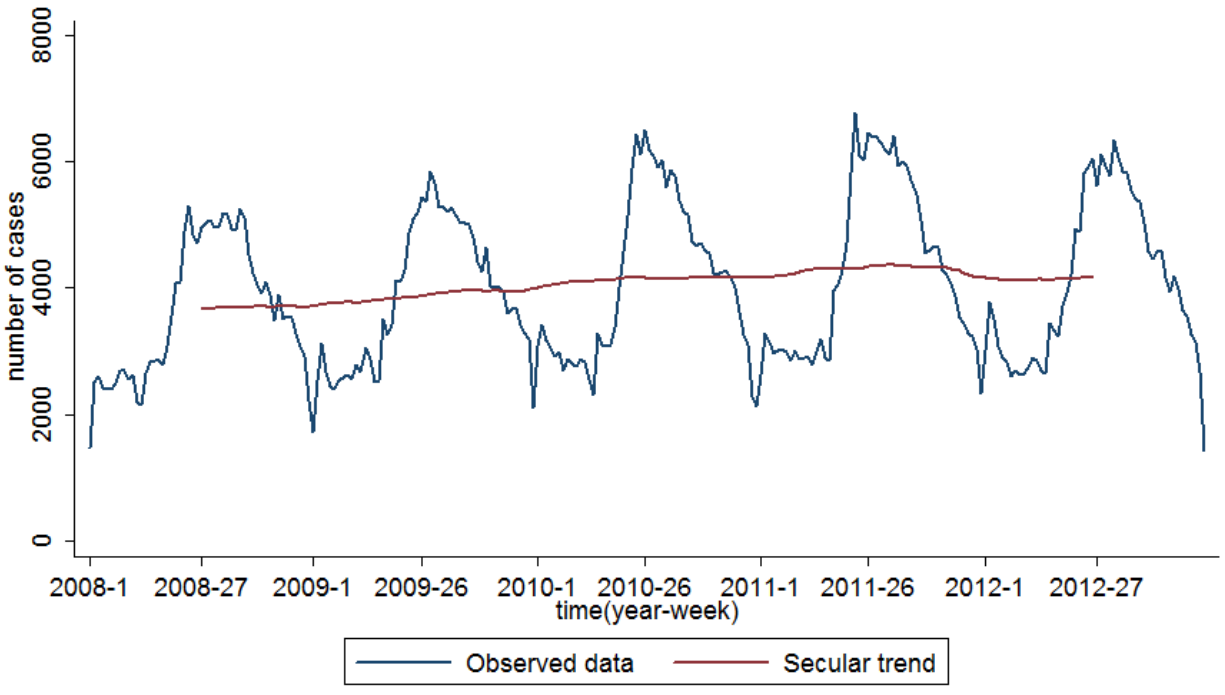
1. A: aggregated data report; C: case-based report; –: no report.
2. Sentinel surveillance; no information on estimated coverage. Thus, the notification rate cannot be estimated.
3. Sentinel surveillance; notification rates calculated on estimated coverage of 20 %.
4. No surveillance system.
5. Sentinel surveillance; notification rates calculated on estimated coverage of 52 %.
6. Sentinel surveillance; notification rates calculated on estimated coverage of 25 %.
7. Switzerland provided data directly to EFSA.

Figure CA1. Notification rates and origin of infection in human campylobacteriosis in the EU/EFTA[1], 2012



Note: The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

Figure CA2. Trend in reported confirmed cases of human campylobacteriosis in the EU, 2008-2012



Source: Data for EU trend 24 MSs: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Bulgaria is excluded because only monthly data were reported and Greece and Portugal do not have surveillance systems for this disease.

3.2.2. *Campylobacter* in food

Twenty-one MSs and two non-MSs reported data on *Campylobacter* in food in 2012 (Table CA1). The number of samples, within the food categories tested, ranged from a few to more than a thousand. Most of the MSs reported data on food of animal origin, primarily poultry meat, which is considered to be one of the major vehicles of *Campylobacter* infections in humans. In the following sections, only results based on 25 or more units tested are presented. Moreover, results from industry own control programmes and HACCP sampling, as well as specified suspect sampling, selective sampling and outbreak investigations, have also been excluded owing to difficulties in the interpretation of the data. These data are presented in the Level 3 Tables.

It is important to note that results from different countries are not directly comparable owing to between-country variation in the sampling and testing methods used. Also, it should be taken into consideration that the proportion of positive samples observed could have been influenced by the sampling season because in many countries *Campylobacter* infections are known to be more prevalent during the summer than during the winter.

Fresh broiler meat

Broiler meat is considered to be the main food-borne source of human campylobacteriosis. In 2012, 15 MSs reported data on fresh broiler meat from investigations with 25 or more samples. The occurrence of *Campylobacter* in fresh broiler meat sampled at slaughter, processing and retail, in 2012, is presented in Table CA3.

Overall, 23.6 % of the samples (single or batch) were found to be positive for *Campylobacter* in the reporting MSs, which was less than in 2011, when 31.3 % of the samples were positive. However, the reporting MSs in 2011 and 2012 were not exactly the same ones, which makes the figures non-comparable. In addition, for the MSs reporting data for both the years, there were increases, decreases, and no changes in the reported proportions of positive samples compared with 2011.

As in previous years, the proportions of *Campylobacter*-positive broiler meat samples (single or batch), at any sampling level, varied widely among MSs, with the prevalence ranging from 0 % to 80.6 %.

At the slaughterhouse, six MSs reported testing of single carcases, with the proportion of positive samples ranging from 10.0 % to 54.4 %. Two MSs reported testing of batches of carcases at slaughter, with the proportion of positive batches ranging from 12.5 % to 60.0 %.

In the seven MSs reporting data on the testing of single samples at processing level, the prevalence of *Campylobacter*-positive samples ranged from 1.0 % to 69.7 %. Only Poland reported data on batches at processing, with 28.6 % of batches positive.

At retail, nine MSs reported data on testing of single broiler samples, with the proportion of *Campylobacter*-positive broiler samples ranging from 0 % to 80.6 %. Belgium and Romania tested batches at retail, with a prevalence of 11.5 % and 32.2 %, respectively.

Data from seven MSs (Belgium, Denmark, Germany, Hungary, the Netherlands, Poland and Spain) reporting investigations at the same sampling unit in at least two sampling stages showed that samples tested at processing level and/or retail were less contaminated than samples tested earlier in the food chain. The Netherlands and Spain were the exceptions, with almost the same proportion of the positives at processing level and retail (around 38 %) and at slaughterhouse and retail (around 50 %).

Other food

Refer to the Level 3 Tables for detailed information on the data reported and on the occurrence of *Campylobacter* in the different food categories.

Table CA3. Campylobacter *in fresh broiler meat, 2012*

Country	Description	Sample unit	Sample weight	2012		
				N	N pos	% pos
At slaughterhouse						
Belgium	Carcase, neck skin	Single	1 g	440	44	10.0
Bulgaria	Carcase	Single	-	98	18	18.4
Czech Republic	Carcase, caecum, monitoring	Batch	25 g	125	75	60.0
Denmark[1]	Fresh chilled meat, monitoring	Single	10 g/15 g	865	185	21.4
Estonia	Carcase, neck skin, monitoring	Batch	25 g	48	6	12.5
Hungary	Carcase, meat	Single	25 g	70	32	45.7
Poland	Carcase, carcase swab	Single	-	401	218	54.4
Spain	Carcase, meat	Single	25 g	72	39	54.2
At processing plant or cutting plant						
Belgium	Fresh meat	Single	1 g	714	16	2.2
Germany	Fresh meat	Single	25 g	62	18	29.0
Hungary	Fresh meat	Single	25 g	140	42	30.0
Netherlands	Fresh meat	Single	160 g	411	160	38.9
Poland	Fresh meat, surveillance	Batch	25 g	56	16	28.6
	Fresh meat	Single	500 g	521	5	1.0
Portugal	Fresh meat	Single	25 g	50	16	32.0
Slovenia	Fresh meat	Single	20 g	66	46	69.7
Spain	Fresh meat	Single	25 g	29	4	13.8
At retail						
Austria	Fresh meat, imported, surveillance	Single	25 g	29	1	3.4
Belgium	Fresh meat	Batch	1 g	383	44	11.5
Czech Republic	Fresh meat	Single	25 g	30	0	0
Denmark[2]	Fresh chilled meat, monitoring	Single	10 g/15 g	521	59	11.3
	Fresh frozen meat, monitoring			216	9	4.2
Estonia	Fresh meat, national survey	Single	25 g	217	29	13.4
Germany	Fresh meat	Single	25 g	627	146	23.3
Hungary	Fresh meat	Single	25 g	276	104	37.7
Luxembourg	Fresh meat	Single	10 g	93	75	80.6
Netherlands	Fresh meat	Single	25 g	563	216	38.4
Romania	Fresh meat, monitoring EFSA specifications	Batch	25 g	466	150	32.2
Spain	Fresh meat	Single	25 g	74	37	50.0
Total (15 MSs)				**7,663**	**1,810**	**23.6**
Iceland	At retail, wings with skin, national survey	Batch	-	117	0	0
	At retail, skinned loins, survey	Single	-	117	0	0
	At retail, neck skin of whole chicken, chilled, national survey	Single	25 g	117	0	0

Note: Data presented include only investigations with sample sizes ≥25. Only data specified as fresh or carcase are included.

1. Denmark: sampled at two major slaughterhouses representing >98 % of the total production. The data exclude samples from smaller slaughterhouses, in 2012 (49 of 179 samples were positive).
2. Denmark: data from 2012 are not comparable with previous years as the method of analysis used has been changed.

3.2.3. *Campylobacter* in animals

In 2012, 20 MSs and 3 non-MSs reported data on *Campylobacter* in animals (Table CA1), primarily in broiler flocks, but also in pigs, cattle, goats, sheep and pets. In this section, only results based on 25 or more units tested are presented. Moreover, results from industry own control programmes and HACCP sampling, as well as results from clinical investigations, specified suspect sampling, selective sampling and outbreak investigations, have also been excluded owing to difficulties in the interpretation of the data. These data are, however, presented in the Level 3 Tables.

It should be noted that results are not directly comparable between countries and, sometimes, within countries and between years, owing to differences in sampling and testing schemes, as well as the impact of the season of sampling.

Broilers

In 2012, eight MSs and three non-MSs provided information on the occurrence of *Campylobacter* in broiler flocks, slaughter batches or individual animals based on a sample size ≥25 (Table CA4). In two of the five MSs reporting flock-based data, the reported prevalence was very high (63.4 %) to extremely high (83.6 %). The occurrence of *Campylobacter* varied widely among the three MSs reporting slaughter batch-based data, with prevalence ranging from 1.6 % to 62.1 %. One MS, Germany, also reporting animal-based data, found 9.2 % of broilers positive out of 672 units tested.

As in 2011, Denmark, Sweden, and Norway reported the highest numbers of broiler flocks tested, while Finland reported the highest number of slaughter batch-based data. These four countries have a *Campylobacter* control or monitoring programme in place. All reported a low to moderate prevalence.

Finland provided information on different sampling periods with different sampling strategies and reported a higher *Campylobacter* prevalence in slaughter animal batches sampled during June–October (5.3 %) than in those sampled during January–May and November–December (1.6 %).

Other animals

For detailed information on the occurrence of *Campylobacter* in the different animal species refer to the Level 3 Tables.

Table CA4. Campylobacter *in broilers, 2012*

Country	Description	2012		
		N	N pos	% pos
Animal-based data				
Germany	At farm, official sampling	672	62	9.2
Flock-based data				
Denmark	At farm, boot swabs, monitoring, industry sampling	3,376	392	11.6
Germany	At farm, official sampling	43	0	0
Hungary	At slaughterhouse, monitoring	165	138	83.6
Slovenia	At slaughterhouse, neck skin, monitoring, official sampling	30	23	76.7
	At slaughterhouse, faeces, monitoring, official sampling	41	26	63.4
Sweden	At slaughterhouse, monitoring, official sampling	2,346	217	9.2
Iceland	At farm, faeces, monitoring, industry sampling	645	28	4.3
Norway[1]	At farm, faeces, surveillance	2,417	106	4.4
Switzerland[2]	At slaughterhouse, cloacal swab, monitoring, official sampling	546	190	34.8
Slaughter batch-based data				
Austria	At slaughterhouse, caecum, monitoring - active, official sampling	312	146	46.8
Finland	At slaughterhouse, caecum, control and eradication programmes, industry sampling[3]	1,534	82	5.3
	At slaughterhouse, caecum, control and eradication programmes, industry sampling[4]	321	5	1.6
Spain	At slaughterhouse, faeces, monitoring	153	95	62.1
Iceland	At slaughterhouse, caecum, monitoring, official and industry sampling	589	26	4.4

Note: Data include only investigations with sample sizes ≥25.

1. In Norway, sampling was performed between 1 May and 31 October.
2. In Switzerland, data originated from the antimicrobial resistance monitoring.
3. In Finland, census sampling of all slaughter batches was performed between June and October.
4. In Finland, random sampling (expected prevalence 1 %, accuracy 1 %, confidence level 95 %) was performed between January and May and between November and December.

3.2.4. Discussion

Campylobacteriosis continued to be the most commonly reported zoonosis in humans, in the EU, since 2005. In 2012, the number of notified cases of *Campylobacter* infection in the EU decreased by 4.3 % compared with 2011, to about the same level as in 2010. The number of human campylobacteriosis cases has shown a statistically significant increasing trend in the last five years (2008–2012). The reasons for this increasing trend are not completely understood at present. Owing to the characteristics of this multi-host pathogen and its prevalence in the environment, where climate factors may play an important role, it is difficult to understand all aspects of its epidemiology and the possible reasons for the increase in human cases.

Considering the high number of campylobacteriosis cases, the severity in terms of fatalities reported was low (0.03 %). The proportion of hospitalised cases was, on the other hand, larger than expected taking into account the fact that the symptoms are often relatively mild. An explanation for this could be that in some countries, the surveillance is focused on the diagnosis of severe cases. In addition, the country with the most campylobacteriosis cases only reported hospitalisation status for a fraction of its cases and of these, the majority were hospitalised. This fraction most likely represents cases reported from the hospital surveillance, while for cases reported from other sources, e.g. laboratories, information on hospitalisation status is often missing. Both these situations result in an overestimation of the proportion of hospitalised cases.

In 2012, overall, about a quarter of the fresh broiler meat samples were reported as *Campylobacter* positive, although there were large differences between the MSs.

The importance of broiler meat as a source of human *Campylobacter* infections was illustrated by the reported food-borne outbreak data from 2012. Approximately half (11 out of 25) of the *Campylobacter* outbreaks, in which information on the implicated food vehicle was provided, were linked to broiler meat. In addition, Switzerland reported two outbreaks, with strong evidence, associated with broiler meat and one fatal case was reported in one of them. In five of the outbreaks the implicated food vehicle was milk and, out of these, three outbreaks were attributed to raw milk, indicating the importance of risks related to consuming unpasteurised milk. The risk of campylobacteriosis and other diseases associated with the consumption of raw milk has been well documented[27,28,29].

In reporting countries the prevalence of campylobacteriosis in broilers remained mainly at levels similar to previous years.

[27] Heuvelink AE, van Heerwaarden C, Zwartkruis-Nahuis A, Tilburg JJ, Bos MH, Heilmann FG, Hofhuis A, Hoekstra T and de Boer E, 2009. Two outbreaks of campylobacteriosis associated with the consumption of raw cow's milk. International Journal of Food Microbiology, 134, 70-74.

[28] Schoder D, Zangana A and Wagner M, 2010. Sheep and goat raw milk consumption: a hygienic matter of concern? Archiv für Lebensmittelhygiene, 61, 229-234.

[29] Amato S, Maragno M, Mosele P, Sforzi M, Mioni R, Barco L, Dalla Pozza MC, Antonello K and Ricci A, 2007. An outbreak of *Campylobacter jejuni* linked to the consumption of raw milk in Italy. Zoonoses and Public Health, 54 (Suppl. 1), p. 23.

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.3. *Listeria*

The bacterial genus *Listeria* currently comprises 10 species, but human cases of listeriosis are almost exclusively caused by the species *Listeria monocytogenes* (*L. monocytogenes*). *Listeria* species are ubiquitous organisms that are widely distributed in the environment, especially in plant matter and soil. The principal reservoirs of *Listeria* are soil, forage and water. Other reservoirs include infected domestic and wild animals. The main route of transmission, to both humans and animals, is through consumption of contaminated food or feed. The bacterium can be found in raw foods and in processed foods which are contaminated after processing. Infection can also rarely be transmitted directly from infected animals to humans. Cooking at temperatures higher than 65 °C destroys *Listeria*, but the bacteria are able to multiply at temperatures as low as +2/+4 °C, which makes presence of *Listeria* in ready-to-eat (RTE) foods, with a relatively long shelf-life, of particular concern.

In humans, severe illness mainly occurs in developing fetuses, newborn infants, the elderly and those with weakened immune systems. Symptoms vary, ranging from mild flu-like symptoms and diarrhoea, to life-threatening infections characterised by septicaemia and meningoencephalitis. In pregnant women, the infection can spread to the fetus, leading to severe illness at birth or death in the uterus, resulting in abortion. Illness is often severe with high hospitalisation and mortality rates. Human infections are rare yet important, given the associated high mortality rate. These organisms are among the most important causes of death from food-borne infections in industrialised countries.

Clinical symptoms of listeriosis in domestic animals (especially sheep and goats) include encephalitis, abortion, mastitis or septicaemia.

Table LI1 presents the countries reporting data for 2011 and 2012.

Table LI1. Overview of countries reporting* L. monocytogenes *data, 2011-2012

Data	Total number of reporting MSs	Countries
Human	2012 - 26	**All MSs** except PT **Non-MSs:** CH, IS, NO
	2011 - 26	**All MSs** except PT **Non-MSs:** CH, IS, NO
Food	2012 - 25	**All MSs** except FI, MT **Non-MSs:** CH, NO
	2011 - 25	**All MSs** except FI, MT **Non-MSs:** CH, NO
Animal	2012 - 14	**All MSs** except AT, BE, BG, CY,CZ, DK, FR, LT, LU, MT, PT, RO, SI **Non-MSs:** CH, NO
	2011 - 13	**MSs:** DE, EE, ES, FI, GR, IE, IT, LV, NL, PL, PT, SK, UK **Non-MSs:** CH, NO

Note: The overview table contains all data reported by MSs and non-MSs.

3.3.1. Listeriosis in humans

In 2012, 26 MSs reported 1,642 confirmed human cases of listeriosis (Table LI2), a 10.5 % increase compared with 2011. The EU notification rate was 0.41 cases per 100,000 population with the highest MS-specific notification rates observed in Finland, Spain and Denmark (1.13, 0.93 and 0.90 cases per 100,000 population, respectively). The lowest notification rate was reported in Romania (0.05 cases per 100,000 population). The vast majority of cases were reported to be domestically acquired (Figure LI1).

A seasonal pattern was observed in the listeriosis cases reported in the EU in the period 2008-2012 (Figure LI2). There was a statistically increasing trend (p = 0.001 with linear regression) over this period, though only

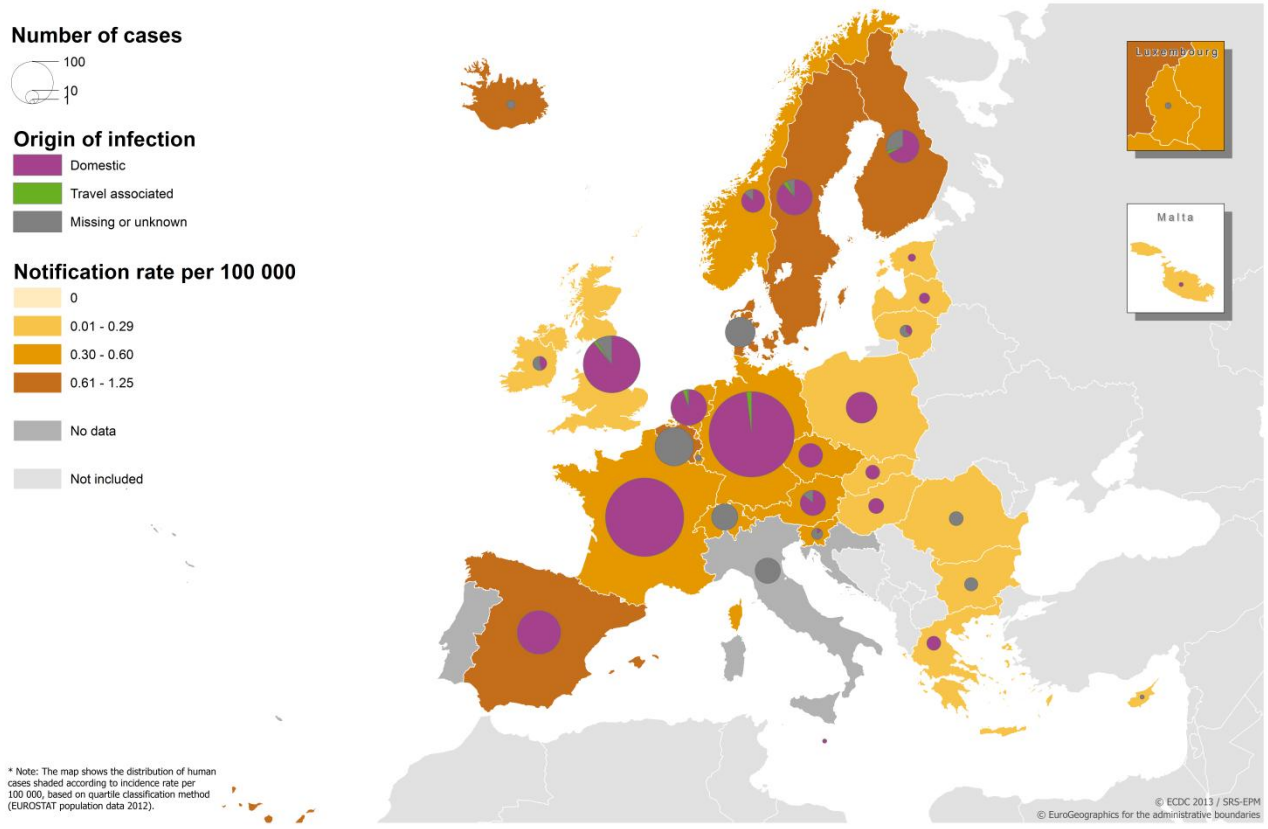
slowly increasing. Statistically increasing trends were also observed in Finland, Germany, the Netherlands and Poland. No country-specific decreasing trends were observed and, for several countries, too few cases were reported for a trend analysis to be possible.

Table LI2. Reported cases of human listeriosis in 2008-2012, and notification rate for confirmed cases in the EU, 2012

Country	2012				2011	2010	2009	2008
	Report Type[1]	Cases	Confirmed Cases	Confirmed cases/ 100,000	Confirmed cases			
Austria	C	36	36	0.43	26	34	46	31
Belgium	C	83	83	0.75	70	40	58	64
Bulgaria	A	10	10	0.14	4	4	5	5
Cyprus	C	1	1	0.12	2	1	0	0
Czech Republic	C	32	32	0.30	35	26	32	37
Denmark	C	50	50	0.90	49	62	97	51
Estonia	C	3	3	0.22	3	5	3	8
Finland	C	62	61	1.13	43	71	34	40
France	C	348	348	0.53	282	312	328	276
Germany	C	427	412	0.50	330	377	394	306
Greece	C	11	11	0.10	10	10	4	1
Hungary	C	13	13	0.13	11	20	16	19
Ireland	C	11	11	0.24	7	10	10	13
Italy[2]	C	36	36	–	100	137	109	118
Latvia	C	6	6	0.29	7	7	4	5
Lithuania	C	8	8	0.27	6	5	5	7
Luxembourg	C	2	2	0.38	2	0	3	1
Malta	C	1	1	0.24	2	1	0	0
Netherlands	C	73	73	0.44	87	72	44	45
Poland	C	54	54	0.14	62	59	32	33
Portugal[3]	–	–	–	–	–	–	–	–
Romania	C	11	11	0.05	1	6	6	0
Slovakia	C	11	11	0.20	31	5	10	8
Slovenia	C	**7**	7	0.34	5	11	6	3
Spain[4]	C	107	107	0.93	91	129	121	88
Sweden	C	72	72	0.76	56	63	73	60
United Kingdom	C	183	183	0.30	164	176	235	206
EU Total		**1,658**	**1,642**	**0.41**	**1,486**	**1,643**	**1,675**	**1,425**
Iceland	C	4	4	1.25	2	1	0	0
Liechtenstein		–	–	–	–	–	–	0
Norway	C	30	30	0.60	21	22	31	34
Switzerland[5]	C	39	39	0.50	47	67	41	43

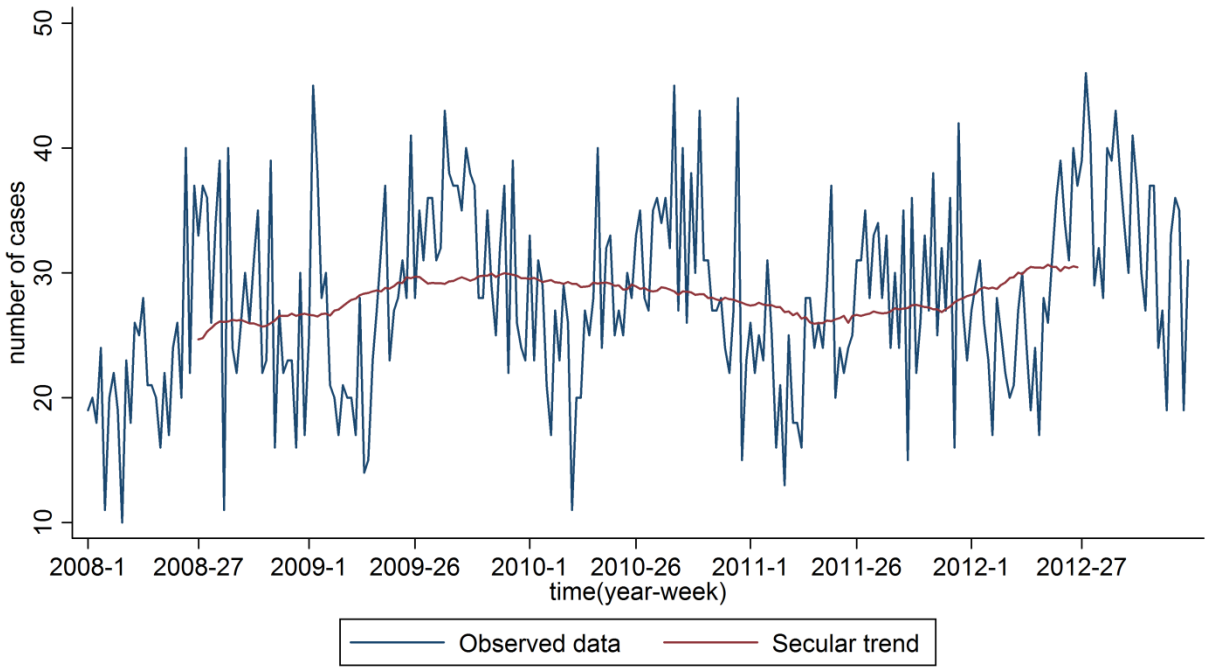
1. A: aggregated data reported; C: case-based data reported; –: no report;
2. Data provisional for 2012 as several regions have not yet reported their cases. Thus, the notification rate cannot be estimated.
3. No surveillance system exists.
4. Sentinel surveillance; notification rates calculated on estimated coverage of 25 %.
5. Switzerland provided data directly to EFSA.

Figure LI1. Notification rates and origin of infection in human listeriosis in the EU/EFTA, 2012



Note: The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

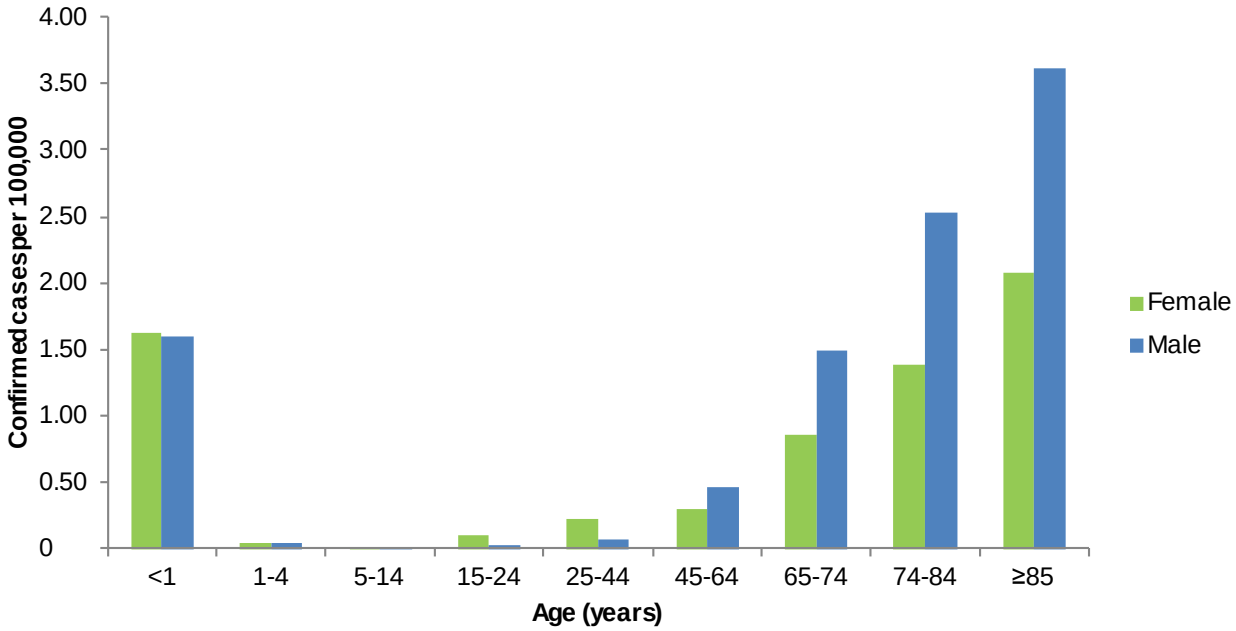
Figure LI2. Trend in reported confirmed cases of human listeriosis in the EU, 2008-2012



Source: 24 MSs: Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. Bulgaria is excluded as only monthly data was reported and Italy is excluded because the 2012 data reported are not representative. Portugal has no surveillance system for listeriosis.

In 2012, the highest notification rates of listeriosis were reported in persons aged below one and those aged 65 years and above (Figure LI3). In the latter group, the rates increased by age. In those aged below one year, 79 % of the cases were reported as related to transmission during pregnancy (information provided for 24 out of 67 cases). Major differences in notification rates were also observed in terms of gender. Female cases dominated in the age groups 15-24 and 25-44 years and 71.3 % of these cases were related to pregnancy (information provided for 55.4 % of cases). Higher incidence rates were observed in male cases compared to female cases in all age groups above 45 years. In these age groups, the male-to-female rate ratio increased by age and in the oldest age group, 85 years or above, the male-to-female rate ratio was 1.7 (male notification rate 3.61 per 100,000 population vs. 2.07 for females).

Figure LI3. Notification rates of human listeriosis by age and gender in the EU, 2012



Fourteen MSs provided information on hospitalisation for all or the majority of their cases (which represented 41.5 % of all confirmed cases reported in the EU) in 2012. On average, 91.6 % of the cases were hospitalised and, in eight MSs, this proportion was 100 %. This is the highest proportion of hospitalised cases of all zoonoses under EU surveillance and reflects the focus of EU surveillance on severe, systemic infections. In order to assess the clinical manifestation of the disease, the variable specimen type was introduced to EU level surveillance as a surrogate to the clinical manifestation. For cases where this information was provided (41.7 %), 70.8 % of positive specimens were from blood, 21.2 % from cerebrospinal fluid and 8.0 % from another normally sterile site.

A total of 198 deaths due to listeriosis were reported by 18 MSs in 2012, which was the highest number of fatal cases reported since 2006. Fifteen MSs reported one or more fatal cases with France reporting the highest number, 63 cases. The EU case fatality rate was 17.8 % among the 1,112 confirmed cases for which this information was reported (67.7 % of all confirmed cases).

Seven MSs and Norway provided information on conventional serotypes of *L. monocytogenes* (accounting for 17.4 % of all confirmed cases). The most common serotypes in 2012 were 1/2a (46.8 %) and 4b (41.7 %), followed by 1/2b (8.5 %), 1/2c (2.7 %) and 3a (0.3 %). As some countries have changed to molecular-based techniques for serotyping, PCR serogrouping was introduced in TESSy in 2012 data collection. Three MSs provided data on this variable (accounting for 30.7 % of all confirmed cases). The most common PCR serogroup was IVb (53.1 %, corresponding to conventional serotype 4b, 4d, and 4e), followed by IIa (30.7 %, corresponding to conventional serotype 1/2a and 3a), IIb (12.1 %, corresponding to conventional serotype 1/2b, 3b and 7) and IIc (4.2 %, corresponding to conventional serotype 1/2c and 3c).

3.3.2. *Listeria* in food

EU legislation (Regulation (EC) No 2073/2005) lays down food safety criteria for *L. monocytogenes* in RTE foods. This regulation came into force in January 2006, and the criteria are described below. Data reported reflect the obligations on MSs under the Regulation and the investigations have, therefore, focused on testing RTE foods for compliance within these limits.

In the following sections, only results based on investigations of 25 or more units tested are presented, with the exception of the section on compliance with microbiological criteria, where investigations with fewer than 25 units have also been included. Results from industry own control programmes, HACCP sampling and EU baseline surveys, as well as specified suspect sampling, selective sampling and outbreak or clinical investigations, have also been excluded owing to difficulties with the interpretation of such data. These data are, however, presented in the Level 3 Tables.

In 2012, 25 MSs and 2 non-MSs reported data on *Listeria* in food. These data cover a substantial number of food samples and food categories. The data presented in this section focus on RTE foods, in which *L. monocytogenes* was detected either by qualitative (absence or presence, using detection methods) and/or by quantitative investigations (determination of *L. monocytogenes* counts (colony forming units/gram (cfu/g)) using enumeration methods).

Compliance with microbiological criteria

In total, 24 MSs reported data which were included in the evaluation for compliance with microbiological criteria (Table LI3 and Figure LI4).

A wide range of different foodstuffs can be contaminated with *L. monocytogenes*. For a healthy human population, foods in which the levels do not exceed 100 cfu/g are considered to pose a negligible risk. Therefore, the EU microbiological criterion for *L. monocytogenes* is set as ≤100 cfu/g for RTE products on the market.

The reported results of *L. monocytogenes* testing in RTE food samples were evaluated according to the *Listeria* criteria indicated in EU legislation applying certain assumptions where appropriate.

Regulation (EC) No 2073/2005 covers primarily RTE food products, and requires the following:

- In RTE products intended for infants and for special medical purposes *L. monocytogenes* must not be present in 25 g.
- *L. monocytogenes* must not be present in levels exceeding 100 cfu/g during the shelf-life of other RTE products.
- In RTE foods that are able to support the growth of the bacterium, *L. monocytogenes* may not be present in 25 g at the time of leaving the production plant; however, if the producer can demonstrate, to the satisfaction of the competent authority, that the product will not exceed the limit of 100 cfu/g throughout its shelf-life, this criterion does not apply.
- In the case of RTE foods that are able to support the growth of *L. monocytogenes*, the microbiological criterion to be applied depends on the stage in the food chain and whether the producer has demonstrated that *L. monocytogenes* will not multiply to levels exceeding 100 cfu/g throughout the shelf-life.

For many of the reported data, it was not evident whether or not the RTE food tested was able to support the growth of *L. monocytogenes*. This information is difficult to collect as the ability of a product to support growth of *L. monocytogenes* depends on various factors, such as the pH, water activity and composition of the specific product, which can vary even within the same food category. Also, information from studies, carried out by the producers, on the growth capacity of *L. monocytogenes* in individual products was not available. Furthermore, in some cases, the stage in the production chain from which samples were collected could not be established.

For the reasons described above, the following assumptions were applied for the evaluation:

- For samples reported to be taken at processing, a criterion of absence in 25 g was applied for single samples. Samples from hard cheeses and fermented sausages are an exception, as these categories are assumed to be unable to support the growth of *L. monocytogenes*. For these samples the limit ≤100 cfu/g was applied at processing;
- For all investigations for which the sampling stage was not reported, it was assumed that samples were collected from products placed on the market, and the criterion ≤100 cfu/g was applied.
- For food intended for infants and special medical purposes the criterion, 'absence in 25 g', was applied throughout the food chain.
- Samples collected at farm level are reported separately but compliance is evaluated with the criteria stated for the processing plant level.
- Unspecified cheeses were reported separately but compliance was evaluated with criteria applied for soft and semi-soft cheeses.

The results from qualitative examinations using the detection method have been used to analyse the compliance with the criterion of absence in 25 g, and the results from quantitative analyses using the enumeration method have been used to analyse compliance with the criterion ≤100 cfu/g. All data submitted by MSs and other reporting countries are presented in the Level 3 Tables.

The percentage of single samples or batches not complying with the *L. monocytogenes* criteria in 2012 is shown in Table LI3. For RTE products on the market, very low percentages (<1 %) were generally found not to comply with the criterion of ≤100 cfu/g. However, higher levels of non-compliance were reported in samples of RTE products at the processing stage, ranging from 0 to 8.0 %.

As in previous years all samples of RTE food intended for infants and for medical purposes were compliant with the *L. monocytogenes* criterion.

At retail, as well as at processing plant, the levels of non-compliance for different RTE food categories were comparable between 2011 and 2012 (Figure LI4). However, it must be noted that these results are highly influenced by variability in MSs reporting and the sample sizes in their investigations.

RTE products at processing and farm level

The highest level of non-compliance in single food samples at processing was observed in RTE fishery products (8.0 %), while the percentage of non-compliance for RTE fishery products at the batch level was 1.0 %. The level of non-compliance among RTE fishery products varied markedly among the 12 MSs which provided data, ranging from 0 to 25.0 % (single samples and batches), and more than half of the tested units originated from one MS.

Investigations of soft cheeses, semi-soft cheeses and hard cheeses were reported by 15 MSs, and more than 99 % of the single samples and batches collected at processing were in compliance with the *L. monocytogenes* criteria. The highest level of non-compliance among cheeses tested at processing was found in the category 'unspecified cheeses' (3.4 % of single samples and 7.2 % of batches). This category covered investigations in which the information on the type of cheese (soft, semi-soft or hard) was not provided. Almost all of the reported single samples were from one MS and most of the reported batches came from two MSs.

In RTE milk samples, collected at processing, the level of non-compliance was very low in single samples, and none of the tested batches of RTE milk was found to be positive. In RTE milk samples collected at the farm, slightly higher but still low levels of non-compliance were observed (1.9 % of single samples and 4.4 % of batches). The samples collected at farms originated from five MSs and were mainly from raw cow milk intended for direct human consumption. Approximately 40 % of all reported single samples, including the few positive samples, were from one MS.

The proportion of non-compliance in other dairy products at processing was 0.5 % for single samples, whereas none of the tested batches was positive. Investigations from nine MSs were included but all positive samples originated from one MS.

Among samples from RTE products of meat origin, other than fermented sausages, low levels of non-compliance were observed at processing (2.5 % of single samples and 1.5 % of batches). The level of non-compliance varied markedly among the 14 MSs reporting data, ranging from 0 to 36.1 % of single samples and from 0 to 20.0 % of batches. Most of the tested units originated from one MS, and most of the positive samples originated from RTE products of cooked pig meat. In the case of fermented sausages, less than 0.1 % of the single samples were found not to meet the *L. monocytogenes* criterion at processing (≤100 cfu/g).

Some non-compliance was also detected in the food category 'other RTE products' (2.6 % of single samples and 0.4 % of batches). Most of the positive samples were from 'prepared dishes' or 'spices and herbs'.

RTE products at retail level

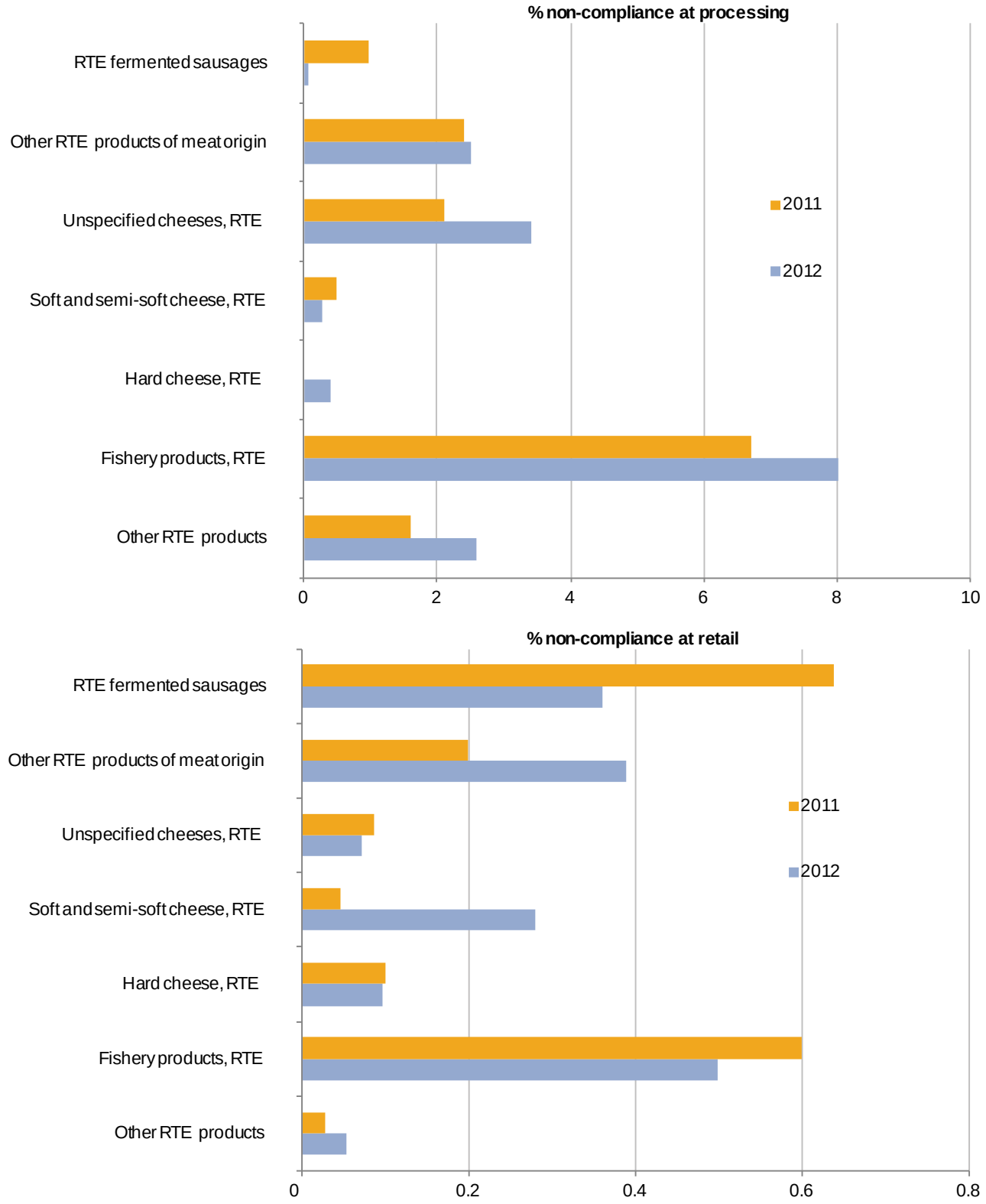
At retail, the levels of non-compliance are generally lower than those observed at processing plant. However, it should be noted that different thresholds are applied depending on the stage of sampling, i.e. samples tested at retail may contain up to 100 cfu/g and still be in compliance with the *L. monocytogenes* criterion.

At retail, as was the case for samples obtained at processing plant, the highest reported levels of non-compliance were observed in RTE fishery products (0.5 % of single samples and 0.7 % of batch samples). Investigations from 18 MSs were reported. The majority of the reported batches and single samples originated from one MS.

In the two categories of RTE products of meat origin, 0.4 % of single samples did not comply with the *L. monocytogenes* criterion. Investigations from 20 MSs were included and the few non-compliant samples were primarily from fermented sausages, cooked meat products and minced meat intended to be eaten raw.

All reported batches of cheeses complied with the *L. monocytogenes* criterion at retail, and very few single samples were non-compliant (investigations from 20 MSs in total). In RTE dairy products, other than milk and cheeses, as well as the category 'other RTE products', none or very few samples were in non-compliance with the *L. monocytogenes* criteria.

Figure LI4. Proportion of single samples at processing and retail non-compliance with EU L. monocytogenes criteria, 2011-2012



Note: RTE: ready-to-eat products.
Includes investigations where the sampling unit (single samples or batches) and sampling stage at retail (also catering, hospitals and care homes) has been specified for the relevant food types.
Please note that these results are highly influenced by the MSs reporting and the sample sizes in their investigations, both of which vary between the years. Includes also investigations with sample size <25.

Table LI3. Compliance with the L. monocytogenes criteria laid down by Regulation (EC) No 2073/2005 in food categories in EU, 2012

Food category[1]	Sampling unit	Absence in 25 g		≤100 cfu/g	
		Units tested	% non compliant	Units tested	% non compliant
RTE food intended for infants and for medical purposes					
Processing plant	Batch	80	0		
	Single	20	0		
Retail	Batch	599	0		
	Single	760	0		
RTE products of meat origin other than fermented sausage					
Processing plant	Batch	34,947	1.5		
	Single	12,216	2.5		
Retail	Batch			5,724	<0.1
	Single			7,224	0.4
RTE products of meat origin, fermented sausage					
Processing plant	Batch			27	0
	Single			1,283	<0.1
Retail	Batch			59	0
	Single			2,772	0.4
Milk, RTE					
At farm	Batch	104	1.9		
	Single	275	4.4		
Processing plant	Batch	1,440	0		
	Single	769	1.0		
Retail	Batch			176	0
	Single			416	0
Soft and semi-soft cheeses, RTE					
At farm	Batch	45	0		
	Single	166	0		
Processing plant	Batch	5,192	0.4		
	Single	3,354	0.3		
Retail	Batch			1,080	0
	Single			2,171	0.3
Hard cheeses, RTE					
At farm	Single			132	0.8
Processing plant	Batch			7,862	<0.1
	Single			1,894	0.2
Retail	Batch			871	0
	Single			2,058	<0.1
Unspecified cheeses, RTE					
At farm	Batch	20	5.0		
	Single	13	0		
Processing plant	Batch	376	7.2		
	Single	1,365	3.4		
Retail	Batch			355	0
	Single			1,037	<0.1

Table continued overleaf.

Table LI3 (continued). Compliance with the* L. monocytogenes *criteria laid down by Regulation (EC) No 2073/2005 in food categories in EU, 2012

Food category[1]	Sampling unit	Absence in 25 g		≤100 cfu/g	
		Units tested	% non compliant	Units tested	% non compliant
Other Dairy products, RTE					
At farm	Batch	262	1.1		
Processing plant	Batch	4,197	0		
	Single	2,901	0.5		
Retail	Batch			680	0
	Single			4,173	0.1
Fishery products, RTE					
At border control	Single	9	0		
Processing plant	Batch	1,143	1.0		
	Single	2,569	8.0		
Retail	Batch			11,525	0.7
	Single			3,026	0.5
Other RTE products					
At border control	Batch	7	0		
Processing plant	Batch	1,995	0.4		
	Single	604	2.6		
Retail	Batch			2,131	<0.1
	Single			14,985	<0.1

Note: RTE: ready-to-eat products.

Investigations with sample size <25 are included.

Data reported as HACCP or own control, suspect sampling, selective sampling and outbreak or clinical investigations are excluded.

1. Retail includes data with unspecified sampling stage.

RTE meat products, meat preparations and minced meat

In 2012, data from investigations of *L. monocytogenes* in RTE meat products, including 25 units or more, were reported from 17 MSs. Data,categorised according to the origin of the meat, are presented in Tables LI4, LI5, LI6 and LI7.

Poultry meat

In 2012, nine MSs reported test results for *L. monocytogenes* in RTE products of broiler meat (Table LI4), and four MSs reported on RTE products of turkey meat (Table LI5). In 2012, 2,224 samples of broiler meat were tested using the detection method, and *Listeria* was detected in 1.0 % of the tested units. In three of the qualitative investigations, *L. monocytogenes* was not detected. In the remaining six investigations, the proportion of *L. monocytogenes*-contaminated units ranged from 0.7 % to 4.8 %.

Using the enumeration method, *L. monocytogenes* was not detected in four out of the seven reported investigations. In the two quantitative investigations in which *L. monocytogenes* was detected at levels above 100 cfu/g (both conducted at processing plants in Poland), the percentage of results with *L. monocytogenes* counts above 100 cfu/g was 0.3 % for the tested batches and 2.2 % for the tested single samples.

In 2012, 365 samples of RTE products of turkey meat were tested using the detection method, and *Listeria* was detected in 0.5 % of the tested units. *L. monocytogenes* was detected in only one of the three qualitative investigations, and in one of the three quantitative investigations. It should be noted that *L. monocytogenes* was not found in any samples from RTE turkey meat products in 2011.

Bovine meat

Test results for RTE bovine meat products were reported by eight MSs in 2012 and are summarised in Table LI6. The number of reported tested units increased considerably compared with 2011.

In total, *L. monocytogenes* was found by the detection method in 4.3 % of the units tested and levels above 100 cfu/g were observed in 0.2 % of the units tested by the enumeration method. The highest qualitative occurrence of *L. monocytogenes* at processing was detected in single samples of fermented sausages from a small investigation (25 samples) conducted in Cyprus (20.0 %). However, fermented sausages are assumed not to support growth of *L. monocytogenes* during their shelf-life, and only concentrations exceeding 100 cfu/g are considered to pose a risk to public health. In 2012, *L. monocytogenes,* at levels above 100 cfu/g was reported only in a few single samples of minced meat intended to be eaten raw tested at retail in Luxembourg.

Pig meat

Data on RTE pig meat products were provided by 17 MSs (Table LI7). Just over 33,000 units were tested using the detection method, among which *L. monocytogenes* was detected in 3.2 %. Among the 19,007 units tested using the enumeration method, *L. monocytogenes* was found at levels above 100 cfu/g in 0.3 % of the tested units.

Among the qualitative investigations of RTE pig meat products, the proportion of *L. monocytogenes* positive units ranged from 0 to 40.0 % at processing and from 0 to 26.3 % at retail. In 2012 Poland reported a very high number of tested units, including investigations at processing where *L. monocytogenes* was found in levels between the detection limit of the enumeration method and 100 cfu/g at very high levels (51.4 % of 9,774 batches and 89.7 % of 68 single samples).

A summary of the proportions of units positive for *L. monocytogenes* in RTE products of meat origin is presented in Figure LI5. Using detection methods, *L. monocytogenes* was most commonly detected in RTE products from bovine meat. For samples tested using enumeration methods, the occurrence in pig meat products was higher than the other meat types, followed by broiler meat products. However, because a very large proportion of the reported samples of RTE products of broiler meat and pig meat all came from one MS, and many of these were found to be contaminated with *L. monocytogenes* at levels between the detection limit and 100 cfu/g, these results cannot be considered representative for the EU and any comparisons with previous years should be done cautiously.

For further information on reported data, refer to the Level 3 Tables.

Table LI4. L. monocytogenes *in ready-to-eat broiler meat products, 2011-2012*

Country	Sampling unit	2012					2011				
		Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
		N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
At processing plant											
Belgium	Batch[1]	74	1.4	96	0	0	-	-	-	-	-
Czech Republic	Batch	155	1.3	-	-	-	377	0.3	57	0	0
Hungary	Single[2]	-	-	-	-	-	43	2.3	-	-	-
Ireland	Single	-	-	-	-	-	84	0	-	-	-
Poland	Batch[3]	1,016	0.9	389	45.8	0.3	-	-	-	-	-
	Single[4,5]	676	0.7	139	0.7	2.2	222	0	455	1.1	0
At retail											
Bulgaria	Batch	35	2.9	-	-	-	-	-	-	-	-
Czech Republic	Batch	95	0	-	-	-	-	-	-	-	-
Estonia	Single	-	-	30	0	0	-	-	39	0	0
France	Single	-	-	-	-	-	164	3.7	164	0.6	0.6
Hungary	Single	65	0	-	-	-	-	-	-	-	-
	Single[1]	-	-	-	-	-	109	0	35	0	0
Ireland	Single	83	4.8	518	0.4	0	-	-	-	-	-
	Single[5]	-	-	-	-	-	128	0.8	488	0.2	-
Romania	Batch[6]	-	-	41	0	0	282	0	-	-	-
Slovakia	Batch[6]	-	-	-	-	-	-	-	26	0	0
Spain	Single	-	-	56	0	0	-	-	-	-	-
United Kingdom	Single	-	-	-	-	-	70	0	70	0	0
Sampling level not specified											
Poland	Single	25	0	-	-	-	-	-	-	-	-
Spain	Single	-	-	-	-	-	-	-	31	3.2	0
Total (2012: 9 MSs, 2011: 10 MSs)		**2,224**	**1.0**	**1269**	**14.3**	**0.3**	**1,479**	**0.6**	**1,365**	**0.6**	**<0.1**

Note: Data are presented only for sample size ≥25.
Sample weight is 25 g, unless otherwise stated.

1. Sample weight: 1 g.
2. Sample weight: 10 or 20 g.
3. Sample weight: 1, 10 or 25 g.
4. In 2012: sample weight: 1, 25 or 500 g.
5. Sample weight is most usually 25 g but occasionally there are other sample weights recorded.
6. Sample weight: 10 g.

Table LI5. L. monocytogenes *in ready-to-eat turkey meat products, 2011-2012*

Country	Sampling unit	2012					2011				
		Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
		N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
At processing plant											
Hungary	Single	45	0	-	-	-	-	-	-	-	-
Ireland	Single[1]	-	-	-	-	-	52	0	-	-	-
Poland	Single[2]	-	-	-	-	-	35	0	35	0	0
At retail											0
Hungary	Single	105	0	45	0	0	-	-	-	-	-
Ireland	Single[1]	-	-	68	1.47	0	-	-	73	0	-
Portugal	Batch	-	-	95	0	0	-	-	-	-	-
Sampling level not specified											
Poland	Single[3]	215	0.9	-	-	-	-	-	-	-	-
Total (2012: 4 MSs, 2011: 2 MSs)		**365**	**0.5**	**208**	**0.5**	**0**	**87**	**0**	**108**	**0**	**0**

Note: Data are only presented for sample size ≥25.
Sample weight is 25 g, unless otherwise stated.

1. Sample weight is most usually 25 g but occasionally there are other sample weights recorded.
2. Sample weight: 10 g or 25 g.
3. Sample weight: 500 g.

Table LI6. L. monocytogenes *in ready-to-eat bovine meat products, 2011-2012*

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
At processing plant												
Bulgaria	Meat products, cooked, ready-to-eat	Batch	180	0	-	-	-	-	-	-	-	-
Cyprus	Meat products, fermented sausages	Single	25	20.0	-	-	-	25	20.0	-	-	-
Ireland	Meat products, cooked, ready-to-eat	Single[1]	-	-	-	-	-	109	0.9	-	-	-
Luxembourg	Minced meat, intended to be eaten raw	Single	35	2.9	35	0	0	39	10.3	39	0	0
Poland	Meat products, cooked, ready-to-eat	Batch[2]	130	4.6	-	-	-	-	-	-	-	-
At retail												
Czech Republic	Meat products, cooked, ready-to-eat	Batch	697	0	186	0	0	-	-	-	-	-
Germany	Meat products, fermented sausages	Single	28	10.7	-	-	-	-	-	-	-	
	Meat products, cooked, ready-to-eat	Single	-	-	-	-	-	28	3.6	48	0	0
Hungary	Meat products, cooked, ready-to-eat	Single[3]	-	-	-	-	-	28	0	-	-	-
Ireland	Meat products, cooked, ready-to-eat	Single[1]	30	0	161	0.6	0	48	0	188	0	0
Luxembourg	Minced Meat, intended to be eaten raw	Single	235	19.1	235	1.7	0.4	106	26.4	106	2.8	0
Netherlands	Meat products, cooked, ready-to-eat	Single	-	-	-	-	-	-	-	33	3.0	0
Romania	Meat products, cooked, ready-to-eat	Batch	-	-	-	-	-	26	0	-	-	-
Spain	Meat products, cooked, ready-to-eat	Single	28	0	-	-	-	-	-	-	-	-
Sampling level not specified												
Spain	Meat products, unspecified, ready-to-eat	Single	-	-	-	-	-	31	0	-	-	-
Total (2012: 8 MSs, 2011: 8 MSs)			**1,388**	**4.3**	**617**	**0.8**	**0.2**	**440**	**8.9**	**414**	**1.0**	**0**

Note: Data are presented only for sample size ≥25.
Sample weight is 25 g, unless otherwise stated.

1. In 2011: sample weight is most usually 25 g but occasionally there are other sample weights recorded.
2. Sample weights: 1 g or 25 g.
3. In 2011: sample weight: 10 or 25 g.

Table LI7.* L. monocytogenes *in ready-to-eat pig meat products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤ 100 cfu/g	% > 100 cfu/g	N	% Pos	N	% ≤ 100 cfu/g	% >100 cfu/g
At processing plant												
Belgium	Meat products, raw ham	Batch[1]	83	1.2	33	3.0	-	-	-	-	-	-
	Meat products, cooked, ready-to-eat	Batch[2]	-	-	-	-	-	51	7.8	58	5.2	0
Bulgaria	Meat products, cooked, ready-to-eat	Batch	2,373	0	-	-	-	-	-	-	-	-
Cyprus	Meat products, cooked, ready-to-eat	Single	275	0	-	-	-	275	0	-	-	-
	Meat products, fermented sausages	Single	125	24.0	-	-	-	125	24.0	-	-	-
Czech Republic	Meat products, cooked, ready-to-eat	Batch	1,622	2.3	489	0	1.0	2,994	0.8	754	0	0.5
Estonia	Meat products, cooked, ready-to-eat	Single	76	1.3	-	-	-	110	8.2	-	-	-
Germany	Meat products, cooked, ready-to-eat	Single	241	3.7	192	0.5	0	145	1.4	85	0	0
	Meat products, fermented sausages	Single	238	10.9	168	9.5	0	157	14.6	118	5.1	0.8
Greece	Meat products, cooked, ready-to-eat	Single	79	38.0	-	-	-	-	-	-	-	-
Hungary	Meat products, raw ham	Single	122	4.1	-	-	-	-	-	-	-	-
	Meat products, fermented sausages	Single	185	6.5	132	1.5	0	-	-	-	-	-
	Meat products, cooked, ready-to-eat	Single[3]	-	-	-	-	-	72	0	-	-	-
Ireland	Meat products, cooked, ready-to-eat	Single[4]	-	-	-	-	-	153	0.7	-	-	-
Italy	Meat products	Single	1,085	2.3	110	0.9	1.8	1,114	1.8	124	0	0
Luxembourg	Meat products, cooked, ready-to-eat	Single	35	0	35	0	0	78	2.6	78	0	0
Poland	Meat products, cooked, ready-to-eat	Batch[5]	15,702	2.5	9,774	51.4	0.1	-	-	-	-	-
	Meat products, cooked, ready-to-eat	Batch[6]	195	25.1	-	-	-	-	-	-	-	-
	Meat products, raw and intended to be eaten raw	Batch[7]	-	-	90	5.6	0	-	-	-	-	-
	Meat preparation, intended to be eaten raw	Single	50	40.0	68	89.7	10.3	-	-	-	-	-
	Meat products, cooked, ready-to-eat	Single[8,9]	5,979	3.1	4,234	2.7	0.5	7,792	4.3	7,513	0.5	<0.1
Portugal	Meat products, unspecified, ready-to-eat	Single	65	20.0	65	20.0	0					
	Meat products, cooked, ready-to-eat	Single	-	-	-	-	-	105	11.4	105	1.9	1.9
Slovakia	Meat products, cooked, ready-to-eat	Batch	105	0	-	-	-	56	0	-	-	-

Table continued overleaf.

Table LI7 (continued).* L. monocytogenes *in ready-to-eat pig meat products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤ 100 cfu/g	% > 100 cfu/g	N	% Pos	N	% ≤ 100 cfu/g	% >100 cfu/g
At retail												
Austria	Meat products, cooked, ready-to-eat	Single[10]	145	8.3	145	1.4	0	-	-	-	-	-
Belgium	Meat products, raw ham	Batch[1]	-	-	114	0	0	-	-	-	-	-
	Meat products, cooked, ready-to-eat	Batch[11]	-	-	-	-	-	-	-	93	4.3	0
Bulgaria	Meat products, cooked, ready-to-eat	Batch	135	3.7	-	-	-	60	0	-	-	-
Cyprus	Meat products, unspecified, ready-to-eat, traditional sausages	Single	35	0	-	-	-	35	0	-	-	-
Czech Republic	Meat products, fermented sausages	Batch	-	-	31	0	0	-	-	-	-	-
	Meat products, cooked, ready-to-eat	Batch	1,628	0	497	0	0	-	-	96	0	0
Estonia	Meat products, cooked, ready-to-eat	Single	-	-	-	-	-	-	-	34	0	0
France	Meat products, cooked, ready-to-eat	Single	-	-	-	-	-	4,475	1.4	4,475	0.2	0.2
Germany	Meat products, cooked, ready-to-eat	Single	531	4.9	517	0.6	0.2	531	2.4	354	7.3	0.3
	Meat products, fermented sausages	Single	413	12.1	513	1.4	0	393	9.2	273	1.8	0.4
Greece	Meat products, cooked, ready-to-eat	Single	-	-	-	-	-	34	0	-	-	-
Hungary	Meat products, cooked, ready-to-eat	Single	59	3.4	-	-	-	-	-	-	-	-
	Meat products, fermented sausages	Single	255	0.8	144	0	0	-	-	-	-	-
	Meat products, raw ham	Single	65	4.6	34	5.9	0	-	-	-	-	-
	Meat products, cooked, ready-to-eat	Single[3]	-	-	-	-	-	154	1.3	60	3.3	1.7
Ireland	Meat products, cooked, ready-to-eat	Single[4,12]	65	0	378	0	0	227	3.5	329	-	-
Italy	Meat products	Single	212	2.8	42	2.4	0	779	1.7	491	0.8	0
Luxembourg	Meat products, cooked, ready-to-eat	Single	194	6.7	194	0	0	68	2.9	68	0	0
Netherlands	Meat products, cooked, ready-to-eat	Single	-	-	-	-	-	216	8.3	382	0	0.3
Portugal	Meat products, cooked, ready-to-eat	Batch	34	8.8	373	1.6	0.3	-	-	-	-	-
	Meat products, unspecified, ready-to-eat	Batch	-	-	-	-	-	-	-	570	0	0
	Meat products, cooked, ready-to-eat	Single	95	26.3	-	-	-	54	7.4	29	10.3	3.4
Romania	Meat products, cooked, ready-to-eat	Batch[13]	-	-	60	0	0	175	0	-	-	-
Slovakia	Meat products, cooked, ready-to-eat	Batch[14]	-	-	79	0	0	-	-	58	0	0
	Meat products, fermented sausages	Batch[14]	-	-	28	0	0	-	-	-	-	-
Spain	Meat products, cooked, ready-to-eat	Single	645	11.8	468	5.3	1.5	-	-	-	-	-

Table continued overleaf.

Table LI7 (continued).* L. monocytogenes *in ready-to-eat pig meat products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤ 100 cfu/g	% > 100 cfu/g	N	% Pos	N	% ≤ 100 cfu/g	% >100 cfu/g
Sampling level not specified												
Austria	Meat products, cooked, ready-to-eat	Single[10]	-	-	-	-	-	787	5.3	787	0	0
Spain	Meat products, unspecified, ready-to-eat	Single[15]	-	-	-	-	-	756	7.9	403	3.7	2.2
Sweden	Meat products	Single[16]	-	-	-	-	-	57	1.8	-	-	-
Total (2012: 17 MSs, 2011: 19 MSs)			**33,146**	**3.2**	**19,007**	**27.8**	**0.3**	**22,028**	**3.3**	**17,337**	**0.6**	**0.2**

Note: Data are presented only for sample size ≥25.

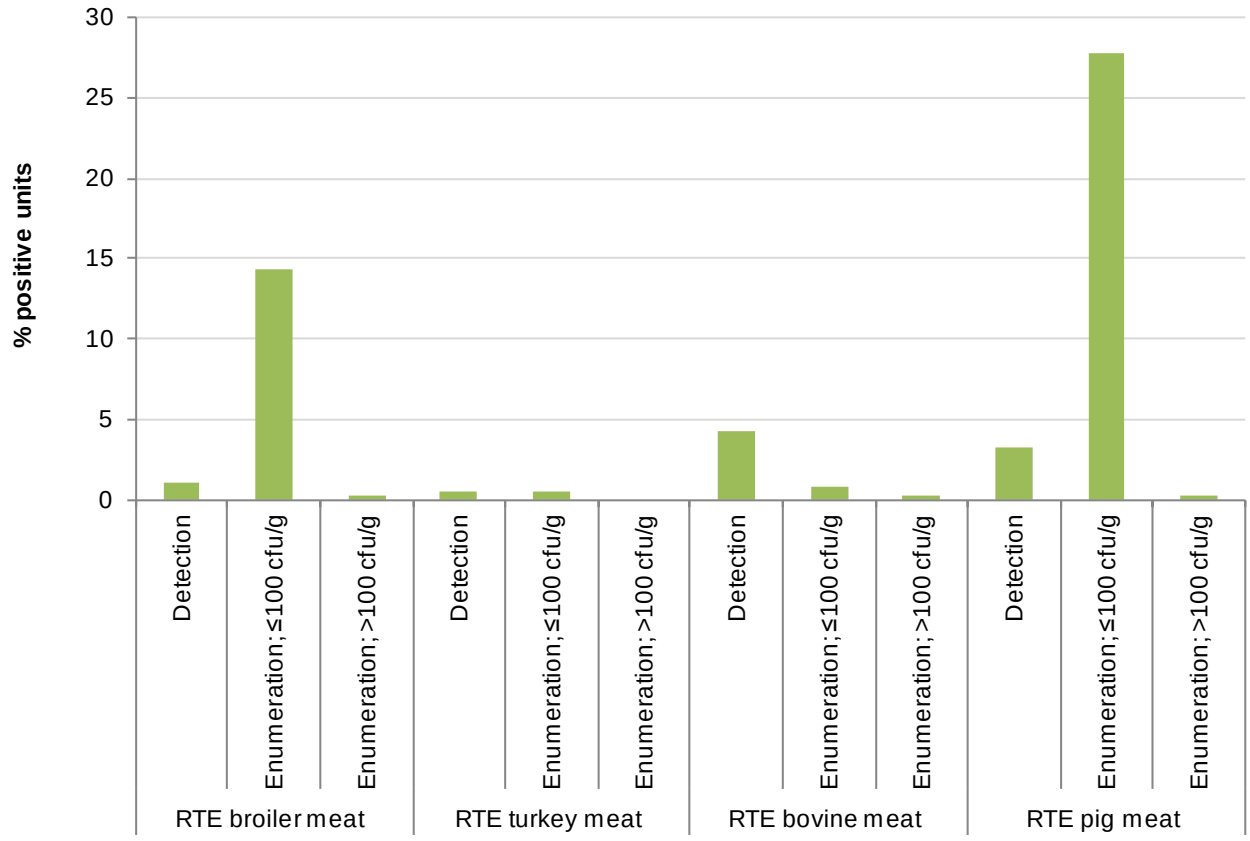
In France, at retail in 2011, the enumeration analysis was carried out on samples positive with the detection method only. Of the 64 samples that were positive by detection method, seven were also positive by the enumeration method with a count of less than or equal to 100 cfu/g and nine were positive with a count higher than 100 cfu/g of *L. monocytogenes*.

In Austria, for samples at retail in 2012, the enumeration analysis was carried out only on 18 samples (which included the 12 samples that were positive with the detection method), two of which were positive with a count of less than or equal to 100 cfu/g of *L. monocytogenes*.

Sample weight is 25 g, unless otherwise stated.

1. Sample weight: 1 g, 2011: sample weight >200 g.
2. Sample weight: >200 g.
3. Sample weight: 10 or 25 g.
4. Sample weight is most usually 25 g but occasionally there are other sample weights recorded.
5. Sample weight: 1, 10, 20, 25 or 125 g.
6. Raw-smoked products.
7. Sample weight: 1 g.
8. Sample weight: 1, 10, 20, 25 or 500 g.
9. Sample weight: 10, 25, 75, 125 g.
10. Sample weight: detection in 25 g, enumeration in 1 g.
11. Sample weight: 200 g.
12. Sample weight is most usually 25 g but occasionally there are other sample weights recorded for 2012, cooked ham products are also included.
13. In 2012 samples - sample weight: 10 g.
14. Sample weight: 10 g.
15. Sample weight: 25 g or unspecified.
16. Sample weight: not reported.

Figure LI5. Proportion of* L. monocytogenes*-positive units in ready-to-eat meat categories in the EU, 2012[1]



Note: Test results obtained by detection and enumeration methods are presented separately.
RTE broiler meat includes data from Belgium, Bulgaria, Czech Republic, Estonia, Hungary, Ireland, Poland, Romania and Spain (detection: six MSs, enumeration: six MSs).
RTE turkey meat includes data from Hungary, Ireland, Poland and Portugal (detection: two MSs, enumeration: three MSs).
RTE bovine meat includes data from Bulgaria, Cyprus, Czech Republic, Germany, Ireland, Luxembourg, Poland and Spain (detection: eight MSs, enumeration: three MSs).
RTE pig meat includes data from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Estonia, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Poland, Portugal, Romania, Slovakia and Spain (detection: 16 MSs, enumeration: 13 MSs).

1. Data pooled for all sampling stages for all reporting MSs (single and batch). Only investigations covering 25 or more samples are included.

Cheeses

In 2012, 16 MSs and 1 non-MS provided data on *L. monocytogenes* in cheeses from investigations including 25 units or more (Tables LI8, LI9, LI10 and LI11).

Soft and semi-soft cheeses

Overall, in 2012, 8,372 units of soft and semi-soft cheeses were tested using detection methods and 3,052 units were tested by enumeration methods in the reporting EU MSs. Results are presented for cheeses made from raw or low heat-treated milk (Table LI8) and from pasteurised milk (Table LI9) originating from cows, sheep and/or goats.

In 2012, the presence of *L. monocytogenes* in soft and semi-soft cheeses made from raw or low heat-treated milk was detected in four out of nine qualitative investigations of cheeses made of cow's milk and in both the qualitative investigations of cheeses made of sheep's milk, in EU MSs. Portugal reported the highest level of *L. monocytogenes* in soft and semi-soft cheeses made from raw or low heat-treated milk from a qualitative investigation at processing, with 20.0 % of batch samples of cheese made from cow's milk testing positive. *L. monocytogenes* was found in one of the six quantitative investigations of cheeses made from raw or low heat-treated cow's milk.

Compared with 2011, the number of tested samples from soft and semi-soft cheeses made from pasteurised milk declined in 2012. In the reporting EU MSs, in 2012, *L. monocytogenes* was detected in 5 of the 18 qualitative investigations of cheeses made from pasteurised cow's milk, while using the enumeration method, *L. monocytogenes* was detected in levels above 100 cfu/g in only two investigations (0.3 % of single samples in Germany and 1.2 % of single samples in Spain). *L. monocytogenes* was not found in any of the tested samples of cheeses made from pasteurised goat's milk, sheep's milk or mixed, unspecified or other milk.

Hard cheeses

Overall, 12,117 units of hard cheeses were reported as tested using detection methods and 3,687 units were reported as tested by enumeration methods, in 2012 in the reporting EU MSs. Results are presented for cheeses made from raw or low heat-treated milk (Table LI10) and from pasteurised milk (Table LI11) originating from cows, sheep and/or goats.

In 2012, *L. monocytogenes* was found in hard cheeses made from raw or low heat-treated milk from cows in 2 of the 10 reported qualitative investigations in EU MSs. The positive findings were from samples taken at farm and at processing, and as hard cheeses are assumed not to support growth of *L. monocytogenes* during shelf-life, only concentrations exceeding 100 cfu/g are considered to pose a risk to public health. One of the six quantitative investigations of hard cheeses made from raw or low heat-treated milk from cows, in EU MSs, reported levels of *L. monocytogenes* above 100 cfu/g (1.9 % of single samples at processing, in France) while in one of the quantitative investigations of hard cheeses made from raw or low heat-treated sheep's milk, levels above 100 cfu/g were reported.

In 2012, *L. monocytogenes* was found in hard cheeses made from pasteurised milk from cows in 3 of the 12 qualitative investigations, and at levels above 100 cfu/g in one out of nine quantitative investigations (0.6 % of single samples at retail in Spain). *L. monocytogenes* was not found in any samples of hard cheeses made from pasteurised milk from sheep and goats.

A summary of tested units and the proportion of units positive for cheeses is presented in Figure LI6. *L. monocytogenes* was more often detected in samples of cheeses made from raw or low heat-treated milk than in samples of cheeses made from pasteurised milk.

For further information on reported data, refer to the Level 3 Tables.

Table LI8. **L. monocytogenes *in soft and semi-soft cheeses made from raw or low heat-treated milk, 2011-2012***

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses made from milk from cows												
Austria	At processing plant	Single[1]	44	0	44	0	0	-	-	-	-	-
	At retail	Single[1]	38	0	38	0	0	33	0	27	0	0
Belgium	At farm	Batch[2]	-	-	-	-	-	32	3.1	51	17.6	2.0
	At processing plant	Batch[3]	50	4.0	-	-	-	48	4.2	-	-	-
	At retail	Batch[4]	-	-	99	0	0	-	-	97	10.3	0
Bulgaria	At processing plant	Batch	650	0	-	-	-	-	-	-	-	-
France	At processing plant	Single	129	1.6	129	0.8	0.8	1,060	<0.1	1,060	<0.1	0
	At retail	Single	-	-	-	-	-	266	0.8	266	0.4	0
Germany	At retail	Single	79	0	69	0	0	50	2.0	49	0	0
Netherlands	At retail	Single	-	-	-	-	-	30	0	33	0	0
Poland	At processing plant	Batch	125	0	-	-	-	-	-	-	-	-
	At processing plant	Single[5]	145	0.7	-	-	-	198	0	30	0	0
Portugal	At processing plant	Batch	30	20.0	-	-	-	-	-	-	-	-
	At processing plant	Single	-	-	-	-	-	45	20.0	-	-	-
Romania	At processing plant	Batch[6]	-	-	-	-	-	502	0	-	-	-
	At retail	Batch[6,7]	-	-	86	0	0	870	0	-	-	-
Total (2012: 8 MSs, 2011: 8 MSs)			**1,290**	**0.9**	**465**	**0.2**	**0.2**	**3,134**	**0.5**	**1,613**	**1.3**	**<0.1**
Switzerland	At processing plant	Single	217	0	217	0	0	98	0	-	-	-

Table continued overleaf.

Table LI8 (continued).* L. monocytogenes *in soft and semi-soft cheeses made from raw or low heat-treated milk, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses made from milk from sheep												
Czech Republic	At processing plant	Batch	-	-	-	-	-	35	0	-	-	-
Portugal	At processing plant	Batch	100	16.0	-	-	-	-	-	-	-	-
	At processing plant	Single	-	-	28	7.1	0	40	5.0	40	2.5	2.5
	At retail	Batch	-	-	-	-	-	-	-	215	2.8	7.9
Romania	At processing plant	Batch	-	-	-	-	-	360	0	-	-	-
	At retail	Batch[6]	-	-	66	0	0	149	0	-	-	-
Slovakia	At processing plant	Batch	171	0.6	-	-	-	161	1.2	-	-	-
Total (2012: 3 MSs, 2011:4 MSs)			**271**	**6.3**	**94**	**2.1**	**0**	**745**	**0.5**	**255**	**2.7**	**7.1**
Cheeses, made from mixed milk from cows, sheep and/or goats												
Portugal	At processing plant	Batch	35	0	-	-	-	-	-	-	-	-
	At retail	Batch	-	-	-	-	-	-	-	95	0	0
Total (2012: 1 MS, 2011: 1 MS)			**35**	**0**	**0**	**0**	**0**	**0**	**0**	**95**	**0**	**0**

Note: Data are presented only for sample size ≥25.

In France, for cheeses made from milk from cows, at processing plant in 2012, the enumeration analysis was carried out on samples positive with the detection method only. Of the two samples that were positive by detection method, one was also positive by the enumeration method with a count of less than or equal to 100 cfu/g and one was positive with a count higher than 100 cfu/g of *L. monocytogenes*.

For cheeses made from milk from cows, at processing plant in 2011, the enumeration analysis was carried out on samples positive with the detection method only. The one sample that was positive by detection method, was also positive by the enumeration method with a count of less than or equal to 100 cfu/g of *L. monocytogenes*.

For cheeses made from milk from cows, at retail in 2011, the enumeration analysis was carried out on samples positive with the detection method only. Of the two samples that were positive by detection method, one was also positive by the enumeration method with a count of less than or equal to 100 cfu/g of *L. monocytogenes*.

Sample weight is 25 g, unless otherwise stated.

1. Sample weight: detection in 25 g, enumeration in 1 g.
2. In 2011 sample weight: 200 g.
3. In 2011 sample weight: 300 g.
4. In 2012 sample weight 1 g. In 2011: sample weight 200 g.
5. In 2011 64 samples (out of 198) tested for detection weighted 10 g.
6. In 2012 sample weight: 10 g.
7. In 2011, 32 samples from non-EU were tested for detection (included in the table), no positive were reported.

Table LI9.* L. monocytogenes *in soft and semi-soft cheeses made from pasteurised milk, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses made from milk from cows												
Austria	At processing plant	Single[1]	86	0	77	0	0	143	0	131	0	0
	At retail	Single[1]	160	0.6	114	0	0	86	0	79	0	0
Belgium	At processing plant	Batch	106	0	-	-	-	100	0	-	-	-
	At retail	Batch[2]	-	-	115	0	0	-	-	112	2.7	0
Bulgaria	At processing plant	Batch	680	0	-	-	-	-	-	-	-	-
	At retail	Batch	-	-	-	-	-	115	0	-	-	-
Cyprus	At processing plant	Single	35	0	-	-	-	35	0	-	-	-
Czech Republic	At processing plant	Batch	945	0	50	0	0	2,550	1.5	743	0.8	0.4
	At retail	Batch	-	-	85	0	0	35	0	117	0	0
Denmark	At processing plant	Batch	33	0	-	-	-	-	-	-	-	-
France	At processing plant	Single	189	0	-	-	-	-	-	-	-	-
	At retail	Single	-	-	-	-	-	1,525	0.1	1,525	0	0.1
Germany	At processing plant	Single	110	1.8	93	1.1	0	60	0	36	0	0
	At retail	Single	501	0.2	371	0.8	0.3	638	0.2	355	16.1	0
Hungary	At processing plant	Single[3]	50	0	-	-	-	61	1.6	-	-	-
	At retail	Single[3]	53	0	30	0	0	87	0	78	0	0
Netherlands	At retail	Single	-	-	-	-	-	375	0.5	492	0	0
Poland	At processing plant	Batch[4]	1,095	0	334	0	0	-	-	-	-	-
	At processing plant	Single[5]	605	0	221	-	-	929	0	477	0	0
	Sampling stage unspecified	Single[1]	167	0	29	0	0	-	-	-	-	-
Portugal	At processing plant	Batch	83	0	-	-	-	55	1.8	-	-	-
	At retail	Batch	-	-	25	0	0	310	0	-	-	-
Romania	At processing plant	Batch	-	-	-	-	-	227	0	-	-	-
	At retail	Batch[6]	-	-	91	0	0	42	0	-	-	-
Slovakia	At processing plant	Batch	96	1.0	-	-	-	87	2.3	-	-	-
	At retail	Batch[6]	-	-	88	0	0	-	-	121	0	0
Spain	At retail	Single	417	0.5	420	0	1.2	-	-	-	-	-
Total (2012: 14 MSs, 2011: 12 MSs)			**5,411**	**0.1**	**2,143**	**0.2**	**0.3**	**7,460**	**0.6**	**4,266**	**1.5**	**0.1**
Switzerland	At processing plant	Single	138	0	138	0	0	-	-	-	-	-

Table continued overleaf.

Table LI9 (continued). **L. monocytogenes** *in soft and semi-soft cheeses made from pasteurised milk, 2011-2012*

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses made from milk from goats												
Bulgaria	At processing plant	Batch[7]	60	0	-	-	-	-	-	-	-	-
Cyprus	At farm	Single	30	0	-	-	-	30	0	-	-	-
	At processing plant	Single	75	0	-	-	-	75	0	-	-	-
Czech Republic	At processing plant	Batch	35	0	-	-	-	55	0	-	-	-
Netherlands	At retail	Single	-	-	-	-	-	41	0	60	-	-
Poland	At processing plant	Batch[6]	-	-	30	0	0	-	-	-	-	-
Portugal	At processing plant	Batch	25	0	-	-	-	60	0	-	-	-
	At retail	Batch	-	-	95	0	0	-	-	35	0	0
United Kingdom	At retail	Single	-	-	-	-	-	31	0	31	0	0
Total (2012: 5 MSs, 2011: 5 MSs)			**225**	**0**	**125**	**0**	**0**	**292**	**0**	**126**	**0**	**0**
Cheeses made from milk from sheep												
Bulgaria	At retail	Batch[2]	-	-	-	-	-	-	-	131	0	0
Cyprus	At processing plant	Single	-	-	-	-	-	85	0	-	-	-
	At retail	Single	85	0	-	-	-	-	-	-	-	-
Greece	At processing plant	Single	-	-	-	-	-	304	0	-	-	-
	At retail	Single	-	-	-	-	-	32	0	-	-	-
Poland	At processing plant	Batch[6]	65	0	-	-	-	-	-	-	-	-
	At retail	Single	-	-	-	-	-	36	0	-	-	-
Portugal	At processing plant	Batch	-	-	225	0	0	85	0	-	-	-
	At retail	Batch	-	-	-	-	-	-	-	120	0	0
Romania	At processing plant	Batch	-	-	-	-	-	46	0	-	-	-
Total (2012: 3 MSs, 2011: 6 MSs)			**150**	**0**	**225**	**0**	**0**	**588**	**0**	**251**	**0**	**0**

Table continued overleaf.

Table LI9 (continued).* L. monocytogenes *in soft and semi-soft cheeses made from pasteurised milk, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses, made from mixed milk from cows, sheep and/or goats												
Cyprus	At processing plant	Single	345	0	-	-	-	345	0	-	-	-
Portugal	At processing plant	Batch	30	0	-	-	-	-	-	-	-	-
	At retail	Batch	-	-	-	-	-	-	-	125	4.0	0
Total (2012: 2 MSs, 2011: 2 MSs)			**375**	**0**	**-**	**-**	**-**	**345**	**0**	**125**	**4.0**	**0**
Cheeses, made from unspecified milk or other animal milk												0
Cyprus	At farm	Single	105	0	-	-	-	105	0	-	-	-
	At processing plant	Single	510	0	-	-	-	510	0	-	-	-
Total (2012: 1 MS, 2011: 1 MS)			**615**	**0**	**-**	**-**	**-**	**615**	**0**	**-**	**-**	**-**

Note: Data are presented only for sample size ≥25.
Sample weight is 25 g, unless otherwise stated.

1. Sample weight: detection in 25 g, enumeration in 1 g.
2. Sample weight: 1 g.
3. Sample weight not reported in 2011.
4. All samples weighted 25 g, except for 175 (out of 334) samples tested for enumeration that weighted 10 g.
5. All samples weighted 25 g except for the following units tested in 2011: 25 and 206 samples tested respectively for detection and enumeration weighted 10 g; 33 samples tested for detection weighted 125 g.
6. Sample weight: 10 g.
7. Sample weight not reported.

Table LI10.* L. monocytogenes *in hard cheeses made from raw or low heat-treated milk, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses made from milk from cows												
Austria	At processing plant	Single[1]	34	0	34	0	0	27	0	27	0	0
	At retail	Single[1]	26	0	26	0	0	-	-	-	-	-
Bulgaria	At processing plant	Batch	425	0	-	-	-	-	-	-	-	-
Czech Republic	At processing plant	Batch	26	0	-	-	-	-	-	-	-	-
France	At processing plant	Single	54	9.3	54	7.4	1.9	1,305	<0.1	1,305	<0.1	0
Germany	At retail	Single	254	0	108	0	0	51	0	25	0	0
	At processing plant	Single	-	-	-	-		51	2.0	29	0	0
Poland	At processing plant	Batch	225	0	-	-	-	-	-	-	-	-
	At farm	Single	112	0.9	-	-	-	-	-	-	-	-
	At processing plant	Single	120	0	30	0	0	-	-	-	-	-
	Unspecified	Single	65	0	-	-	-	-	-	-	-	-
	At retail	Single	-	-	-	-	-	25	0	-	-	-
Romania	At retail	Batch[2]	-	-	162	0	0	89	0	-	-	-
	At processing plant	Batch	-	-	-	-	-	176	0.1	-	-	-
Total hard cheeses made from milk from cows (2012: 7 MSs, 2011: 5 MSs)			**1,341**	**0.4**	**414**	**1.0**	**0.2**	**1,724**	**0.1**	**1,386**	**<0.1**	**0**
Switzerland	At processing plant	Single	329	0	329	0	0	300	0	-	-	-

Table continued overleaf.

Table LI10 (continued).* L. monocytogenes *in hard cheeses made from raw or low heat-treated milk, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses made from milk from sheep and goats												
Germany	Goat's milk, at processing plant	Single	34	0	-	-	-	27	3.7	-	-	-
	Sheep's milk, at retail	Single	58	0	50	0	0	-	-	-	-	-
Poland	Sheep's milk, at processing plant	Batch[2]	-	-	130	0	3.8	-	-	-	-	-
Portugal	Sheep's milk, at processing plant	Batch	65	6.2	-	-	-	110	0	-	-	-
	Sheep's milk, at retail	Batch	-	-	-	-	-	0	0	135	2.2	8.9
Romania	Sheep's milk, at retail	Batch[2]	-	-	164	0	0	-	-	-	-	-
	Sheep's milk, at processing plant	Batch[2]	-	-	-	-	-	314	1.6	-	-	-
	Sheep's milk, at retail	Batch[2]	-	-	-	-	-	355	0.3	-	-	-
Total hard cheeses made from milk from sheep and goats (2012: 4 MSs, 2011: 3 MSs)			**157**	**2.5**	**344**	**0**	**1.5**	**806**	**0.9**	**135**	**2.2**	**8.9**

Note: Data are presented only for sample size ≥25.

In France, for the cheeses made from milk from cows at processing plant, the enumeration analysis was carried out on samples positive with the detection method only. For 2012 of the five samples that were positive by detection method, four were also positive by the enumeration method with a count of less than or equal to 100 cfu/g and one was positive with a count higher than 100 cfu/g of *L. monocytogenes*.

For 2011: the one sample that was found positive by detection method was also found positive by enumeration method with a count of less than or equal to 100 cfu/g of *L. monocytogenes*.

Sample weight is 25 g, unless otherwise stated.

1. Sample weight: detection in 25 g, enumeration in 1 g.
2. Sample weight: 10 g.

Table LI11.* L. monocytogenes *in hard cheeses made from pasteurised milk, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses made from milk from cows												
Bulgaria	At processing plant	Batch	4,681	0	-	-	-	-	-	-	-	-
	At retail	Batch	215	0	-	-	-	76	0	-	-	-
Czech Republic	At processing plant	Batch	105	0	-	-	-	238	0	-	-	-
France	At processing plant	Single	54	0	-	-	-	-	-	-	-	-
Germany	At processing plant	Single	664	0.2	254	0.4	0	662	0.5	250	0.4	0
	At retail	Single	2,413	0.4	1078	0.3	0	2,505	0.8	926	7.0	0.1
Greece	At retail	Single	-	-	-	-	-	26	0	-	-	-
Latvia	At retail	Single	-	-	40	0	-	-	-	-	-	-
Lithuania	At retail	Batch[1]	35	0	-	-	-	-	-	-	-	-
Poland	At processing plant	Batch	1,018	0	160	0	0	-	-	-	-	-
	Unspecified	Batch	38	0	-	-	-	-	-	-	-	-
	At processing plant	Single	648	0	162	0	0	3,179	<0.1	120	-	-
	Unspecified	Single[2]	122	-	106	0	0	-	-	-	-	-
	At processing plant	Single[3]	-	-	-	-	-	578	0	176	0	0
Romania	At retail	Batch[4]	-	-	132	0.8	0	-	-	-	-	-
	At processing plant	Batch	-	-	-	-	-	545	0	-	-	-
Slovakia	At retail	Batch[4]	-	-	28	0	0	-	-	31	0	0
Spain	At retail	Single	133	2.3	169	0	0.6	-	-	-	-	-
Total hard cheeses made from milk from cows (2012: 10 MSs, 2011: 7 MSs)			**10,126**	**0.1**	**2,129**	**0.2**	**<0.1**	**7,733**	**0.3**	**1,503**	**4.4**	**<0.1**

Table continued overleaf.

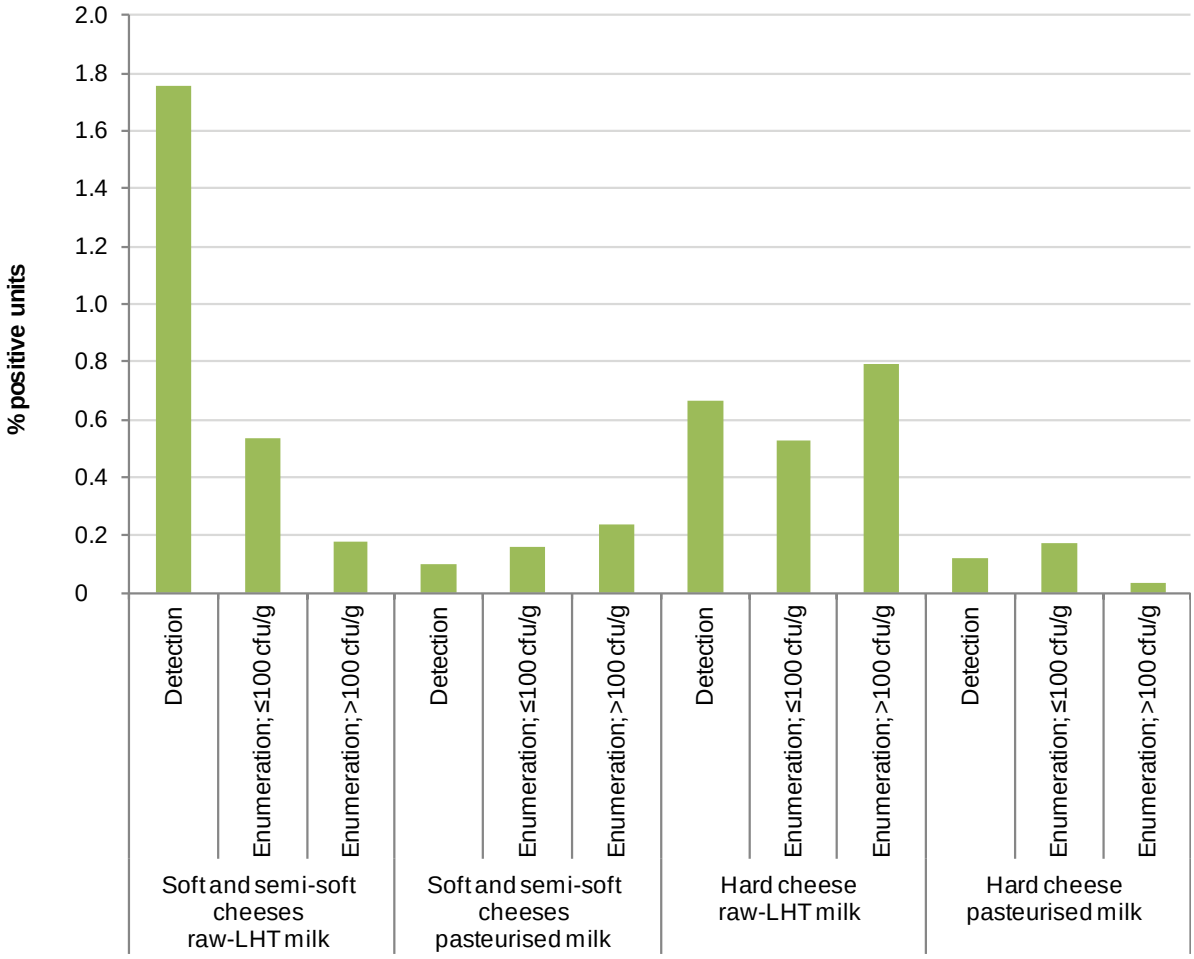
Table LI11 (continued). **L. monocytogenes** *in hard cheeses made from pasteurised milk, 2011-2012*

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Cheeses made from milk from sheep and goats												
Bulgaria	Goat's milk, at processing plant	Batch[5]	-	-	565	0	0	-	-	-	-	-
	Goat's milk, at retail	Batch[6]	-	-	65	0	0	-	-	-	-	-
	Sheep's milk, at processing plant	Batch	290	0	-	-	-	-	-	-	-	-
Germany	Goat's milk, at processing plant	Single	54	0	27	0	0	69	0	27	3.7	0
	Goat's milk, at retail	Single	116	0	71	0	0	99	0	41	7.3	0
	Sheep's milk, at retail	Single	33	0	72	0	0	28	0	-	-	-
	Sheep's milk, at processing plant	Single	-	-	-	-	-	28	0	-	-	-
Greece	Goat's milk, at processing plant	Single	-	-	-	-	-	28	0	-	-	-
	Sheep's milk, at processing plant	Single	-	-	-	-	-	85	2.4	-	-	-
Romania	Sheep's milk, at processing plant	Batch	-	-	-	-	-	37	0	-	-	-
Total hard cheeses made from milk from sheep and goats (2012: 2 MSs, 2011: 3 MSs)			**493**	**0**	**800**	**0**	**0**	**416**	**0.5**	**110**	**4.5**	**0**
Cheeses made from unspecified milk or other animal milk												
Cyprus	At processing plant	Single	340	0	-	-	-	340	0	-	-	-

Note: Data are presented only for sample size ≥25.
Sample weight is 25 g, unless otherwise stated.

1. Sample weight: 500 g.
2. Sample weight: 25 or 200 g.
3. Sample weight: 10 or 250 g.
4. Sample weight: 10 g.
5. Sample weight not reported.
6. Sample weight: 1 g.

Figure LI6. Proportion of* L. monocytogenes*-positive units in soft and semi-soft cheeses, and hard cheeses made from raw or low heat-treated milk and pasteurised milk, 2012[1]



Note: Test results obtained by detection and enumeration methods are presented separately. LHT: low heat-treated milk;
Soft and semi-soft cheeses, made from raw-LHT milk, includes data from Austria, Belgium, Bulgaria, France, Germany, Poland, Portugal, Romania, Slovakia and Switzerland (detection: nine MSs, enumeration: seven MSs).
Soft and semi-soft cheeses, made from pasteurised milk, includes data from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, France, Germany, Hungary, Poland, Portugal, Romania, Slovakia, Spain and Switzerland (detection: 14 MSs, enumeration: 11 MSs).
Hard cheese, made from raw-LHT milk, includes data from Austria, Bulgaria, Czech Republic, France, Germany, Poland, Portugal, Romania and Switzerland (detection: eight MSs, enumeration: six MSs).
Hard cheese, made from pasteurised milk, includes data from Bulgaria, Cyprus, Czech Republic, France, Germany, Latvia, Lithuania, Poland, Romania, Slovakia and Spain (detection: eight MSs, enumeration: seven MSs).

1. Data pooled for all sampling stages for all reporting MSs (single and batch). Only investigations covering 25 or more samples are included.

Fishery products

In 2012, 17 MSs reported data on *L. monocytogenes* in RTE fish or fishery products (Table LI12). The products tested were mainly smoked fish, and the majority were tested at the processing plant.

In 2012, the presence of *L. monocytogenes* in RTE fish was detected in 12 out of 16 qualitative investigations. In total, *L. monocytogenes* was detected in 12.0 % of the 10,831 tested units, but, as the majority of the tested units were sampled in one MS, Poland, the lack of representativeness should be taken into account when interpreting the overall results. *L. monocytogenes* was also detected in 9 out of 16 quantitative investigations of RTE fish in 2012 (6,141 tested units in total), and in six investigations at levels above 100 cfu/g. *L. monocytogenes* counts above 100 cfu/g were found in 1.4 % of the samples tested by enumeration testing in 2012 (0.5 % in 2011). However, this increase was mainly due to the results of one large investigation in Poland.

In 2012, *L. monocytogenes* was detected in all four reported qualitative investigations of unspecified fishery products. In the quantitative investigations of unspecified fishery products, *L. monocytogenes* was found at levels above 100 cfu/g in only one investigation (7.1 % of batch samples in Slovenia).

A summary of the proportion of *L. monocytogenes* positive units in different types of fishery products is presented in Figure LI7. *L. monocytogenes* was most often detected in RTE fish, in which the highest percentage of units with *Listeria* counts of more than 100 cfu/g was also detected.

For further information on reported data, refer to the Level 3 Tables.

Table LI12.* L. monocytogenes *in ready-to-eat fish and other fishery products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Fish												
Austria	Smoked, at retail	Single[1]	72	2.8	72	2.8	0	36	5.6	36	0	0
	Smoked, unspecified	Single[1]	-	-	-	-	-	31	3.2	31	0	0
Belgium	Smoked, at processing plant	Batch[2]	-	-	200	0	0	-	-	-	-	-
	Smoked, at retail	Batch	-	-	200	0	0	-	-	-	-	-
	Smoked, at retail	Batch[3]	-	-	-	-	-	-	-	203	1.0	0.5
Bulgaria	Smoked, at retail	Batch	50	2.0	45	0	0	-	-	-	-	-
	Smoked, at processing plant	Batch	-	-	-	-	-	34	5.9	-	-	-
	Smoked – cold smoked, at processing plant	Batch[2]	-	-	-	-	-	-	-	65	0	0
Cyprus	Smoked, at processing plant	Single	45	0	-	-	-	45	0	-	-	-
Czech Republic	Smoked, at retail	Batch	60	0	79	0	0	-	-	38	0	2.6
	Smoked, at processing plant	Batch	30	0	-	-	-	84	2.4	47	0	6.4
Estonia	Smoked, at retail	Single	-	-	-	-	-	-	-	29	0	0
France	Smoked, at retail	Single	-	-	-	-	-	386	8.8	386	0	0
Germany	Smoked - cold smoked, at processing plant	Single	44	18.2	34	17.6	2.9	55	7.3	69	0	2.9
	Smoked - hot smoked, at processing plant	Single	263	3.0	253	0.4	0	-	-	-	-	-
	Smoked - cold smoked, at retail	Single	454	14.5	358	4.2	0.6	323	8.0	308	0.6	0.6
	Smoked - hot smoked, at retail	Single	929	5.1	734	0.3	0.4	663	2.7	604	27.3	0.7
Hungary	Smoked, at retail	Single[4]	39	5.1	-	-	-	134	17.9	47	21.3	8.5
Ireland	Smoked, at processing plant	Single[5]	-	-	-	-	-	182	22.5	62	3.2	4.8
Latvia	Smoked, at retail	Single	-	-	45	0	0	-	-	-	-	-
Lithuania	Smoked, at retail	Batch[6]	-	-	-	-	-	56	12.5	56	1.8	-
Netherlands	Smoked, at processing plant	Single	91	8.8	-	-	-	125	8.8	133	0.8	1.5
	Smoked, at processing plant	Single	-	-	-	-	-	-	-	-	-	-
	Smoked, at retail	Single	-	-	91	3.3	1.1	-	-	772	0.4	0.3

Table continued overleaf.

Table LI12 (continued). **L. monocytogenes** *in ready-to-eat fish and other fishery products, 2011-2012*

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Poland	Smoked, at processing plant	Batch[7]	195	4.1	26	0	0	8,964	9.1	2,974	4.1	0.3
	Smoked, unspecified, at processing plant	Batch[8]	7,199	13.6	3,184	2.7	2.4	-	-	-	-	-
	Smoked, at processing plant	Single[9]	1,144	13.4	512	0.2	0	-	-	-	-	-
	Smoked, unspecified, at processing plant	Single[2]	-	-	68	0	0	-	-	-	-	-
Portugal	Smoked, at retail	Batch	-	-	-	-	-	-	-	45	0	0
Slovenia	Smoked	Batch	50	0	-	-	-	-	-	-	-	-
Spain	Smoked, at retail	Single	166	11.4	240	0.8	2.1	-	-	-	-	-
Romania	Smoked, at processing plant	Batch	-	-	-	-	-	103	0	-	-	-
	Smoked, at retail	Batch	-	-	-	-	-	36	0	-	-	-
Total Fish (2012: 12 MSs, 2011: 15 MSs)			**10,831**	**12.0**	**6,141**	**1.9**	**1.4**	**11,257**	**8.8**	**5,905**	**5.2**	**0.5**
Fishery products unspecified												
Austria	Ready-to-eat – chilled, at retail	Single[8]	-	-	-	-	-	34	14.7	34	0	0
Belgium	Ready-to-eat, at processing plant	Batch[10]	65	1.5	92	0	0	103	8.7	51	0	0
	Ready-to-eat, at retail	Batch[11]	-	-	148	0	0	0	0	179	0	0
Estonia	Ready-to-eat, at processing plant	Single	44	4.5	-	-	-	36	8.3	-	-	-
	Ready-to-eat, at retail	Single	-	-	41	0	0	-	-	-	-	-
	Smoked, at processing plant	Single	-	-	-	-	-	-	-	-	-	-
France	Seafood pâté, at retail	Single	-	-	-	-	-	880	1.0	880	0.3	0.1
Germany	Cooked, at retail	Single	62	3.2	53	1.9	0	-	-	-	-	-
Ireland	Smoked, at retail	Single[5]	-	-	-	-	-	68	2.9	68	-	-
	Ready-to-eat, at retail	Single[5]	-	-	-	-	-	-	-	30	0	0
	Cooked, at retail	Single[5]	-	-	84	0	0	-	-	66	0	0
Lithuania	Ready-to-eat – chilled, at retail	Batch	135	4.4	-	-	-	-	-	-	-	-
Romania	Ready-to-eat, at retail	Batch[12]	-	-	32	0	0	-	-	-	-	-
Slovenia	Ready-to-eat – chilled	Batch	-	-	28	0	7.1	-	-	-	-	-
Total Fishery products unspecified (2012: 7 MSs, 2011: 5 MSs)			**306**	**3.6**	**478**	**0.2**	**0.4**	**1,121**	**2.5**	**1308**	**0.2**	**<0.1**

Table continued overleaf.

Table LI12 (continued).* L. monocytogenes *in ready-to-eat fish and other fishery products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Crustaceans												
Bulgaria	Cooked, at processing plant	Batch	115	0	-	-	-	-	-	-	-	-
Poland	Cooked, at processing plant	Batch	221	1.4	-	-	-	-	-	-	-	-
	Cooked, at processing plant	Single	-	-	44	0	0	532	0.2	0	0	0
Portugal	Cooked, at retail	Batch	-	-	100	0	0	112	0	0	0	0
Spain	Cooked, at retail	Single	41	0	75	1.3	0	-	-	-	-	-
Total Crustaceans (2012: 4 MSs , 2011: 2 MSs)			**377**	**0.8**	**219**	**0.5**	**0**	**644**	**0.2**	**0**	**0**	**0**
Molluscan shellfish												
Hungary	Cooked, at retail	Single	25	0	-	-	-	-	-	-	-	-
Portugal	Cooked, at retail	Batch	-	-	25	0	0	-	-	-	-	-
Spain	Cooked, at retail	Single	37	0	44	0	0	-	-	-	-	-
Total Molluscan shellfish (2012: 3 MSs)			**62**	**0**	**69**	**0**	**0**	**-**	**-**	**-**	**-**	**-**

Note: Data are only presented for sample size >25

In France, for fish smoked at retail, the enumeration analysis was carried out on samples positive with the detection method only. For 2011 of the 34 samples that were positive by detection method, none was positive by the enumeration method.

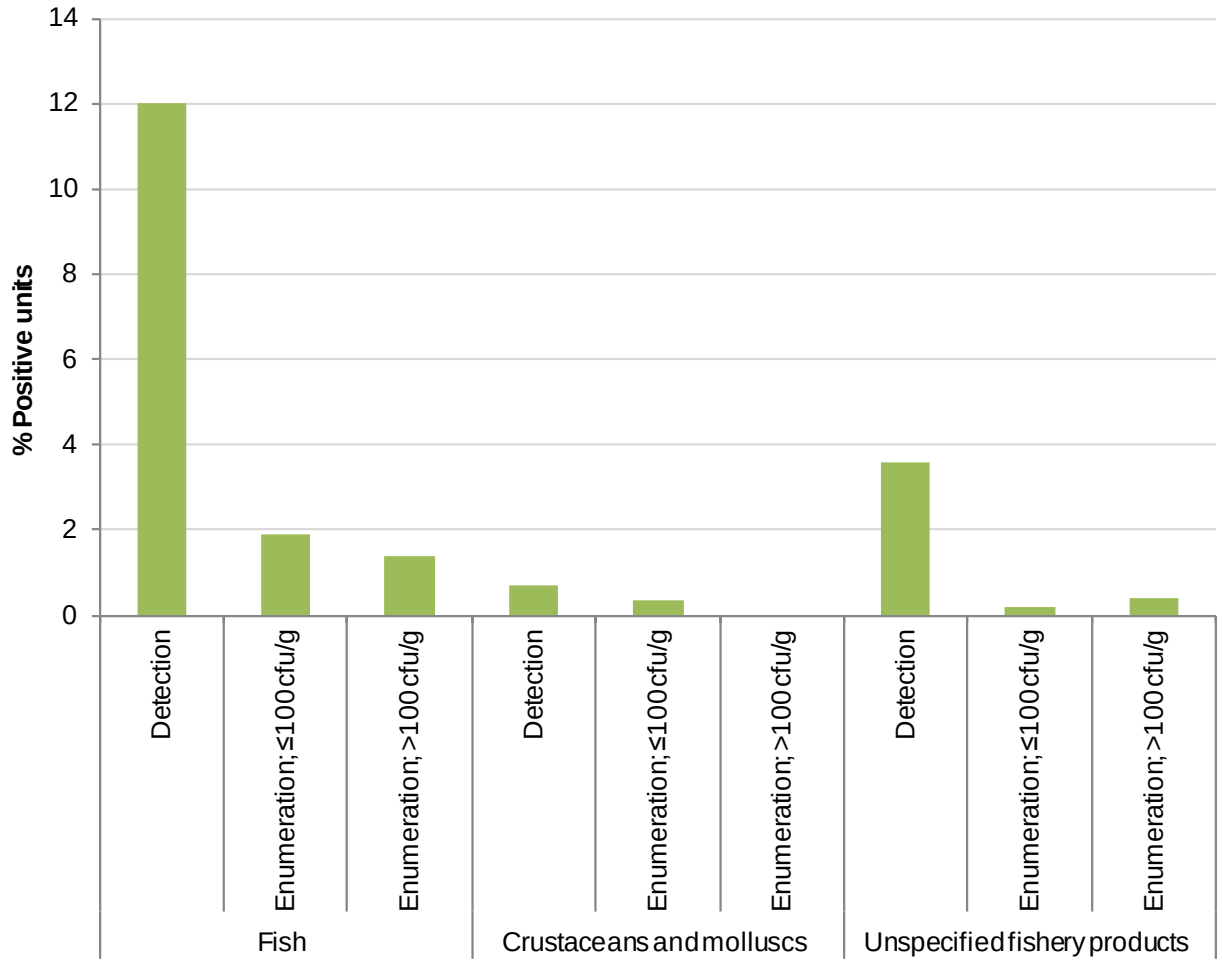
Also, for fishery products unspecified - seafood pâté, at retail, the enumeration analysis was carried out on samples positive with the detection method only. For 2011 of the nine samples positive by detection method, three were also positive by the enumeration method with a count of less than or equal to 100 cfu/g and one was positive with a count higher than 100 cfu/g of *L. monocytogenes.*

In Austria, for fish smoked at retail in 2012, the enumeration analysis was carried out only on 10 samples (which included the two samples that were positive with the detection method), 2 of which were positive with a count of less than or equal to 100 cfu/g of *L. monocytogenes.*

Sample weight is 25 g, unless otherwise stated

1. Sample weight: detection in 25 g, enumeration in 1 g .
2. Sample weight: 1 g.
3. Sample weight: >100 g .
4. For 2011: sample weight was 10 g or 25 g .
5. For 2011: sample weight is most usually 25 g but occasionally there are other sample weights recorded.
6. Sample weight: 25 g for detection and 1 g for enumeration.
7. Sample weight: 10 g or 25 g.
8. Sample weight: detection in 25 g, enumeration in 1 g .
9. Sample weight: 1 g, 10 g or 25 g .
10. For 2012: 1 g. For 2011: > 200 g .
11. For 2012: 1 g. For 2011: 100 g.
12. Sample weight: 10 g.

Figure LI7. Proportion of L. monocytogenes-positive units in ready-to-eat fishery products categories in EU, 2012[1]



Note: Test results obtained by detection and enumeration methods are presented separately.
Fish includes data from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Germany, Hungary, Latvia, Netherlands, Poland, Slovenia and Spain (detection: 10 MSs, enumeration: 9 MSs).
Crustaceans and molluscs includes data from Bulgaria, Hungary, Poland, Portugal and Spain (detection: four MSs, enumeration: three MSs).
Unspecified fishery products includes data from Belgium, Estonia, Germany, Ireland, Lithuania, Romania and Slovenia (detection: four MSs, enumeration: six MSs).

1. Data pooled for all sampling stages for all reporting MSs (single and batch). Only investigations covering 25 or more samples are included.

Other ready-to-eat products

A substantial number of investigations were reported on *L. monocytogenes* in other RTE products, such as bakery products, sandwiches, fruits and vegetables, prepared dishes and salads (Table LI13).

In 2012, in the category bakery products, *L. monocytogenes* was detected in 6 of the 10 qualitative investigations. *L. monocytogenes* was not found at levels above 100 cfu/g in any of the nine quantitative investigations; neither was *L. monocytogenes* found in the relatively few reported investigations of confectionery products and pastes, egg products or fruits in 2012. In qualitative investigations of 'other processed food products and prepared dishes', *L. monocytogenes* was detected in sandwiches at processing and at retail.

L. monocytogenes was detected in 6 of the 11 qualitative investigations of RTE salads. In 2012, only 1 of the 2,285 units of RTE salads tested by enumeration method was found to contain *L. monocytogenes* at a level above 100 cfu/g.

In 2012, there were no findings of *L. monocytogenes* in the relatively few tested pre-cut vegetables.

For further information on reported data refer to the Level 3 Tables.

Table LI13.* L. monocytogenes *in other ready-to-eat products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Bakery products												
Austria	Cakes, at retail	Single[1]	59	0	55	0	0	83	0	75	0	0
	Pastry, at retail	Single[1]	141	0.7	111	0	0	97	2.1	91	0	0
Belgium	Pastry, at processing plant	Batch[2]	-	-	-	-	-	-	-	69	2.9	0
	Pastry, at retail	Batch[2]	-	-	-	-	-	-	-	149	2.7	0
Germany	Cakes, at retail	Single	611	1.0	697	0.1	0	829	0.4	276	94.6	0
Hungary	Cakes	Single	193	0.5	89	0	0	-	-	-	-	-
Ireland	Cakes, at retail	Single[3]	-	-	48	0	0	43	2.3	122	0.8	0
	Desserts, at retail	Single[3]	-	-	51	0	0	-	-	51	0	0
	At retail	Single[3]	-	-	-	-	-	-	-	42	0	0
Italy	Pastry, at processing plant	Single	-	-	-	-	-	45	0	-	-	-
	Pastry, at catering	Single	57	3.5	-	-	-	-	-	-	-	-
	Pastry, at retail	Single	75	0	-	-	-	325	0	-	-	-
	Pastry, unspecified	Single	-	-	-	-	-	25	0	-	-	-
Portugal	Cakes	Batch	-	-	-	-	-	-	-	75	0	0
Poland	At processing plant	Single	34	0	-	-	-	-	-	-	-	-
Slovenia	Desserts, at catering	Single	50	0	50	0	0	-	-	-	-	-
	Desserts containing heat-treated cream, at retail	Single	100	1.0	100	0	0	-	-	-	-	-
	Cakes, at catering	Single	-	-	-	-	-	100	1.0	100	1.0	0
Spain	At retail	Single	224	0.4	349	0	0	-	-	-	-	0
Total Bakery products (2012: 8 MSs, 2011: 7 MSs)			**1,544**	**0.8**	**1,550**	**<0.1**	**0**	**1,547**	**0.5**	**1,050**	**25.6**	**0**

Table continued overleaf.

Table LI13 (continued). **L. monocytogenes** *in other ready-to-eat products, 2011-2012*

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Confectionery products and pastes												
Czech Republic	At processing plant	Batch	48	0	230	0	0	-	-	303	0	0
	At retail	Batch	-	-	32	0	0	-	-	-	-	-
Hungary	At retail	Single[4]	-	-	-	-	-	77	1.3	40	0	0
Romania	At retail	Batch[5]	-	-	96	0	0	-	-	-	-	-
Slovakia	At retail	Batch[6]	-	-	61	0	0	-	-	-	-	-
Total Confectionery products and pastes (2012: 3 MSs, 2011: 2 MSs)			**48**	**0**	**419**	**0**	**0**	**77**	**1.3**	**343**	**0**	**0**
Egg products												0
Bulgaria	Ready-to-eat, at processing plant	Batch[7]	25	0	-	-	-	-	-	-	-	-
Ireland	Ready-to-eat, at retail	Single	-	-	123	0	0	-	-	140	0	0
Total Egg products (2012: 2 MSs, 2011: 1 MS)			**25**	**0**	**123**	**0.0**	**0.0**	**-**	**-**	**140**	**0**	**0**
Fruits												
Belgium	Pre-cut, at retail	Batch[8]	-	-	114	0	0	-	-	-	-	-
Netherlands	Pre-cut, at retail	Single	-	-	182	0	0	402	0.5	425	0	0
Portugal	Pre-cut, at retail	Batch	-	-	95	0	0	-	-	95	0	0
Spain	Pre-cut, at retail	Single	-	-	66	0	0	-	-	-	-	-
United Kingdom	Products, dried, at retail	Single	175	0	175	0	0	-	-	-	-	-
	Pre-cut, ready-to-eat (grapes)	Single	306	0	306	0	0	-	-	-	-	-
Total Fruits (2012: 5 MSs, 2011: 2 MSs)			**481**	**0**	**938**	**0**	**0**	**402**	**0.5**	**520**	**0**	**0**
Fruits and vegetables												
Belgium	Pre-cut, at processing plant	Batch[9]	-	-	-	-	-	52	0	42	7.1	0
	Pre-cut, at retail	Batch[9]	-	-	-	-	-	-	-	148	8.1	0
Ireland	Pre-cut, ready-to-eat, at retail	Single	-	-	-	-	-	44	0	185	0	0
	Product, at retail	Single	-	-	-	-	-	98	0	399	0	0
Slovenia	Pre-cut, pre-packed, ready-to-eat, at retail	Batch	-	-	-	-	-	30	0	30	0	0
	Pre-cut, frozen, ready-to-eat, at retail	Batch	-	-	-	-	-	30	10.0	30	10.0	0
Total Fruits and vegetables (2012: no MSs, 2011: 2 MSs)			**-**	**-**	**-**	**-**	**-**	**254**	**1.2**	**834**	**2.2**	**0**

Table continued overleaf.

Table LI13 (continued).* L. monocytogenes *in other ready-to-eat products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Other processed food products and prepared dishes												
Bulgaria	Sandwiches, at retail	Single[7]	538	0	-	-	-	-	-	-	-	-
Czech Republic	Sandwiches, at processing plant	Batch	36	0	115	0	0	42	0	153	0	0.7
	Sandwiches, at retail	Batch	-	-	47	0	0	-	-	28	0	0
	Sandwiches, at processing plant	Batch	25	16.0	35	0	0	-	-	-	-	-
Hungary	Sandwiches, at retail	Single	34	2.9	-	-	-	194	1.5	72	1.4	0
Ireland	Pasta/rice salad, at retail	Single[3]	-	-	-	-	-	-	-	28	0	0
	Sandwiches with meat, at retail	Single[3]	-	-	63	0	0	27	7.4	122	0.8	-
Portugal	Sandwiches, at retail	Batch	-	-	35	0	0	-	-	475	0	0
Slovakia	Sandwiches, at retail	Single[6]	69	0	69	0	0	30	0	-	-	-
	Ices and similar frozen desserts, at retail	Single[6]	-	-	-	-	-	38	0	-	-	-
	Sandwiches, at processing plant	Single[6]	-	-	-	-	-	-	-	58	0	1.7
	Sandwiches, at retail	Single[6]	-	-	-	-	-	69	0	-	-	-
Slovenia	Sandwiches, at retail	Single	50	12.0	50	0	0	-	-	-	-	-
United Kingdom	Sandwiches, at retail	Single	285	0	285	3.2	0	-	-	-	-	-
Total Other processed food products and prepared dishes (2012: 9 MSs, 2011: 5 MSs)			**1,037**	**1.1**	**699**	**1.3**	**0**	**400**	**1.3**	**936**	**0.2**	**0.2**

Table continued overleaf.

Table LI13 (continued).* L. monocytogenes *in other ready-to-eat products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Ready-to-eat salads												
Austria	At retail	Single[1]	57	0	57	0	0	-		-	-	-
Belgium	At retail	Batch[10]	-	-	272	0.7	0	-	-	-	-	-
	Unspecified[10]		-	-	-	-	-	-	-	223	6.7	0
Bulgaria	At processing plant	Batch	903	0.1	-	-	-					
Czech Republic	Containing mayonnaise, at processing plant	Batch	-	-	-	-	-	382	2.1	124	0.8	0
	At processing plant	Batch	68	1.5	187	0	0	37	0	172	0	0
	At retail	Batch	0	0	102	0	1.0	-	-	77	0	0
Estonia	At processing plant	Single	-	-	26	0	0	-	-	25	0	0
	At retail	Single	-	-	90	0	0	-	-	109	0	0
Hungary	Unspecified	Single	275	4.7	130	0	0	-				
	At catering	Single	-	-	-	-	-	107	2.8	33	0	0
	At processing plant	Single	-	-	-	-	-	62	3.2	-	-	-
	At retail	Single	-	-	-	-	-	145	9.7	87	4.6	0
Ireland	Containing mayonnaise, at retail	Single	41	2.4	181	0	0	-	-	-	-	-
Netherlands	Lettuce and lettuce mix, at retail.	Single	-	-	138	0	0	-	-	-	-	-
Poland	At processing plant	Batch	33	0	237	11.8	0	-	-	-	-	-
Slovakia	At retail	Batch	-	-	41	0	0	-	-	-	-	-
	Containing mayonnaise, at retail	Batch	107	0.9	107	0	0	411	0.5	224	0	0
	At retail	Single	109	0	-	-	-					
	Containing mayonnaise, at retail	Single	27	7.4	27	0	0	168	0.6	72	0	0
Slovenia	Unspecified	Single	77	0	77	0	0	-	-	-	-	-
	Ready-to-eat deli dishes, at catering	Single	-	-	-	-	-	143	2.1	143	2.1	0
Spain	At retail	Single	225	0	613	0	0	-	-	-	-	-
Total Ready-to-eat salads (2012: 12 MSs, 2011: 6 MSs)			**1,922**	**1.0**	**2,285**	**1.3**	**<0.1**	**1,455**	**2.3**	**1,289**	**1.8**	**0**

Table continued overleaf.

Table LI13 (continued).* L. monocytogenes *in other ready-to-eat products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Sauce and dressings												
Ireland	At retail	Single	32	0	110	0	0	36	2.8	148	-	-
	Mayonnaise, at retail	Single	-	-	26	0	0			27	0	0
Slovenia	Ready-to-eat deli dishes, at catering, including spreads	Single	-	-	-	-	-	37	0	37	0	0
Total Sauce and dressings (2012: 1 MS, 2011: 2 MSs)			**32**	**0**	**136**	**0**	**0**	**73**	**1.4**	**212**	**0**	**0**
Soups												
Ireland	Ready-to-eat, at retail	Single	-	-	41	0	0	-	-	57	0	0
Total Soups (2012: 1 MS, 2011: 1 MS)					**41**	**0**	**0**			**57**	**0**	**0**
Spices and herbs												
Germany	At processing plant	Single	-	-	46	0	0	-	-	-	-	-
	At retail	Single	28	0	66	1.5	0	-	-	-	-	-
Ireland	At retail	Single	-	-	-	-	-	28	0	134	0	0
Slovakia	Dried, at retail	Batch	-	-	-	-	-	-	-	25	0	0
United Kingdom	Herbs dried, at retail	Single	8	0	8	0	0	8	0	8	0	0
	Spices dried, at retail	Single	31	0	31	3.2	0	31	0	31	3.2	0
Total Spices and herbs (2012: 3 MSs, 2011: 3 MSs)			**67**	**0**	**151**	**1.3**	**0**	**67**	**0**	**198**	**0.5**	**0**
Surimi												
Italy	At processing plant	Single	-	-	-	-	-	90	0	-	-	-
Total Surimi (2011: 1 MS)			**-**	**-**	**-**	**-**	**-**	**90**	**0**	**-**	**-**	**-**

Table continued overleaf.

Table LI13 (continued).* L. monocytogenes *in other ready-to-eat products, 2011-2012

Country	Description	Sampling unit	2012					2011				
			Presence in 25 g		Enumeration			Presence in 25 g		Enumeration		
			N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g	N	% Pos	N	% ≤100 cfu/g	% >100 cfu/g
Vegetables												
Czech Republic	Pre-cut, ready-to-eat, at retail	Batch	-	-	-	-	-	-	-	77	0	0
Denmark	Pre-cut, ready-to-eat, at retail	Single	-	-	-	-	-	-	-	167	0	0
Estonia	Products, at processing plant	Single	-	-	-	-	-	-	-	-	-	-
France	Pre-cut, ready-to-eat, at retail	Single	-	-	-	-	-	972	0.7	972	0.1	0.1
Hungary	Pre-cut, ready-to-eat, at processing plant	Single	-	-	-	-	-	-	-	-	-	-
	Pre-cut, ready-to-eat, at retail	Single	-	-	-	-	-	102	1.0	40	2.5	0
Netherlands	Pre-cut, ready-to-eat, at retail	Single	-	-	245	0	0	-	-	193	0	0
Portugal	Pre-cut, ready-to-eat, at retail	Batch	-	-	-	-	-	-	-	80	0	0
Slovakia	Pre-cut, ready-to-eat, at catering	Single	58	0	58	0	0	30	0	-	-	-
Slovenia	Pre-cut, ready-to-eat, at retail	Single	50	0	50	0	0	-	-	-	-	-
Spain	Pre-cut, ready-to-eat, at retail	Single	38	0	121	0	0	537	4.1	661	1.1	0.2
Total Vegetables (2012: 4 MSs, 2011: 9 MSs)			**146**	**0**	**474**	**0**	**0**	**1,641**	**1.8**	**2,190**	**0.4**	**<0.1**

Note: Data are only presented for sample size ≥25.

In France, for pre-cut vegetables, ready-to-eat, at retail, in 2011, the enumeration analysis was carried out on samples positive with the detection method only. Of the seven samples that were positive by detection method, one was also positive by the enumeration method with a count of less than or equal to 100 cfu/g and one was positive with a count higher than 100 cfu/g of *L. monocytogenes*.

In Austria, for ready-to-eat salads at retail, in 2012, not all 57 samples tested by detection method were also tested by enumeration method. Only 10 samples were examined by enumeration method and they were all negative for *L. monocytogenes.*

Sample weight is 25 g, unless otherwise stated.

1. Sample weight: 1 g or 25 g for both years' data.
2. Sample weight: >200g or >100g for 2011 data.
3. Sample weight is most usually 25 g but occasionally there are other sample weights recorded for both years' data.
4. Sample weight: 10 or 25 g for both years' data.
5. Sample weight is 10 g for 2012 data.
6. Sample weight is 10 g for both years' data.
7. Sample weight is 250 g for 2012 data.
8. Sample weight is 1 g for 2012 data.
9. Sample weight: >200 g or 200 g for both years' data.
10. Sample weight is 1 g for 2012 data and 200 g for 2011 data.

3.3.3. *Listeria* in animals

In 2012, 10 MSs reported qualitative data on *Listeria* in animals, including samples from investigations in which suspect sampling had been applied and samples from clinical investigations. The main *Listeria* species was *L. monocytogenes*, but most isolates were of unspecified species. Two additional *Listeria* species, *L. innocua and L. ivanovii*, were identified by Slovakia and Ireland.

L. monocytogenes was detected by several MSs in cattle, fowl, sheep and goats, but not in pigs. As in previous years the highest proportions of positive findings were reported from goats and sheep, especially from Germany, where 13.3 % of the goat herds and 14.5 % of the sheep herds were positive. Also in Germany, a large number of other animals were tested, and *L. monocytogenes* was isolated from one cat and a few horses (1.2 %), but not from dogs.

Most of the investigations on *Listeria* in animals were reported as clinical investigations, suspect samplings or the sampling strategy was not specified. However, in Slovakia all cases of abortion in cattle, sheep and goats are officially tested for *Listeria*. In these investigations, reported as objective sampling, the occurrence of *Listeria* among cattle (0.4 %) and sheep (2.9 %) was lower than among the cattle (6.3 %) and sheep (12.4 %) tested as suspect sampling.

A summary of number of tested and percentage of *Listeria* positive units from the different animal species is set out in Table LI14. For further information on reported data, refer to the Level 3 Tables.

Table LI14. **L. monocytogenes *and other species in animals, 2011-2012***

Country	Description	Sampling unit	2012						2011						
			Presence in 25 g		*Listeria* species				Presence in 25 g		*Listeria* species				
			N	% Pos	*L. monocytogenes*	*Listeria* spp., unspecified	*L. ivanovii*	*L. innocua*	N	% Pos	*L. monocytogenes*	*Listeria* spp., unspecified	*L. ivanovii*	*L. innocua*	*L. grayi*
Cattle (bovine animals)															
Estonia	At farm	Animal	60	6.7	4	-	-	-	-	-	-	-	-	-	-
	Dairy cows, at farm	Animal	-	-	-	-	-	-	37	10.8	2	-	-	1	1
Germany	At farm	Animal	4,881	2.8	138	-	-	-	-	-	-	-	-	-	-
	At farm	Herd/flock	706	8.9	63	-	-	-	-	-	-	-	-	-	-
	Calves (under 1 year), at farm	Animal	432	6.3	27	-	-	-	-	-	-	-	-	-	-
	Calves (under 1 year), at farm	Herd/flock	254	7.1	18	-	-	-	119	1.7	2	-	-	-	-
	Dairy cows, at farm	Animal	200	9.0	18	-	-	-	-	-	-	-	-	-	-
	Dairy cows, at farm	Herd/flock	76	11.8	9	-	-	-	59	22.0	13	-	-	-	-
Ireland	At farm	Animal	13,173	0.6	79	-	1	-	10,451	0.7	68	3	1	-	-
	Dairy cows, at farm	Animal	933	0	-	0	-	-	942	0	-	0	-	-	-
Italy	At farm	Animal	392	0.3	-	1	-	-	305	2.0	-	0	-	4	-
	At farm	Herd/flock	34	0	-	0	-	-	31	0	-	0	-	-	-
Latvia	At farm	Animal	348	0.9	3	-	-	-	-	-	-	-	-	-	-
	Dairy cows, at farm	Animal	89	16.9	15	-	-	-	48	25.0	11	1	-	-	-
Netherlands	At farm	Animal	2,845	<0.1	-	2	-	-	2,686	0.1	-	4	-	-	-
Slovakia	At farm	Animal	559	3.6	18	1	-	1	-	-	-	-	-	-	-
	Dairy cows, at farm	Animal	-	-	-	-	-	-	531	2.8	15	-	-	-	-
Spain	Dairy cows, at farm	Herd/flock	850	0.1	1	-	-	-	-	-	-	-	-	-	-
	Dairy cows, at farm	Animal	-	-	-	-	-	-	97	3.1	1	2	-	-	-
Total Cattle (2012: 8 MSs, 2011: 8 MSs)			**25,832**	**1.5**	**393**	**4**	**1**	**1**	**15,306**	**0.9**	**112**	**10**	**1**	**5**	**1**

Table continued overleaf.

Table LI14 (continued).* L. monocytogenes *and other species in animals, 2011-2012

Country	Description	Sampling unit	2012						2011						
			Presence in 25 g		*Listeria* species				Presence in 25 g		*Listeria* species				
			N	% Pos	*L. monocytogenes*	*Listeria* spp., unspecified	*L. ivanovii*	*L. innocua*	N	% Pos	*L. monocytogenes*	*Listeria* spp., unspecified	*L. ivanovii*	*L. innocua*	*L. grayi*
Fowl (*Gallus gallus*)															
Germany	Broilers, at farm	Animal	163	0	0	-	-	-	-	-	-	-	-	-	-
	Broilers, at farm	Herd/flock	30	0	0	-	-	-	-	-	-	-	-	-	-
	Laying hens, at farm	Animal	435	0.7	3	-	-	-	-	-	-	-	-	-	-
	Laying hens, at farm	Herd/flock	57	0	0	-	-	-	104	1.0	1	-	-	-	-
	Laying hens - adult, at farm	Herd/flock	-	-	-	-	-	-	65	0	0	-	-	-	-
Netherlands	At farm	Herd/flock	-	-	-	-	-	-	1,430	0	-	-	-	-	-
Total Fowl (2012: 1 MSs, 2011: 2 MSs)			**685**	**0.4**	**3**	**0**	**0**	**0**	**1,599**	**<0.1**	**1**	**0**	**0**	**0**	**0**
Goats															
Germany	At farm	Animal	368	10.1	37	-	-	-	-	-	-	-	-	-	-
	At farm	Herd/flock	113	13.3	15	-	-	-	97	22.7	22	-	-	-	-
Greece	At farm		-	-	-	-	-	-	44	4.5	2	-	-	-	-
Ireland	At farm	Animal	67	0	-	0	-	-	32	0	-	0	-	-	-
Italy	At farm	Herd/flock	62	0	-	0	-	-	28	3.6	-	1	-	-	-
Netherlands	At farm	Animal	221	8.6	-	19	-	-	-	-	-	-	-	-	-
Slovakia	At farm	Animal	39	0	-	-	-	-	-	-	-	-	-	-	-
Total Goats (2012: 5 MSs, 2011: 4 MSs)			**870**	**8.2**	**52**	**19**	**0**	**0**	**201**	**12.4**	**24**	**1**	**0**	**0**	**0**

Table continued overleaf.

Table LI14 (continued).* L. monocytogenes *and other species in animals, 2011-2012

Country	Description	Sampling unit	2012						2011						
			Presence in 25 g		*Listeria* species				Presence in 25 g		*Listeria* species				
			N	% Pos	*L. monocytogenes*	*Listeria* spp., unspecified	*L. ivanovii*	*L. innocua*	N	% Pos	*L. monocytogenes*	*Listeria* spp., unspecified	*L. ivanovii*	*L. innocua*	*L. grayi*
Pigs															
Germany	At farm	Animal	3,119	<0.1	1	-	-	-	-	-	-	-	-	-	-
	At farm	Herd/flock	111	0	0	-	-	-	735	0	0	-	-	-	-
Ireland	At farm	Animal	675	0	-	0	-	-	381	0	-	0	-	-	-
Latvia	At farm	Animal	25	0	-	-	-	-	-	-	-	-	-	-	-
Netherlands	At farm	Animal	2,811	0	-	-	-	-	3,341	0	-	-	-	-	-
Total Pigs (2012: 4 MSs, 2011: 3 MSs)			**6,741**	**<0.1**	**1**	**0**	**0**	**0**	**4,457**	**0**	**0**	**0**	**0**	**0**	**0**
Sheep															
Germany	At farm	Animal	1,619	7.0	113	-	-	-	-	-	-	-	-	-	-
	At farm	Herd/flock	373	14.5	54	-	-	-	190	14.7	28	-	-	-	-
Ireland	At farm	Animal	1,651	1.6	23	3	1	-	1,568	0.6	6	3	-	-	-
Italy	At farm	Animal	49	0	-	0	-	-	64	0	-	0	-	-	-
	At farm	Herd/flock	235	0.4	-	1	-	-	160	1.9	-	2	1	-	-
Latvia	At farm	Animal	29	0	-	-	-	-	-	-	-	-	-	-	-
Netherlands	At farm	Animal	467	1.1	-	5	-	-	-	-	-	-	-	-	-
Slovakia	At farm	Animal	376	6.4	24	-	-	-	356	3.7	13	-	-	-	-
Total Sheep (2012: 6 MSs, 2011: 4 MSs)			**4,799**	**4.7**	**214**	**9**	**1**	**0**	**2,338**	**2.3**	**47**	**5**	**1**	**0**	**0**

Table continued overleaf.

Table LI14 (continued).* L. monocytogenes *and other species in animals, 2011-2012

Country	Description	Sampling unit	2012						2011						
			Presence in 25 g		*Listeria* species				Presence in 25 g		*Listeria* species				
			N	% Pos	*L. monocytogenes*	*Listeria* spp., unspecified	*L. ivanovii*	*L. innocua*	N	% Pos	*L. monocytogenes*	*Listeria* spp., unspecified	*L. ivanovii*	*L. innocua*	*L. grayi*
Sheep and goats															
Italy	At farm	Animal	-	-	-	-	-	-	94	13.8	-	2	1	5	-
Other animals															
Germany	Cats, unspecified	Animal	1,043	<0.1	1	-	-	-	-	-	-	-	-	-	-
	Dogs, unspecified	Animal	1,672	0	0	-	-	-	-	-	-	-	-	-	-
	Other poultry, at farm	Animal	226	0	0	-	-	-	-	-	-	-	-	-	-
	Solipeds, domestic - horses, at farm	Animal	2,075	1.2	25	-	-	-	-	-	-	-	-	-	-
	Solipeds, domestic - horses, at farm	Herd/flock	61	1.6	1	-	-	-	65	15.4	10	-	-	-	-
	Turkeys, at farm	Animal	490	0	0	-	-	-	-	-	-	-	-	-	-
Greece	Other ruminants - farmed, at farm		-	-	-	-	-	-	64	1.6	-	-	-	1	-
Ireland	Birds - wild, at farm	Animal	88	0	-	0	-	-	84	0	-	0	-	-	-
	Dogs, at farm	Animal	131	0	-	0	-	-	137	0	-	0	-	-	-
	Rabbits, at farm	Animal	39	0	-	0	-	-	26	0	-	0	-	-	-
	Solipeds, domestic - horses, at farm	Animal	219	0	-	0	-	-	168	0	-	0	-	-	-
Italy	Water buffaloes, at farm	Animal	39	0	-	0	-	-	142	0	-	0	-	-	-
Netherlands	Rabbit	Animal	-	-	-	-	-	-	344	0.3	1	-	-	-	-
Spain	Rodents - wild	Animal	-	-	-	-	-	-	343	0.3	-	1	-	-	-
United Kingdom	Alpacas	Animal	742	0.1	1	0	-	-	-	-	-	-	-	-	-
	Squirrels - wild	Animal	-	-	-	-	-	-	69	1.4	1	0	-	-	-
	Zoo animals, red kangaroo and miscellaneous antelope	Animal	-	-	-	-	-	-	26	7.7	2	0	-	-	-
Total Other animals (2012: 7 MSs, 2011: 7 MSs)			**6,825**	**0.4**	**28**	**0**	**0**	**0**	**1,468**	**1.1**	**14**	**1**	**0**	**0**	**0**

Note: Data are presented only for sample size ≥25.

3.3.4. Discussion

Human listeriosis is a relatively rare but serious zoonotic disease, with high morbidity, hospitalisation and mortality rates in vulnerable populations. In 2012, 1,642 confirmed human cases were reported in the EU, which was a 10.5 % increase compared with 2011 (1,486). The highest notification rates were observed in male cases 74 years and older. This could potentially be due to differences in food consumption habits between men and women, particularly in the elderly, and should be investigated further. In women of fertile age (15-44 years), the majority of cases were associated with pregnancy. Of all the zoonotic diseases under EU surveillance, listeriosis caused the most severe human disease, with 91.6 % of the cases hospitalised and 198 of cases being fatal (case fatality rate 17.8 %). This also reflects the focus of EU surveillance on severe, systemic infections.

In 2012, five strong-evidence food-borne outbreaks caused by *L. monocytogenes* were reported by three MSs; four were general and one was a household outbreak (for further information, see Chapter 4, Food-borne outbreaks). The outbreaks resulted in 55 cases, 47 hospitalisations and nine deaths, i.e. 37.5 % of all deaths due to reported strong-evidence food-borne outbreaks in 2012. Mixed food (sandwiches), bakery products (pork pies), bovine meat and products thereof (pressed beef), cheese and other or mixed red meat and products thereof (meat jelly) were the implicated foods.

A wide range of different foodstuffs can be contaminated with *L. monocytogenes* which is widespread in the environment and has a propensity to form biofilms on food processing equipment. For a healthy human population, foods in which *L. monocytogenes* levels do not exceed 100 cfu/g are considered to pose a negligible risk. Therefore, the EU microbiological criterion for *L. monocytogenes* in RTE food is set as ≤100 cfu/g for RTE products on the market.

Also in 2012, a substantial number of food samples were tested for *L. monocytogenes.* At retail as well as at processing, the non-compliance for different RTE food categories was at a level comparable to previous years. However, it must be noted that these results are highly influenced by the MSs reporting and the sample sizes in their investigations. As in previous years, the level of non-compliance at retail was lower than at processing, one reason being the different thresholds for non-compliance applied at processing and at retail. At retail, food samples containing up to 100 cfu/g are also in compliance with the *L. monocytogenes* criterion. As in previous years, the highest proportion of non-compliant units were observed in RTE fishery products, at levels of 8.0 % and 0.5 % in single samples, at processing and at retail, respectively. Overall, the EU level findings based on the monitoring of *L. monocytogenes* in certain retail foods are consistent with the results of the baseline survey on the EU level prevalence of *L. monocytogenes* in certain RTE foods at retail[30], which was carried out in 2010 and 2011. In this baseline survey it was found that, at the end of shelf-life, the EU level prevalence of *Listeria monocytogenes* was highest in fish products (10.3 %) and clearly lower in meat and cheese products: 2.1 % and 0.47 % respectively. However, the proportion of samples exceeding the level of 100 cfu/g at the end of shelf-life was 1.7 % for smoked and gravad fish, 0.43 % for meat products and 0.06 % for soft and semi-soft cheeses.

In 2012*, Listeria* was also reported, from several MSs, in cattle, fowl, sheep and goats. The main reported *Listeria* species was *L. monocytogenes*, but most isolates were of unspecified species. As the bacterium is widespread in the environment, isolation from animals is to be expected, but clinical disease in animals can follow increased exposure.

[30] European Food Safety Authority, 2013. Analysis of the baseline survey on the prevalence of *Listeria monocytogenes* in certain ready-to-eat (RTE) foods in the EU, 2010-2011 Part A: *Listeria monocytogenes* prevalence estimates. EFSA Journal 2013;11(6):3241, 75 pp. doi:10.2903/j.efsa.2013.3241

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.4. Verocytoxigenic *Escherichia coli*

Verocytoxigenic *Escherichia coli* (VTEC) are a group of *Escherichia coli* (*E. coli*) that are characterised by the ability to produce toxins, designated verocytotoxins (synonym Shiga-like toxin)[31]. Human pathogenic VTEC usually harbour additional virulence factors which are important in the development of the disease in man. A large number of serogroups of *E. coli* have been recognised as verocytotoxin producers. Human VTEC infections are, however, most often associated with a limited number of O:H serogroups. Of these, O157:H7 and O157:H- (VTEC O157) are the pathogens most frequently reported to be associated with human disease. The terms VTEC and STEC (Shiga toxin-producing *E. coli*) are synonymous.

The majority of reported human VTEC infections are sporadic cases. The symptoms associated with VTEC infection in humans vary from mild to bloody diarrhoea, which is often accompanied by abdominal cramps, usually without fever. VTEC infections can result in haemolytic-uraemic syndrome (HUS). HUS is characterised by acute renal failure, anaemia and lowered platelet counts. HUS develops in up to 10 % of patients infected with VTEC O157 and is the leading cause of acute renal failure in young children.

Human infection may be acquired through the consumption of contaminated food or water, by direct transmission from person to person or from infected animals or faecally-contaminated environments to humans.

VTEC (including VTEC O157) have been isolated from many different animal species. The gastrointestinal tract of healthy ruminants, which includes cows, goats, sheep and wild ruminants, seems to be the most important reservoir for VTEC, and these bacteria are shed in the animals' faeces. Foods of bovine and ovine origin are frequently reported as a source of human VTEC infections. Other important food sources include faecally contaminated vegetables and drinking water. For many VTEC serogroups isolated from animals and foodstuffs, the significance for human infections is not yet clear.

According to an opinion from EFSA's BIOHAZ Panel on the VTEC-seropathotype and scientific criteria regarding pathogenicity assessment[32], the human pathogenic potential of many VTEC serogroups remains unknown. For public health investigation of VTEC infection, clinical and/or food samples should be screened by PCR or other suitable method (e.g. microarray, sequencing) for the presence of the *vtx* genes. If positive, all efforts should be made to isolate and characterise the causative organism. According to a previous opinion from EFSA's BIOHAZ Panel on the monitoring of VTEC[33], the serogroups which are currently considered the most important regarding pathogenicity in humans are: O26, O91, O103, O111, O145 and O157. In 2012, with the exception of O111, all of these serogroups were isolated from fresh bovine meat and cattle.

In order to improve the quality of the data from VTEC monitoring in the EU, EFSA issued technical specifications for the monitoring and reporting of VTEC in animals and food in 2009[34]. These guidelines were developed to facilitate the generation of data which would enable a more thorough analysis of VTEC in food and animals in the future. The specifications encourage MSs to monitor and report data on serogroups defined by the BIOHAZ Panel as most important regarding human pathogenicity.

Table VT1 presents the countries reporting data for 2012. Regarding food and animal data, only the information reported on VTEC in bovine meat and bovine animals are included in this report.

[31] Verotoxigenic *E. coli* (VTEC) is also known as verocytotoxigenic *E. coli*, verocytotoxinproducing *E. coli* and Shiga toxin-producing *E. coli* (STEC).

[32] European Food Safety Authority, 2013. Scientific Opinion on VTEC-seropathotype and scientific criteria regarding pathogenicity assessment. EFSA Journal 2013;11(4):3138, 106 pp. doi:10.2903/j.efsa.2013.3138

[33] European Food Safety Authority, 2007. Scientific Opinion of the Panel on Biological Hazards (BIOHAZ) on monitoring of verotoxigenic *Escherichia coli* (VTEC) and identification of human pathogenic VTEC types. The EFSA Journal 2007, 579, 1-61.

[34] European Food Safety Authority, 2009. Scientific Report of EFSA on technical specifications for the monitoring and reporting of verotoxigenic *Escherichia coli* (VTEC) on animals and food (VTEC surveys on animals and food). EFSA Journal 2009;7(11):1366, 43 pp. doi:10.2903/j.efsa.2009.1366

Table VT1. Overview of countries reporting data on VTEC for 2012

Data	Total number of reporting MSs	Countries
Human	26	**All MSs** except PT **Non-MSs:** CH, IS, NO
Food	21	**All MSs** except BG, DK, EE, LU, MT, UK **Non-MS:** CH
Animal	11	**MSs:** AT, DE, DK, EE, FI, IT, LV, NL, SK, SE, UK

Note: The overview table includes all data reported by MSs.

3.4.1. VTEC in humans

In 2012, the total number of confirmed VTEC cases in the EU was 5,671 based on 22 MSs reporting at least one confirmed case and four MSs reporting zero cases. This represents a decrease of 40 % compared with 2011 (N = 9,487), when a large outbreak of STEC/VTEC O104:H4 occurred in Germany. The outbreak was associated with the consumption of contaminated raw sprouted seeds affecting more than 3,800 persons alone in Germany and linked cases in an additional 15 countries[35].

The EU notification rate was 1.15 cases per 100,000 population in 2012 (Table VT2). The highest country-specific notification rates were observed in Ireland, the Netherlands and Sweden (8.99, 6.27 and 4.98 cases per 100,000 population, respectively). The lowest rates were reported in Bulgaria, Cyprus, the Czech Republic, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Romania and Spain (<0.1 cases per 100,000).

Most (81 %) of the VTEC cases reported in the EU, with known data, were infected within their own country, with the highest proportion of domestic cases (83.3-100 %) reported in the Czech Republic, Germany, Ireland, Slovakia and Spain (Figure VT1). Only three countries (Denmark, Estonia and Sweden) reported a higher proportion of travel-associated cases than domestic cases with the highest proportion in Estonia (67 % of the three cases).

There was a clear seasonal trend in the confirmed VTEC cases reported in the EU in 2008-2012 with more cases reported in the summer months (Figure VT2). A dominant peak in the summer of 2011 (Figure VT2, top) was attributed to the large STEC/VTEC O104:H4 outbreak mentioned above. A statistically significant increasing EU trend of confirmed VTEC cases was observed in 2008-2010 with the 2011 outbreak data removed (p = 0.001 with linear regression) (Figure VT2, bottom). By countries, increasing trends in 2008-2012 were observed in 12 MSs: Austria, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Slovenia, Sweden and the United Kingdom. Decreasing trends were observed in only one MS, Malta.

Thirteen MSs provided information on hospitalisation, covering 37.5 % of all confirmed VTEC cases in 2012. Of the cases with this information provided, on average 36.5 % of cases were hospitalised. The highest hospitalisation rates 87.8 %, 55.6 % and 46.4 %, were reported in Italy, the Czech Republic and the United Kingdom, respectively. Two of these countries also reported among the lowest notification rates of VTEC, which indicates that the surveillance systems in these countries primarily capture the more severe cases. Two confirmed VTEC cases, each reported by Poland and Romania, were also hospitalised.

In 2012, 12 deaths due to VTEC infection were reported by 18 MSs (four MSs reported two to five fatal cases each, the other 14 MSs none). This resulted in an EU case fatality rate of 0.36 % among the 3,332 confirmed cases for which this information was provided (58.7 % of all reported confirmed cases).

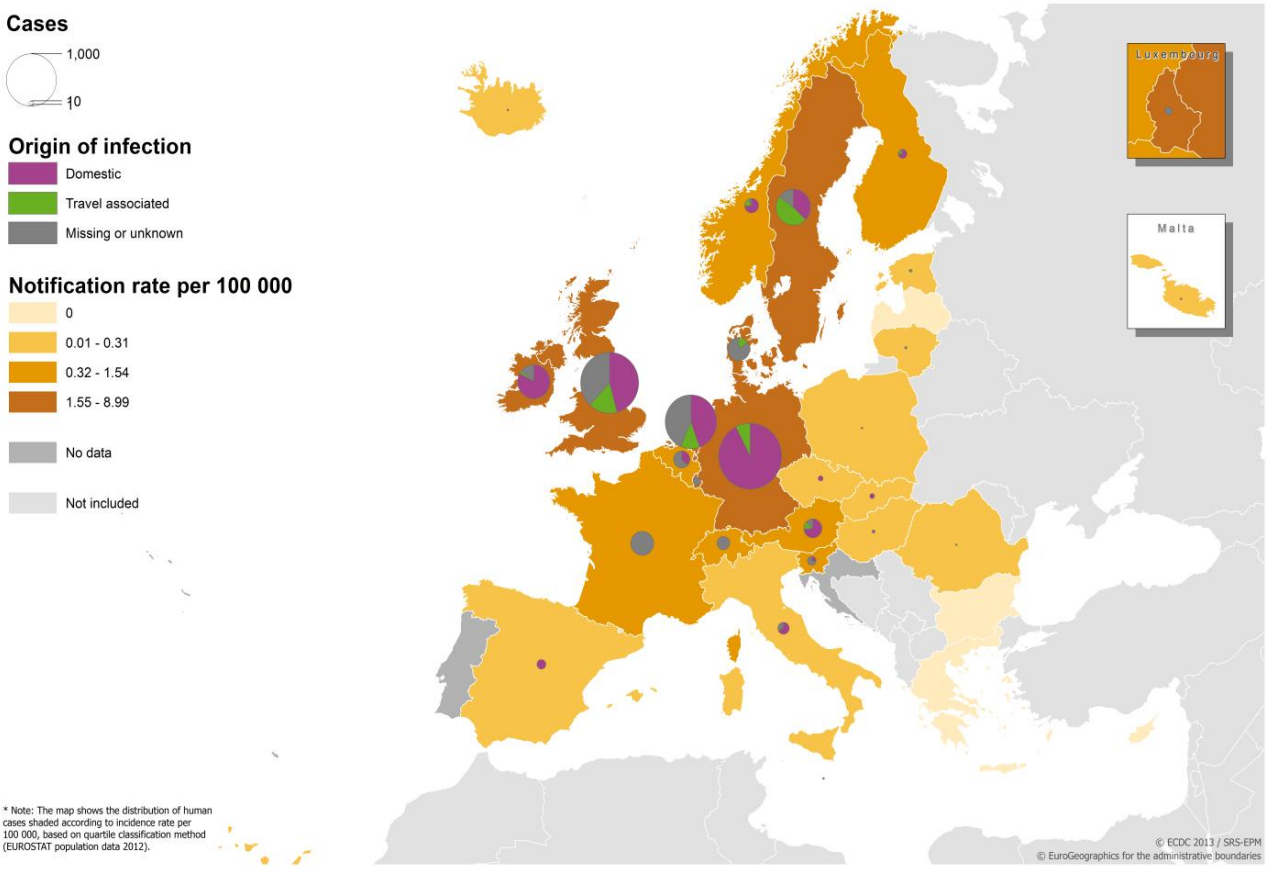
[35] EFSA (European Food Safety Authority) and ECDC (European Centre for Disease Prevention and Control), 2013. The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2011. EFSA Journal 2013;11(4):3129, 250 pp. doi:10.2903/j.efsa.2013.3129

Table VT2. Reported VTEC cases in humans, 2008-2012 and notification rates for confirmed cases, 2012

Country	2012				2011	2010	2009	2008
	Report Type[1]	Cases	Confirmed cases	Confirmed cases/ 100,000	Confirmed cases			
Austria	C	131	130	1.54	120	88	91	69
Belgium	C	105	105	0.95	100	84	96	103
Bulgaria	U	0	0	0	1	0	0	0
Cyprus	U	0	0	0	0	0	0	0
Czech Republic[2]	C	9	9	0.09	7	-	-	-
Denmark	C	193	193	3.46	215	178	160	161
Estonia	C	3	3	0.22	4	5	4	3
Finland	C	30	30	0.56	27	21	29	8
France	C	208	208	0.32	221	103	93	85
Germany	C	1,587	1,573	1.93	5,558	955	887	876
Greece	U	0	0	0	1	1	0	0
Hungary	C	3	3	0.03	11	7	1	0
Ireland	C	554	412	8.99	275	197	237	213
Italy	C	68	50	0.08	51	33	51	26
Latvia	U	0	0	0	0	0	0	0
Lithuania	C	2	2	0.07	0	1	0	0
Luxembourg	C	21	21	4.00	14	7	5	4
Malta	C	1	1	0.24	2	1	8	8
Netherlands	C	1,049	1,049	6.27	845	478	314	92
Poland	C	3	1	<0.01	5	3	0	3
Portugal[3]	-	-	-	-	-	-	-	-
Romania	C	1	1	<0.01	2	2	0	4
Slovakia	C	9	9	0.17	5	10	14	8
Slovenia	C	29	29	1.41	25	20	12	7
Spain	C	31	31	0.07	20	18	14	24
Sweden	C	472	472	4.98	477	334	228	304
United Kingdom	C	1,339	1,339	2.17	1,501	1,110	1,339	1,164
EU Total		**5,848**	**5,671**	**1.15**	**9,487**	**3,656**	**3,583**	**3,162**
Iceland	C	1	1	0.31	2	2	8	4
Liechtenstein	-	-		-				0
Norway	C	75	75	1.50	47	52	108	22
Switzerland[4]	C	63	63	0.79	71	31	40	72

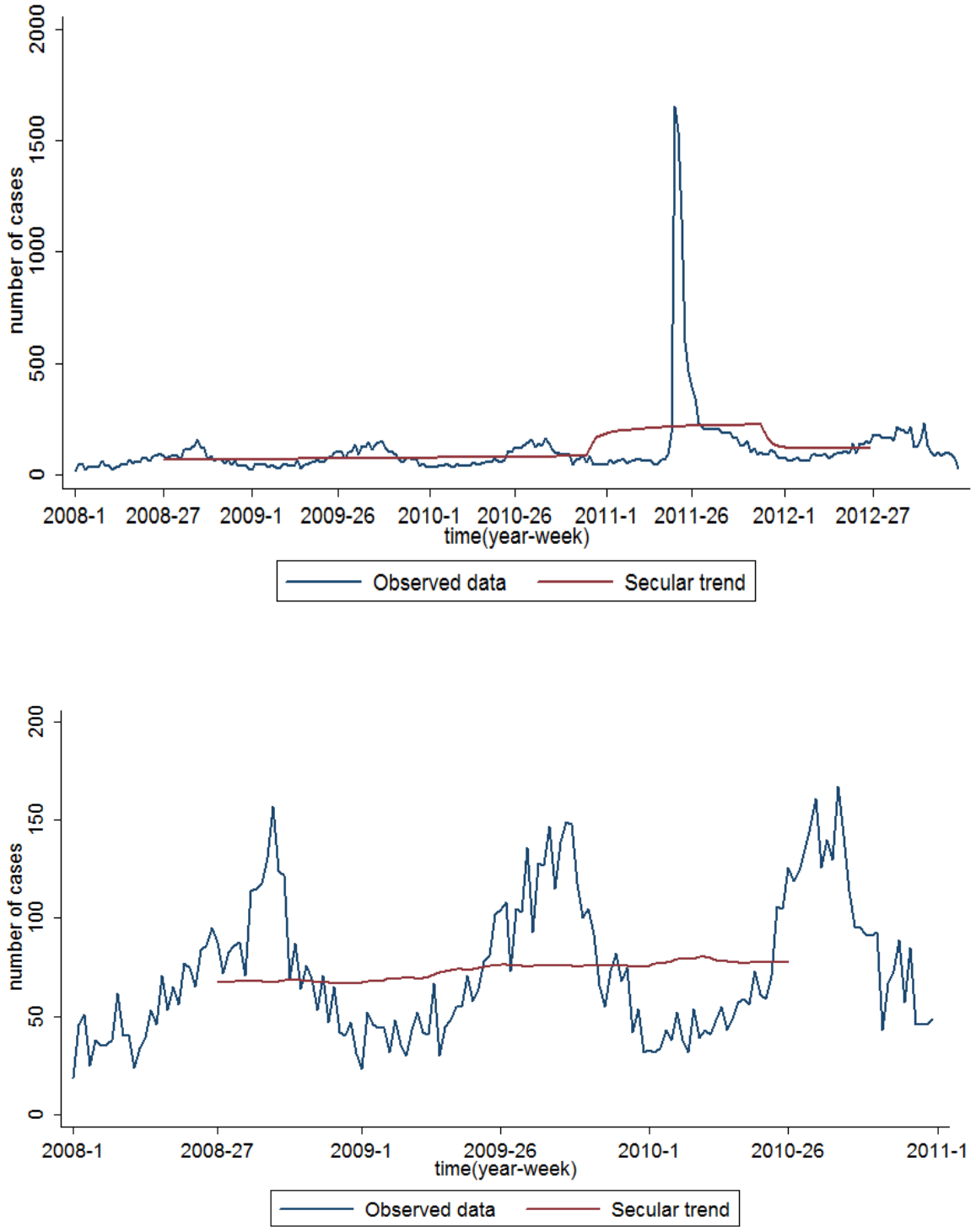
1. C: case-based data reported; -: no report; U: unspecified.
2. Mandatory notification of VTEC in 2008 and reported to ECDC from 2011.
3. No surveillance system.
4. Switzerland provided data directly to EFSA.

Figure VT1. Notification rates and origin of VTEC infections in humans in the EU/EFTA, 2012



Note: The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

Figure VT2. Trend in reported confirmed cases of human VTEC infections in the EU, 2008-2012 (top) and 2008-2010 (bottom)



Source: Data for EU trend from 23 MSs: Austria, Belgium, Cyprus, Denmark, Estonia, Finland, Greece, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Bulgaria was excluded as only monthly data were reported. The Czech Republic did not report cases for all five years. Latvia reported zero cases throughout the period and Portugal does not have surveillance systems for this disease.

Data on O antigens of strains were reported for 3,483 (61 %) of the confirmed VTEC cases in 2012. The most commonly reported serogroup was O157 (41.1 %), followed by O26 (12.0 %) and O91 (3.6 %). As in previous years, the highest numbers of O157-associated confirmed cases (accounting for 75.2 % of all confirmed O157 cases) were reported by the United Kingdom and Ireland (Table VT3). This can be due to a

higher proportion of confirmed VTEC cases being serotyped in the United Kingdom and Ireland compared with some other countries. Serogroup VTEC O104 was reported in significantly lower numbers than in 2011. Seven confirmed cases of serogroup O104 were reported in 2012 in five countries (Austria, Belgium, France, Germany and the Netherlands) (data not shown).

Table VT3. VTEC serogroups in humans by EU MS, 2012

Country	Serogroup										
	O157	O26	O91	O103	O145	O146	O111	O128	O113	NT	Other
Austria	17	23	0	7	9	1	5	1	4	19	23
Belgium	65	8	1	3	3	-	1	1	1	-	22
Denmark	38	8	7	8	19	18	3	6	1	2	68
Czech Republic	5	4	-	-	-	-	-	-	-	-	-
France	68	37	7	1	4	-	18	3	-	47	20
Germany[1]	84	50	72	34	26	14	14	1	4	47	125
Hungary	1	-	1	-	-	-	-	-	-	1	-
Ireland	187	147	-	5	21	2	6	-	-	24	1
Italy	14	17	-	4	3	-	5	-	-	-	-
Lithuania	1	1	-	-	-	-	-	-	-	-	-
Luxembourg	-	2	-	1	-	-	-	1	-	-	1
Netherlands	89	29	30	9	9	10	2	1	3	30	74
Poland	1	-	-	-	-	-	-	-	-	-	-
Romania	-	1	-	-	-	-	-	-	-	-	-
Slovakia	-	-	-	-	-	-	-	-	-	9	-
Slovenia	5	2	-	3	-	1	-	-	1	5	5
Spain	24	1	-	-	-	-	3	-	-	-	3
Sweden	71	60	7	37	8	8	9	6	8	21	57
United Kingdom	1,277	21	-	4	2	2	-	-	2	-	9
EU Total	**1,947**	**411**	**125**	**116**	**104**	**56**	**66**	**20**	**24**	**205**	**408**
Iceland	1	-	-	-	-	-	-	-	-	-	-
Norway	12	6	5	17	8	2	-	-	-	21	4
EU/EEA Total	**1,960**	**417**	**130**	**133**	**112**	**58**	**66**	**20**	**24**	**226**	**412**

1. DataSource = 'DE-SURVNET@RKI-7.1'

3.4.2. VTEC in food

In total, 21 MSs and 1 non-MS (Switzerland) reported data on VTEC in food for 2012. When interpreting the VTEC data it is important to note that data from different investigations are not necessarily directly comparable owing to differences in sampling strategies and the analytical methods applied. Belgium, Hungary and Poland reported having used the ISO 16654:2001 analytical method, which is designed to detect only VTEC O157. Romania used real-time PCR. Austria, Belgium, the Czech Republic, France and the Netherlands reported using the ISO/PRF TS 13136:2012 method specifically for testing seed samples. This method aims to detect the VTEC serogroups O157, O111, O26, O103 and O145. Germany did not provide information on the analytical method used for testing food samples.

Bovine meat

Contaminated bovine meat is considered to be a major source of food-borne VTEC infections in humans. In 2012, nine MSs reported data on VTEC in fresh bovine meat from 10 investigations with 25 or more samples. VTEC was detected in seven of these 10 investigations. A total of 4,603 bovine meat units (single or batch) were tested for VTEC and 58 units (1.3 %) were found to be VTEC-positive and six units (0.1 %) VTEC O157-positive (Table VT4).

The Czech Republic and Romania reported testing batches of carcases at the slaughterhouse. Only the Czech Republic reported 1.3 % of the batches positive for VTEC. Both countries used carcase swabs, but in the Czech Republic investigation, the area swabbed was larger. The Czech Republic also tested for the presence of other human pathogenic VTEC serogroups in the bovine meat samples and detected isolates from the VTEC O103, O104 and O145 serogroups. Belgium and Germany reported investigations of single carcases for VTEC at the slaughterhouse. Belgium found 0.9 % of the carcase surface samples positive for VTEC and 0.2 % positive for VTEC O157, and Germany reported 5.7 % of carcases positive for VTEC, but none for VTEC O157.

In the Czech Republic, the sampling for monitoring of VTEC, in fresh bovine meat, was performed at slaughterhouses during June, July and August. The samples were taken as swabs from the carcases of cattle. Swabs were taken from four places on the carcase. The sampling area of the swab was 100 cm^2. VTEC was detected in 8 of 622 swabs from carcases (1.3 %) (Table VT4).

Source: The Czech Republic National Zoonoses Summary Report, 2012.

At point of processing, Belgium found 0.5 % of samples from batches of fresh meat positive for VTEC and VTEC O157, France found 0.4 % of samples of fresh meat positive for VTEC and 0.2 % for VTEC O157, while Hungary did not find any positive samples.

Austria and the Netherlands reported investigations of fresh bovine meat at retail; 1.8 % and 3.2 %, respectively, were found positive for VTEC but none was positive for VTEC O157.

The other data reported on bovine meat and products thereof are presented in the Level 3 Tables.

Table VT4. VTEC in fresh bovine meat, 2012

Country	Description	Sample unit	Sample weight	N	VTEC		VTEC O157		VTEC serogroups
					N pos	% pos	N pos	% pos	
Austria	Fresh, at retail	Single	25 g	56	1	1.8	0	0	O51:H49 *eae* positive *vtx1* negative *vtx2* positive
Belgium	Carcase swab, at slaughterhouse	Single	1,600 cm^2	453	4	0.9	1	0.2	
	Fresh, at processing	Batch	25 g	374	2	0.5	2	0.5	
Czech Republic	Carcase swab, at slaughterhouse	Batch	400 cm^2	622	8	1.3	0	0	O103 *eae* positive *vtx2* positive (1), O103 *eae* positive *vtx1* positive (1), O104 (3), O145 *eae* positive *vtx1* positive (1), O145 (2)
France	Fresh, at processing	Single	25 g	1,923	7	0.4	3	0.2	O103:H2 *eae* positive and *stx1* positive (2), O26:H11 *eae* positive and *stx2* positive (2), O157:H7 *eae* positive, *stx1* and *stx2* positive (2), O157:H7 *eae* positive and *stx2* positive (1)
Germany	Carcase swab, at slaughterhouse	Single	25 g	315	18	5.7	0	0	
Hungary	Fresh, at processing	Single	25 g	77	0	0	0	0	
Netherlands	Fresh, at retail	Single	25 g	555	18	3.2	0	0	
Poland	Fresh, at unspecified sampling level	Batch	25 g	25	0	0	0	0	
Romania	Carcase swab - chilled, at slaughterhouse	Batch	100 cm^2	203	0	0	0	0	
Total (9 MSs)				**4,603**	**58**	**1.3**	**6**	**0.1**	

Note: Data presented include only investigations with sample size ≥25.
Figures in parentheses are the number of isolates from the non-VTEC O157 strains.

Other submitted data on VTEC, in meat from other animal species and products thereof, are reported in the Level 3 Tables.

3.4.3. VTEC in animals

In total, 11 MSs provided data on VTEC in animals. When interpreting these data it is important to note that data from different investigations are not necessarily directly comparable owing to differences in sampling strategies and the analytical methods applied. In the case of cattle samples, Denmark, Estonia and Finland reported having used the ISO 16654:2001 analytical method, which is intended to detect only VTEC O157. Italy used a method based on ISO 16654:2001. Sweden used NMKL 164:2005, which is designed to detect only VTEC O157. Austria used enzyme-linked immunosorbent assay (ELISA) to screen the samples for presence of verotoxins. The toxin-positive samples were then cultivated to isolate VTEC and, finally, real-time fluorescent Polymerase Chain Reaction (PCR) was used to detect the toxin genes. Germany reported the results of tests in which toxin production was examined by means of Shiga-like toxin-PCR (SLT-PCR), ELISA or cytotoxin testing.

Cattle

Altogether seven MSs provided data on VTEC in cattle for the year 2012 from investigations with 25 or more samples (Table VT5). In all reported investigations VTEC was detected from the animals tested.

All countries reported data from animals sampled in slaughterhouses. Austria found 32.1 % of the tested cattle, over two years old, and 35.7% of the young cattle (one to two years old), positive for VTEC and 1.8 % of the young cattle positive for VTEC O157, using recto-anal swabs. Austria used an analytical method that is able to detect many VTEC serogroups, and this is very likely the reason why Austria reported a higher VTEC prevalence than other MSs.

Denmark, Estonia, Finland, Italy and Sweden reported a low prevalence of VTEC and VTEC O157, at levels ranging from 1.7 % to 8.4 %. Denmark and Finland sampled faeces, while Estonia used hide samples in accordance with EFSA's VTEC monitoring specifications.

> In Sweden, in an abattoir survey conducted during 2011-2012, VTEC O157 was detected in 73 of 2,376 faecal samples (3.1 %). In this study, VTEC O157:H7 was isolated predominantly from cattle in southern Sweden but rarely from the northern two-thirds of the country.
>
> Source: Sweden National Zoonoses Summary Report, 2012.

Germany provided data at herd level and found 12.9 % of farms with calves under one year and 14.2 % of herds with unspecified cattle positive for VTEC, while both types of herds were 0.3 % positive for VTEC O157. At farm, Germany reported 2.2 % of calves under one year and 13.7 % of unspecified cattle positive for VTEC. Germany also reported 0.4 % and 0.2 % of these animals positive for VTEC O157, respectively. At slaughterhouse, at animal level, Germany found 24.0 % of calves under one year positive for VTEC, but none of them positive for O157.

Austria and Germany detected VTEC O26, O91 and O103 serogroups, which are other human pathogenic VTEC serogroups, in cattle.

The other submitted data on VTEC in cattle are reported in the Level 3 Tables.

Other animals

Additional information on VTEC findings in animals can be found in the Level 3 Tables.

Table VT5. VTEC in cattle, 2012

Country	Description	Sample unit	Sample weight	N	VTEC		VTEC O157		VTEC serogroups
					N pos	% pos	N pos	% pos	
Austria	Adult cattle over 2 years, at slaughterhouse, recto-anal swab	Animal		56	18	32.1	0	0	***eae* negative *vtx1* negative *vtx2* positive:** O113:H21 (2), O178:HNM (1), O39:H48 (1), O113:H4 (1), O46:H2 (1), O43:Hrough (1), O178:H19 (1), ONT:H21 (1) ***eae* negative *vtx1* positive *vtx2* positive:** O183:H18 (2), O91:H21 (1), Orough:H28 (1), O178:H19 (1), O179:HNM (1), O15:H2 (1), Orough:H2 (1) ***eae* positive *vtx1* positive *vtx2* negative:** O129:HNM (1)
	Young cattle (1-2 years), at slaughterhouse, recto-anal swab	Animal		56	20	35.7	1	1.8	***eae* negative *vtx1* negative *vtx2* positive:** Orough:H21 (1), O91:H10 (1), O91:H21 (1), O179:H8 (2), O39:H48 (2), ONT:Hrough (1), O36:Hrough (1), O179:Hrough (1), O109:H16 (1), O113:H4 (1) ***eae* negative *vtx1* positive *vtx2* negative:** O168:H8 (2) ***eae* negative *vtx1* positive *vtx2* positive:** O15:HNM (1), O91:H21 (1), O178:H12 (1), O22:H8 (2), Orough:HNM (1), O185:H5 (1), O36:H2 (1) ***eae* positive *vtx*1 positive *vtx2* negative:** O103:H2 (1), O26:HNM (3) ***eae* positive *vtx1* positive *vtx2* positive:** O157:HNM (1)
Denmark	At slaughterhouse, faeces	Animal	25 g	251	21	8.4	21	8.4	
Estonia	At slaughterhouse, hide	Animal	cm^2	246	13	5.3	13	5.3	
Finland	At slaughterhouse, faeces	Animal	10 g	1,553	27	1.7	27	1.7	
Germany	At farm, domestic	Animal		925	127	13.7	2	0.2	VTEC O103 (2), VTEC O26 (1), VTEC O91 (1)
	At farm, domestic	Herd		709	101	14.2	2	0.3	VTEC O103 (2), VTEC O26 (1), VTEC O91 (1)
	Calves (under 1 year), at farm, domestic	Animal		542	12	2.2	2	0.4	VTEC O103 (2), VTEC O26 (1)
	Calves (under 1 year), at slaughterhouse, caecum, domestic	Animal	25 g	325	78	24.0	0	0	
	Calves (under 1 year), at farm, domestic	Herd		692	89	12.9	2	0.3	VTEC O103 (2), VTEC O26 (1)
Italy	At slaughterhouse, domestic	Animal	g	112	2	1.8	2	1.8	
Sweden	At slaughterhouse, faeces, domestic	Animal		2,376	73	3.1	73	3.1	VTEC O157:H (73)
Total (7 MSs)				**7,843**	**581**	**7.4**	**145**	**1.8**	

Note: Data presented include only investigations with sample size ≥25.
Figures in parentheses are the number of isolates from the non-VTEC O157 strains.

3.4.4. Discussion

In 2012, the number of reported human cases of VTEC infections decreased by 40 % compared with 2011, when the largest STEC/VTEC outbreak ever reported in the EU occurred. The outbreak, caused by an enteroaggregative Shiga toxin–producing *E. coli* O104:H4 in raw sprouted seeds, affected more than 3,800 persons in Germany alone, and additional cases in 15 other countries. There was an increasing EU trend of confirmed human VTEC infections in 2008–2012. Even without the 2011 outbreak, the EU trend for VTEC infections during 2008–2010 was significantly increasing. The increase in the number of reported cases in 2012 compared with 2010 is most likely due to a generally increased awareness of the disease and increased detection and reporting by the countries as a result of the 2011 outbreak. Increasing trends in 2008–2012 were observed in more than half of the reporting MSs, and only one MS observed a significant decreasing trend. For example, in the Netherlands the increase in VTEC is mainly caused by more and more laboratories testing for all VTEC instead of VTEC O157 only. The trend of VTEC O157 in the Netherlands showed a small increase in 2011 and 2012.

On average, one-third of the VTEC cases in the EU were hospitalised. However data were available for less than 40 % of the confirmed cases. Some countries reported very high proportions of hospitalised cases but among the lowest notification rates, indicating that the surveillance systems in these countries primarily capture the more severe cases. A low case-fatality rate (0.36 %) was reported based on information provided by 18 MSs covering almost 60 % of the confirmed VTEC cases. As in previous years, the most commonly reported serogroup was O157, followed by O26, O91, O103 and O145. In contrast to 2011, only seven confirmed cases of serogroup VTEC O104 were reported in 2012, in five countries.

Only data reported on VTEC in bovine meat and bovine animals are included in this report. This is because cattle and meat thereof are considered the major sources of human VTEC infections. VTEC pathogenic for humans were detected by the reporting MSs from fresh bovine meat occasionally and at low levels. The human pathogenic VTEC serogroups isolated from bovine meat and cattle samples included VTEC O157, O26, O91, O103 and O145.

The importance of bovine meat as a source of human VTEC infections in humans was also illustrated by the reported food-borne outbreak data from 2012. Twelve VTEC outbreaks were reported. Nine outbreaks were due to VTEC O157, one to VTEC O113:H4, one to 'other' VTEC serogroups, and one to non-grouped *E. coli* positive for LT genes. Half (six out of 12) of the VTEC outbreaks, in which information on the implicated food vehicle was provided, were linked to bovine meat and products thereof. Moreover, 10 strong-evidence VTEC waterborne outbreaks were reported, all by Ireland, and seven were reported to be linked to private water supplies or wells.

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.5. Tuberculosis due to *Mycobacterium bovis*

Tuberculosis is a serious disease of humans and animals caused by species in the *Mycobacterium tuberculosis* (*M. tuberculosis*) complex. This group includes *M. bovis*, responsible for bovine tuberculosis, which is a highly contagious disease that can easily spread from one cow to another. *M. bovis* is capable of infecting a wide range of mammals, including humans. In humans, infection with *M. bovis* causes a disease that is indistinguishable from that caused by *M. tuberculosis*, the primary agent of human tuberculosis.

The main transmission routes of *M. bovis* to humans are through contaminated food, especially through drinking raw milk from infected cows, or eating raw milk products. However, as pasteurisation of milk products kills *M. bovis,* cases of food-borne transmission of this bacterium to humans are extremely rare. *M. bovis* can also be transmitted to humans through direct contact with infected animals. A number of wildlife animal species, such as deer, wild boar, badgers and the European bison, may contribute to the spread and/or maintenance of *M. bovis* infection in cattle.

This chapter focuses on zoonotic tuberculosis caused by *M. bovis.*

Table TB1 presents the countries reporting data for 2012.

Table TB1. Overview of countries that reported data for tuberculosis due to* M. bovis *for humans and animals, 2012

Data	Total number of reporting MSs	Countries
Human	25	**All MSs** except FR, GR
		Non-MSs: CH, IS, NO
Animal	27	**All MSs**
		Non-MSs: CH, NO

Note: The overview table contains all data reported by MSs and non-MSs.

3.5.1. *M. bovis* in humans

In 2012, 25 MSs provided information on human tuberculosis due to *M. bovis* (Table TB2). In total, 125 confirmed cases were reported by 9 MSs while 16 MSs reported zero cases. The number of confirmed cases reported decreased in the EU by 15.5 % compared with 2011. Most cases were reported in Germany, the United Kingdom and Spain, while the highest notification rate, 0.07 cases per 100,000 population, was reported in Ireland. The EU notification rate in 2012 was 0.03 cases per 100,000 population (Table TB2).

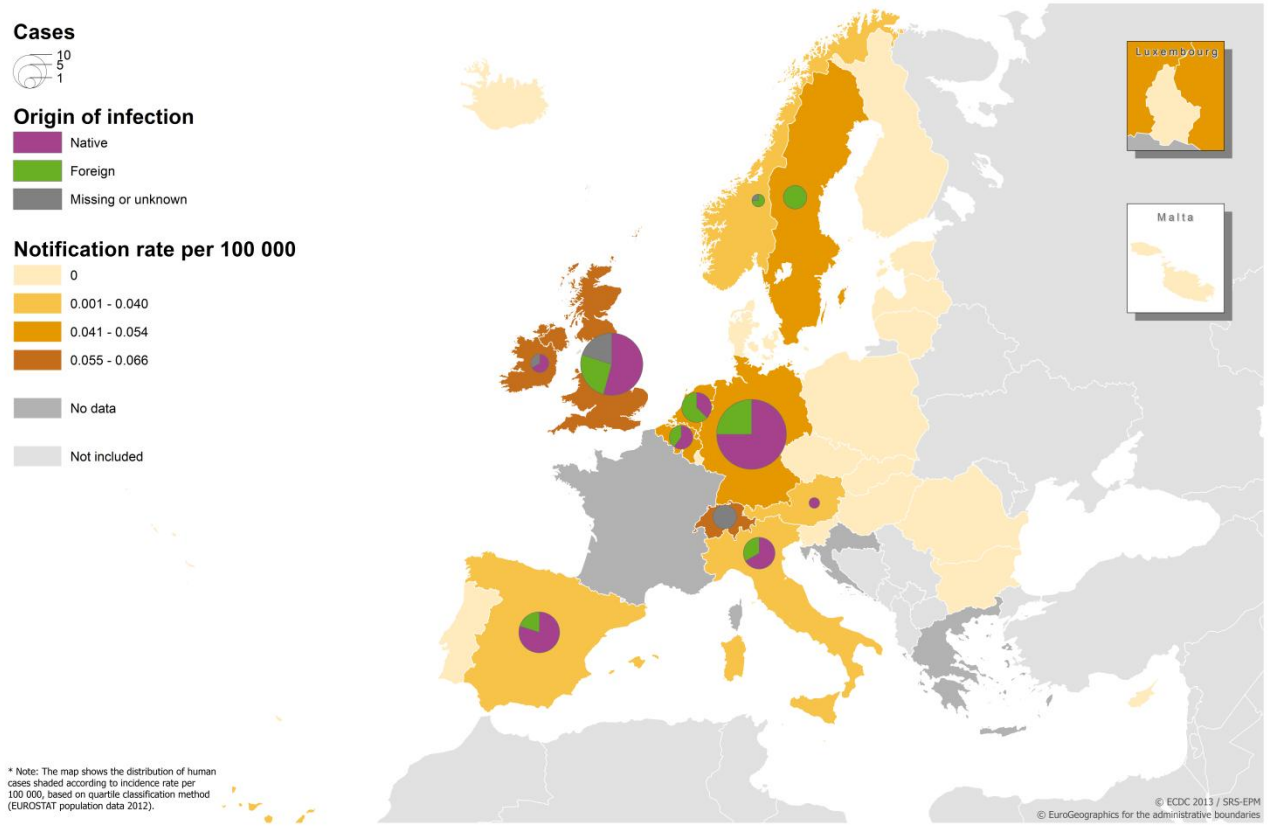
As tuberculosis is a chronic disease with a long incubation period, it is not possible to assess travel-associated cases in the same way as diseases with acute onset. Instead, the distinction is made between cases born in the reporting country (native infection) and those moving there at a later stage (foreign infection). In a few cases the distinction is also made on nationality of the cases. On average, 62.2 % of the cases reported in 2012 were native to the reporting country, 31.5 % were foreign and 6.3 % were of unknown origin (Figure TB1). Among cases with origin provided, there was a somewhat larger proportion (72.2 %) of native cases in countries not free of bovine tuberculosis than in countries officially bovine tuberculosis free (OTF) (61.5 %).

Table TB2. Reported cases of human tuberculosis due to M. bovis in 2008–2012 and notification rates for confirmed cases in the EU, in 2012; OTF[1] status is indicated

Country	2012				2011	2010	2009	2008
	Report Type[2]	Cases	Confirmed cases	Confirmed cases/ 100,000	Confirmed cases			
Austria (OTF)	C	1	1	0.01	0	4	2	3
Belgium (OTF)	C	5	5	0.05	5	9	3	2
Bulgaria	C	0	0	0	2	0	0	0
Cyprus	U	0	0	0	0	0	0	0
Czech Republic (OTF)	U	0	0	0	4	0	0	0
Denmark (OTF)	U	0	0	0	1	2	0	1
Estonia (OTF)	U	0	0	0	0	0	0	0
Finland (OTF)	C	0	0	0	1	0	0	0
France (OTF)[3]	–	–	–	–	–	–	–	–
Germany (OTF)	C	44	44	0.05	42	44	57	47
Greece[3]	–	–	–	–	–	–	–	–
Hungary	U	0	0	0	0	0	0	0
Ireland	C	3	3	0.07	6	12	8	12
Italy[4,5]	C	9	9	0.01	15	15	6	4
Latvia (OTF)	U	0	0	0	0	0	0	0
Lithuania	U	0	0	0	0	0	0	0
Luxembourg (OTF)	U	0	0	0	0	0	0	0
Malta	U	0	0	0	0	0	0	0
Netherlands (OTF)	C	8	8	0.05	11	13	11	19
Poland (OTF)	U	0	0	0	0	0	0	0
Portugal	C	0	0	0	0	0	1	1
Romania	U	0	0	0	0	0	0	0
Slovakia (OTF)	U	0	0	0	0	0	0	0
Slovenia (OTF)	U	0	0	0	0	0	0	0
Spain	C	15	15	0.03	23	34	17	11
Sweden (OTF)	C	5	5	0.05	2	2	5	2
United Kingdom[6]	C	35	35	0.06	36	33	23	21
EU Total		**125**	**125**	**0.03**	**148**	**168**	**133**	**123**
Iceland[7]	U	0	0	0	0	0	0	0
Liechtenstein (OTF)	–	–	–	–	–	–	–	–
Norway (OTF)	C	2	2	0.04	2	2	1	0
Switzerland (OTF)[8]	C	5	5	0.06	13	6	4	5

1. OTF: Officially Tuberculosis Free.
2. C: case-based report; –: no report; U: unspecified.
3. Not reporting species of the *M. tuberculosis* complex (France) or only reporting for *M. tuberculosis* (Greece).
4. In Italy, 6 regions and 15 provinces are OTF.
5. All cases reported from Italy to TESSy in 2008–2012 were without laboratory results but were still included in the table since reported as *M. bovis.*
6. In the United Kingdom, Scotland is OTF.
7. In Iceland, which has no special agreement concerning animal health (status) with the EU, the last outbreak of bovine tuberculosis was in 1959.
8. Switzerland reported data directly to EFSA.

Figure TB1. Notification rates and origin of infection in tuberculosis due to* M. bovis *in the EU/EFTA, 2012



Note: The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

3.5.2. Tuberculosis due to *M. bovis* in animals

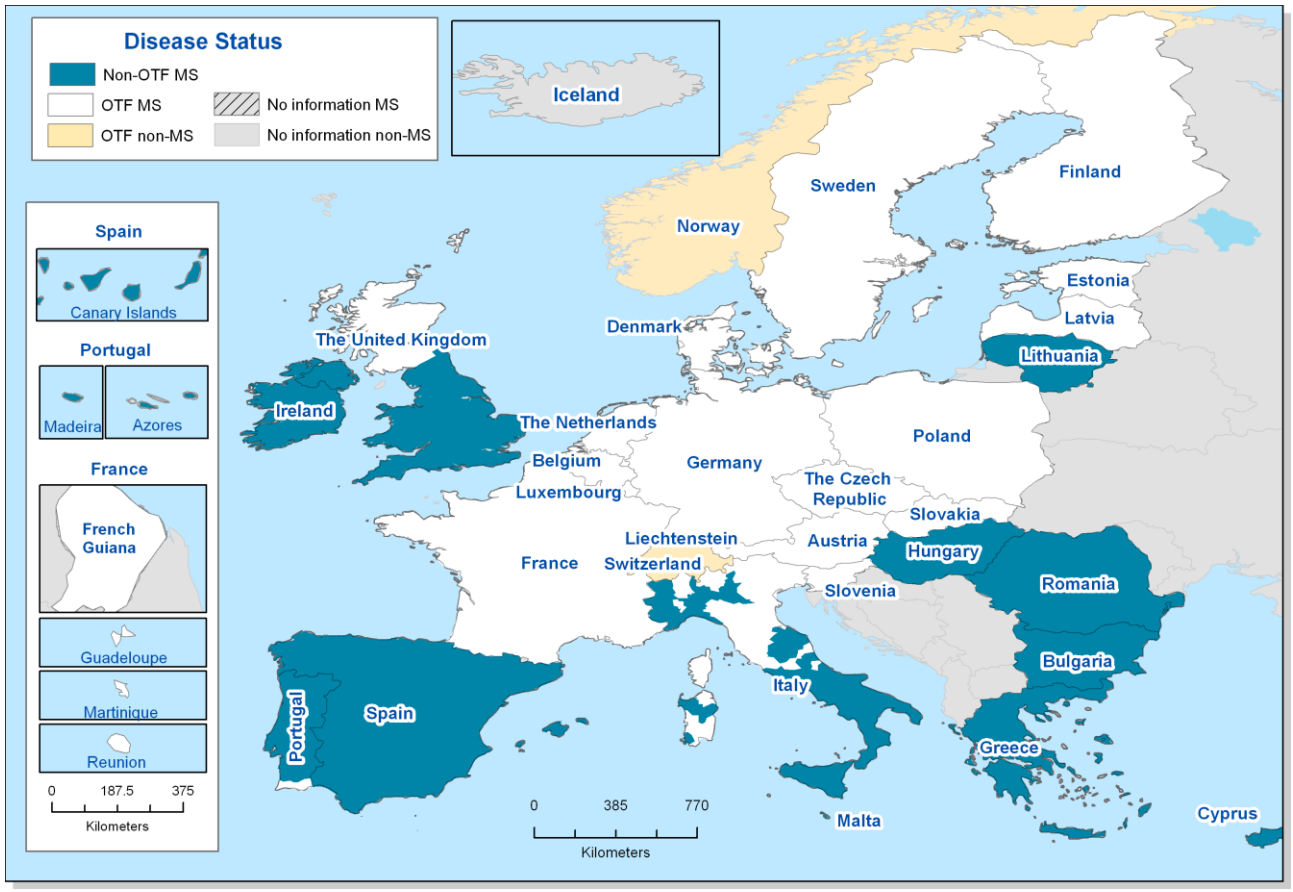
Cattle

The status regarding freedom from bovine tuberculosis (OTF) and the occurrence of the disease in MSs and non-MSs, in 2012, is presented in Figures TB2 and TB3. As in 2011, Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Latvia, Luxembourg, the Netherlands, Poland, Slovakia, Slovenia, Sweden, Norway and Switzerland were OTF in accordance with EU legislation. Liechtenstein has the same status (OTF) as Switzerland. In Iceland, which has no special agreement concerning animal health (status) with the EU, the last outbreak of bovine tuberculosis was in 1959. Moreover, in Italy the provinces of Asti and Biella in the region of Piemonte were declared OTF as well as all administrative regions within the superior administrative unit of Algarve in Portugal (Decision 2012/204/EU[36]). Italy now has 6 OTF regions and 15 OTF provinces. In the United Kingdom, Scotland is OTF.

Vaccination of cattle against bovine tuberculosis is prohibited in all MSs and in reporting non-MSs.

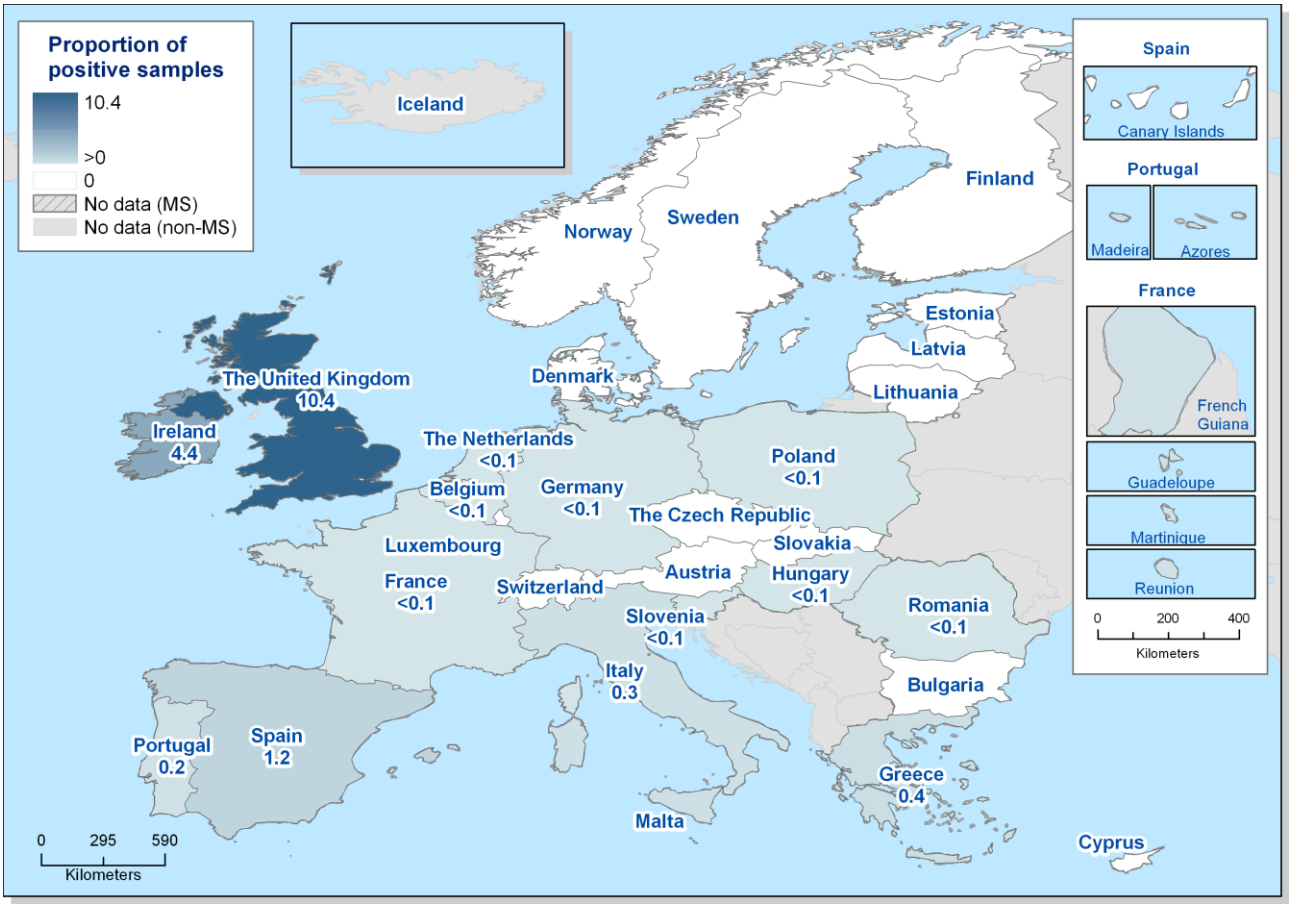
All data submitted by MSs and other reporting countries are presented in the Level 3 Tables of the report.

Figure TB2. Status of countries regarding bovine tuberculosis, 2012



[36] Commission Implementing Decision 2012/204/EU of 19 April 2012 amending the Annexes to Decision 2003/467/EC as regards the declaration of Latvia as officially brucellosis-free Member State and of certain regions of Italy, Poland and Portugal as officially tuberculosis-free, brucellosis-free and enzootic-bovine-leukosis-free regions. OJ L 109, 21.4.2012, p. 26–32.

Figure TB3. Proportion of existing cattle herds infected with or positive for* M. bovis*, country based-data, 2012



Trend indicators for tuberculosis due to *M. bovis*

To assess the annual EU trends in bovine tuberculosis and to complement the MS-specific figures, two epidemiological trend indicators have been used since 2005.

The first indicator, **'% existing herds infected/positive'** is 'the number of infected herds' (or 'the number of positive herds', respectively) divided by 'the number of existing herds in the country'. This indicator describes the situation in the whole country during the reporting year.

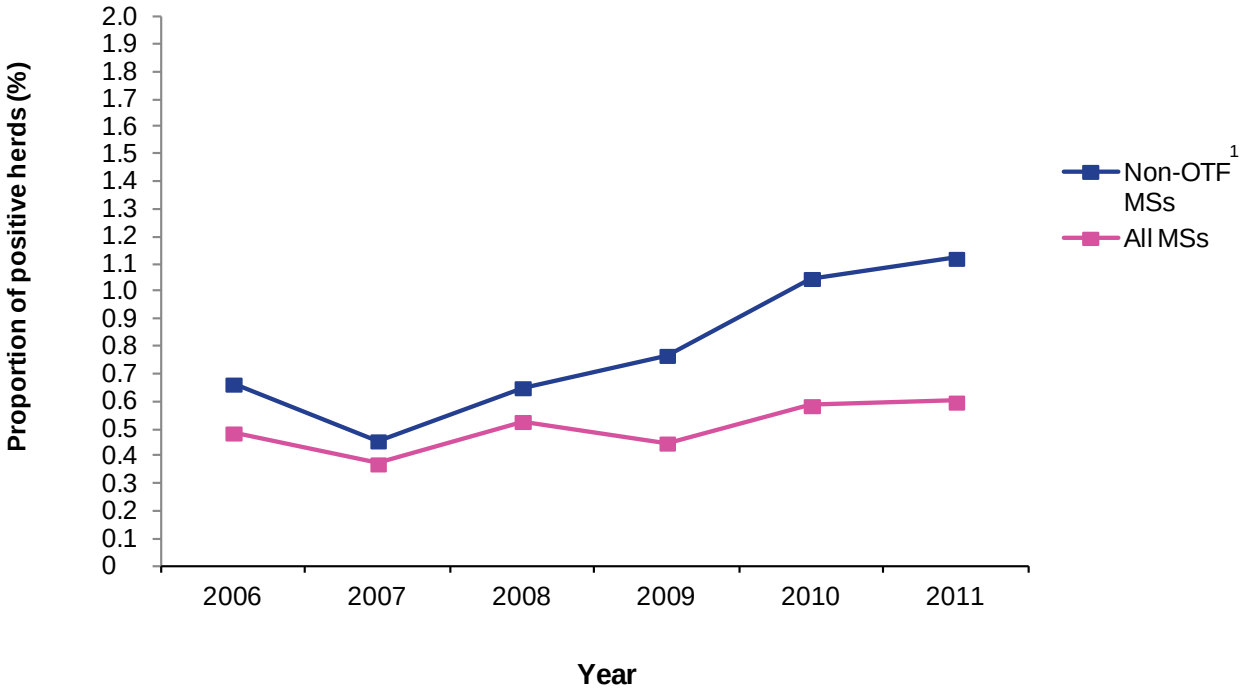
A second indicator **'% tested herds positive'** is 'the number of test-positive herds' divided by 'the number of tested herds'. This indicator gives a more precise picture of the testing results and also estimates the herd prevalence during the whole reporting year. This information is available only from countries or regions with EU co-financed eradication programmes.

Infected herds means all herds under control which are not OTF at the end of the reporting period. This figure summarises the results of different activities (tuberculin testing, meat inspection, follow-up investigations and tracing). Data on infected herds are reported from countries and regions that do not receive EU co-financing for eradication programmes.

Positive herds are herds with at least one bacteriological or tuberculin skin test-positive animal during the reporting year, independent of the number of times the infection status of each herd has been checked. Data for positive herds are reported from countries and regions that receive EU co-financing for eradication programmes.

During the years 2006–2012, the proportion of existing cattle herds infected or positive for *M. bovis* in the EU (all MSs) was relatively stable at a very low level and ranging from 0.37 % in 2007 to 0.67 % in 2012 (Figure TB4). In the non-OTF MSs the proportion of *M. bovis*-positive herds increased from very low (0.46 %) in 2007 to low (1.26 %) in 2012.

Figure TB4. Proportion of existing cattle herds infected with or positive for* M. bovis*, 2006–2012



Source: All reporting countries that are MSs during the current year are included. Data from Bulgaria only for 2008 and 2009, Romania for 2007-2009. Data missing from Lithuania (2007) and Malta (2006).

1. OTF: Officially Tuberculosis Free.

Officially Tuberculosis-Free Member States and non-Member States

Bovine tuberculosis was not detected in cattle herds in nine of the 15 OTF MSs and Norway and Switzerland, during 2012. However, in total, out of the 1,311,492 existing herds in the OTF MSs, 203 herds were infected with *M. bovis*: in Belgium (one herd), France (169 herds), Germany (23 herds), Poland (seven herds), the Netherlands (two herds) and in Slovenia (one herd). Three herds were positive for *M. caprae* in Austria.

Non-Officially Tuberculosis-Free Member States

All reporting non-OTF MSs have national eradication programmes for bovine tuberculosis in place. Table TB3 shows the reported results from MSs that did not receive EU co-financing for their eradication programmes in 2012, while Table TB4 shows results from those MSs with eradication programmes co-financed by the EU. In 2012, Ireland, Italy, Portugal, Spain and the United Kingdom received EU co-financing (Decision 2011/807/EU[37]).

Among the non-co-financed non-OTF MSs, four, Bulgaria, Cyprus, Lithuania and Malta, did not report any infected herds during 2012 (Table TB3).

In total, the 12 non-OTF MSs reported 1,443,690 existing bovine herds, with 18,208 of them (1.26 %) infected with or positive for *M. bovis* in 2012.

[37] Commission Implementing Decision 2011/807/EU of 30 November 2011 approving annual and multiannual programmes and the financial contribution from the Union for the eradication, control and monitoring of certain animal diseases and zoonoses presented by the Member States for 2012 and following years. OJ L 322, 6.12.2011, p. 11–22.

Among the non-co-financed non-OTF MSs, Greece reported the highest number of infected herds (166), followed by Romania (75). Compared with the data from 2011, the overall prevalence of infected herds in the MS group that did not receive EU co-financing for their eradication programmes increased slightly (from 0.02 % to 0.03 %).

Table TB3.* Mycobacterium bovis *in cattle herds in non-co-financed non-OTF MSs, 2012

Non-officially free MSs	No of existing herds	No of officially free herds	No of infected herds	% existing herds infected
Bulgaria	98,177	98,177	0	0
Cyprus[1]	309	277	0	0
Greece	40,376	11,656	166	0.41
Hungary	16,645	16,632	1	0.01
Lithuania	79,242	79,242	0	0
Malta	121	121	0	0
Romania	682,802	682,728	75	0.01
Total (7 MSs)	**917,672**	**888,833**	**242**	**0.03**

1. The total number of existing bovine herds refers to the number of herds under the bovine tuberculosis control programme.

The non-OTF MSs with eradication programmes co-financed by the EU were the same as in 2011: Ireland, Italy, Portugal, Spain and the United Kingdom. For these five MSs there was an overall slight increase in both indicators (the proportions of positive herds among the existing herds and among the tested herds): from 3.23 % and 4.36 %, respectively, in 2011, to 3.42 % and 4.72 % respectively, in 2012. The United Kingdom had the highest percentages of existing positive herds and herds testing positive (10.4 % and 16.16 %, respectively) (Table TB4). Ireland reported the next highest percentages of existing positive herds (4.37 %) and herds testing positive (4.37 %).

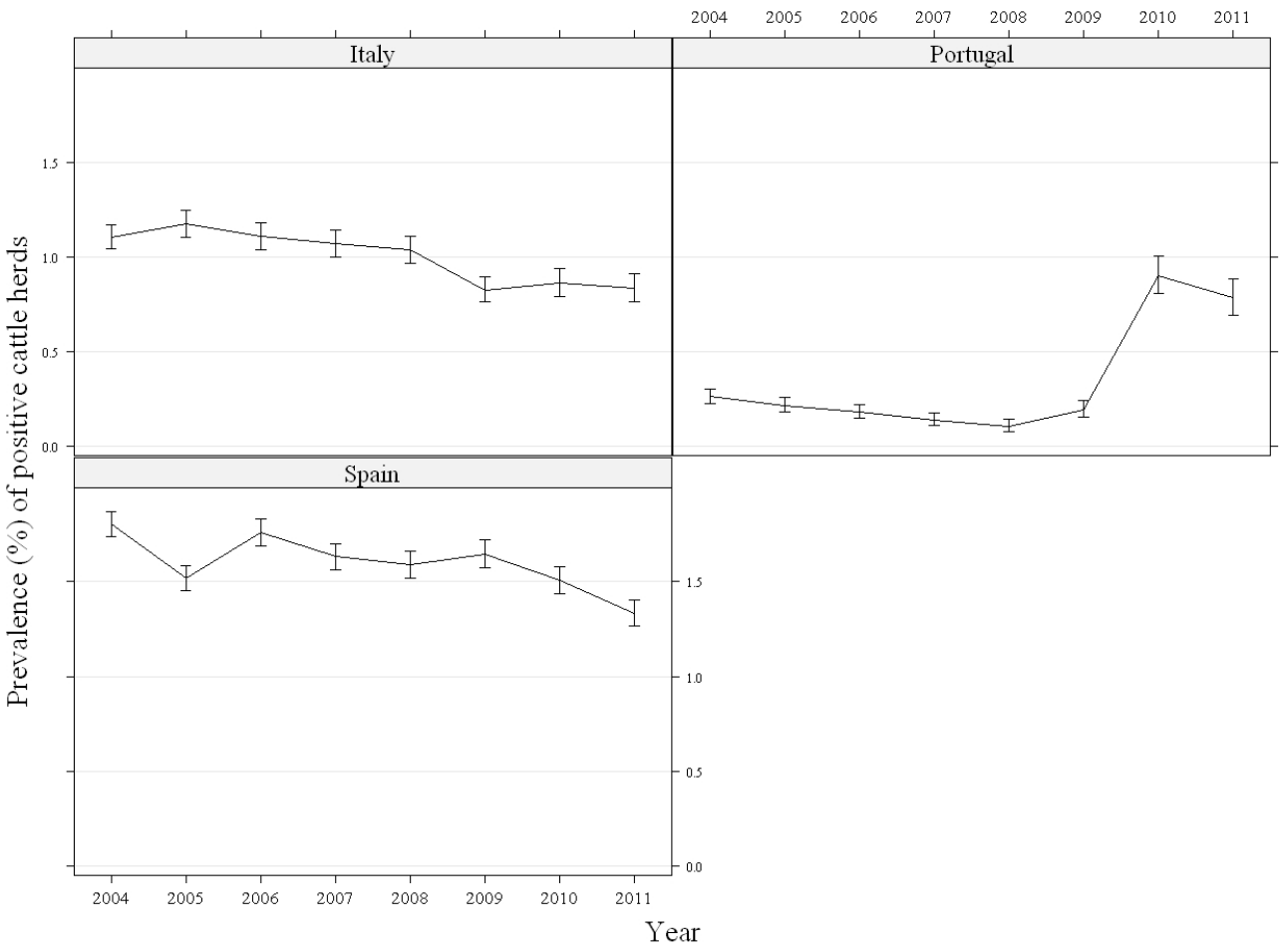
Table TB4.* Mycobacterium bovis *in cattle herds in co-financed non-OTF MSs[1], 2012

Non-officially free MSs	No of existing herds	No of tested herds	No of positive herds	% existing herds positive	% tested herds positive
Ireland	115,787	115,787	5,063	4.37	4.37
Italy[2]	123,661	54,157	414	0.33	0.76
Portugal[3]	57,704	31,570	113	0.20	0.36
Spain	123,826	111,636	1,457	1.18	1.31
United Kingdom[4]	105,040	67,549	10,919	10.40	16.16
Total (5 MSs)	**526,018**	**380,699**	**17,966**	**3.42**	**4.72**

1. Only tested and positive herds from regions that have co-financed eradication programmes are included. The number of existing herds includes all herds from all regions in the MS.
2. In Italy, 6 regions and 15 provinces are OTF. In the provinces that are OTF or do not have a co-financed eradication programme, one of the 46,925 existing herds was found infected.
3. In Portugal, all administrative regions (distritos) within the superior administrative unit (região) of Algarve were recognized as OTF in 2012. In that superior administrative unit none of the 311 herds was found infected.
4. During 2009, Scotland obtained status as OTF (Decision 2009/761/EC). In Scotland, 5 of the 12,982 existing herds were found infected in 2012.

The MS-specific trends in test-positive herds in the three non-OTF MSs with continued co-financing from 2004 to 2012 are shown in Figure TB5. Over the nine years reported, the trends seem to be decreasing in Italy and Spain. For Portugal the trend is less clear but is at a lower level than in the two other non-OTF MSs.

Figure TB5. Prevalence and 95 % CI for* M. bovis *test-positive cattle herds, at MS level, in three co-financed non-OTF MSs, 2004–2012[1]



1. Vertical bars indicate the exact binomial 95 % Confidence Interval.

Animal species other than cattle

Where performed, surveillance of tuberculosis due to *M. bovis* in animal species other than cattle mainly entails post-mortem meat inspection. In addition, results from clinical investigations or from other specific local studies are also reported.

In 2012, 15 MSs and 1 non-MS sampled animal species other than cattle. *M. bovis* was detected in alpacas, badgers, bison, cats, farmed and hunted wild and park deer (roe deer, red deer and fallow deer), dogs, goats, lamas, pigs, sheep and wild boar.

All data submitted by MSs and other reporting countries are presented in the Level 3 Tables.

3.5.3. Discussion

Tuberculosis due to *M. bovis* is a rare infection in humans in the EU, with 125 confirmed human cases reported in 2012. The case numbers in the EU have decreased in the last two years. There was no clear association between a country's status as officially free from bovine tuberculosis (OTF) and notification rates in humans. This could be due to many of the cases in both OTF and non-OTF countries being persons who have immigrated to the country; thus, the infection might have been acquired in their country of origin. Cases native to the country could have been infected before the disease was eradicated from the animal population as it may take years before disease symptoms develop.

Fifteen MSs have OTF status and nine of them did not report any infected cattle herds. The reported proportion of infected or positive herds in the 12 non-OTF MSs increased slightly in 2012 compared with 2011. Four of the 12 non-OTF MSs reported no infected cattle herds in 2012. Of the eight non-OTF MSs reporting herds infected with or positive for *M. bovis*, the prevalence of bovine tuberculosis remained at a level comparable to or lower than in 2011, except in the United Kingdom which reported an increase in the prevalence of bovine tuberculosis and accounted for the highest proportion of positive herds. This was the fourth consecutive year that the United Kingdom reported an increase in bovine tuberculosis.

In 2012, 15 MSs and 1 non-MS sampled animal species other than cattle and detected *M. bovis* in several domestic and wildlife species. These findings demonstrate that wild animals are infected and may constitute a reservoir for *M. bovis*, which is in line with a technical report submitted to EFSA in October 2009[38].

[38] European Food Safety Authority, 2009.Technical report submitted to EFSA. Scientific review on Tuberculosis in wildlife in the EU. Available online: http://www.efsa.europa.eu/en/supporting/pub/12e.htm

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.6. *Brucella*

Brucellosis is an infectious disease caused by some bacterial species of the genus *Brucella*. There are six species known to cause human disease, and each of these has a specific animal reservoir: *Brucella melitensis* (*B. melitensis*) in goats and sheep, *B. abortus* in cattle, *B. suis* in pigs, *B. canis* in dogs and *B. ceti* and *B. pinnipedialis* in marine mammals.

In humans, brucellosis is characterised by flu-like symptoms such as fever, headache and weakness of variable duration. However, severe infections of the central nervous system or endocarditis may occur. Brucellosis can also cause long-lasting or chronic symptoms including recurrent fever, joint pain, arthritis and fatigue. Of the six species known to cause disease in humans, *B. melitensis* is the most virulent and has the largest public health impact in the EU owing to the prevalence of this *Brucella* species in small ruminant populations in many areas of the world and in certain European MSs. Humans can be infected from direct contact with infected animals or with animal tissue contaminated with the organisms (occupational exposure). Transmission to humans also occurs through ingestion of contaminated products, such as drinking raw (unpasteurised) milk from infected animals, or eating raw milk products. In animals, the organisms are localised in the reproductive organs, causing infertility and abortions, and are shed in large numbers in urine, milk and placental fluid.

Table BR1 presents the countries reporting data for 2012.

Table BR1. Overview of countries reporting* Brucella *data, 2012

Data	Total number of reporting MSs	Countries
Human	26	**All MSs** except DK **Non-MSs:** CH, NO
Food	3	**MSs:** BE, ES, IT
Animal	27	**All MSs** **Non-MSs:** CH, IS, NO

Note: The overview table contains all data reported by MSs and non-MSs.

3.6.1. Brucellosis in humans

In 2012, 26 MSs provided information on brucellosis in humans. Eleven MSs (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Romania and Slovenia) reported no human cases. In total, 359 cases of human brucellosis, of which 328 were confirmed, were reported in the EU in 2012 (EU notification rate 0.07 cases per 100,000 population) (Table BR2). This was a 2.4 % decrease in confirmed cases compared with 2011.

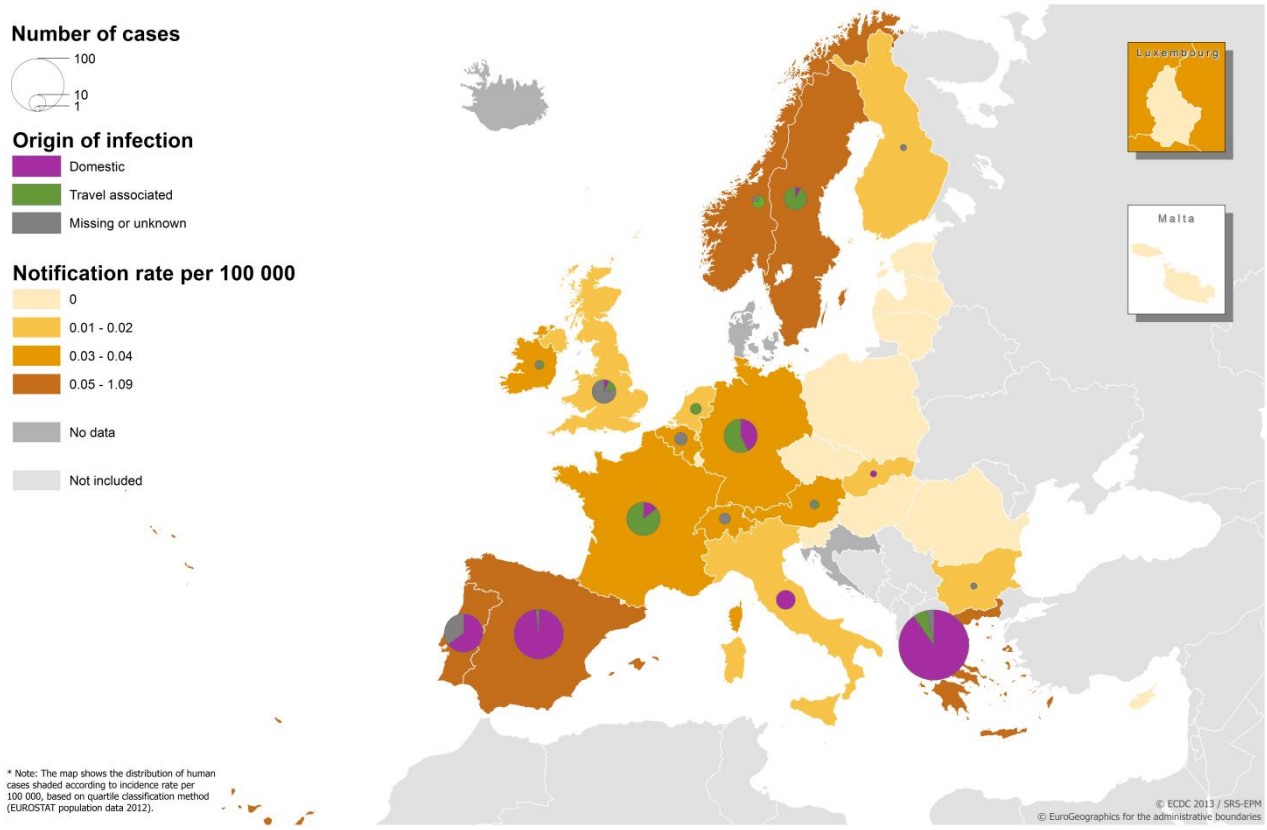
As in previous years, MSs with the status officially free of bovine brucellosis (Officially Brucellosis Free, OBF, see map in animal section, figure BR3) as well as officially free of ovine and caprine brucellosis caused by *B. melitensis* (Officially *B. melitensis* Free, ObmF) reported low numbers of human cases, whereas the non-OBF/non-ObmF MSs Greece, Portugal and Spain, accounted for 67.7 % of all confirmed cases in 2012 (Table BR2). The highest notification rates were observed in Greece (1.09 cases per 100,000 population), Portugal (0.36), Sweden (0.14), Spain (0.13) and Norway (0.08), but while the majority of cases were domestically acquired in the non-OBF/non-ObmF MSs, the majority of cases in Sweden and Norway, as in other OBF and OBmF countries, were travel associated (Figure BR1). In addition to travel-associated cases, OBF and OBmF countries may also experience domestically acquired cases (Figure BR1). These can occur in immigrants from endemic areas or be due to (private) import of unpasteurised dairy products from endemic areas.

Table BR2. Reported cases of human brucellosis in 2008-2012, and notification rates for confirmed cases in 2012, OBF and ObmF status[1] is indicated

Country	2012				2011	2010	2009	2008
	Report Type[2]	Cases	Confirmed cases	Confirmed cases/ 100,000	Confirmed cases			
Austria (OBF/ObmF)	C	3	2	0.02	5	3	2	5
Belgium (OBF/ObmF)	C	4	4	0.04	5	0	1	1
Bulgaria	A	1	1	0.01	2	2	3	8
Cyprus	U	0	0	0	0	0	0	0
Czech Republic (OBF/ObmF)	U	0	0	0	0	1	0	1
Denmark[3] (OBF/ObmF)	-	-	-	-	-	-	-	-
Estonia (OBF/ObmF)	U	0	0	0	0	0	0	0
Finland (OBF/ObmF)	U	1	1	0	0	0	1	0
France[4](OBF)	C	32	28	0.04	21	20	19	21
Germany (OBF/ObmF)	C	28	28	0.03	24	22	19	24
Greece	C	123	123	1.09	98	97	106	304
Hungary (ObmF)	U	0	0	0	0	0	0	0
Ireland (ObmF)	C	2	2	0.04	1	1	0	2
Italy[5]	C	9	9	0.01	21	10	23	163
Latvia	U	0	0	0	0	0	0	0
Lithuania	U	0	0	0	0	0	1	0
Luxembourg (OBF/ObmF)	C	0	0	0	1	1	0	0
Malta	U	0	0	0	0	0	0	0
Netherlands (OBF/ObmF)	C	3	3	0.02	1	6	3	3
Poland (ObmF)	U	0	0	0	0	0	3	1
Portugal[6]	C	48	37	0.36	76	88	80	56
Romania (ObmF)	C	0	0	0	1	2	3	2
Slovakia (OBF/ObmF)	U	1	1	0	0	1	0	1
Slovenia (ObmF)	C	0	0	0	1	0	2	2
Spain[7]	C	77	62	0.13	43	78	114	120
Sweden (OBF/ObmF)	C	13	13	0.14	11	12	7	8
United Kingdom (OBF/ObmF)[8]	C	14	14	0.02	25	12	17	13
EU Total		**359**	**328**	**0.07**	**336**	**356**	**404**	**735**
Iceland[9]	-	-	-	-	0	0	0	0
Liechtenstein	-	-	-	-	-	-	-	-
Norway (OBF/ObmF)	C	4	4	0.08	2	2	0	0
Switzerland (OBF/ObmF)[10]	C	3	3	0.04	8	5	14	5

1. OBF/ObmF: Officially Brucellosis free/Officially *B. melitensis* free in cattle or sheep/goat population.
2. A: aggregated data report; C: case-based report; –: no report; U: unspecified.
3. No surveillance system.
4. In France, 64 departments are ObmF and no cases of brucellosis have been reported in small ruminants since 2003.
5. In Italy, 10 regions and 11 provinces are OBF and also 11 regions and 8 provinces are ObmF.
6. In Portugal, six islands of the Azores and the superior administrative unit of Algarve are OBF whereas all nine Azores islands are ObmF.
7. In Spain, two provinces of the Canary Islands are OBF/ObmF and the Balearic Islands are ObmF.
8. In the United Kingdom, England, Scotland and Wales in Great Britain and the Isle of Man are OBF and the whole of the United Kingdom is ObmF.
9. In Iceland, which has no special agreement concerning animal health (status) with the EU, brucellosis (*B. abortus*, *B. melitensis*, *B. suis*) has never been reported.
10. Switzerland provided data directly to EFSA.

Figure BR1. Notification rates and origin of infection in human brucellosis in the EU/EFTA, 2012



Note: The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

There was some seasonality observed in the number of confirmed brucellosis cases reported in the EU in 2008-2012 (Figure BR2, top), with a dominant peak in 2008 attributed to a large outbreak on the Greek island of Thassos, in which 98 people fell ill with brucellosis. Consumption of locally produced raw cheese was identified as the most likely source of infection[39]. When removing the year 2008 (Figure BR2, bottom), no significant increasing or decreasing EU trend could be observed for the remainder of the period (2009-2012). Significant decreasing trends by country over the period 2008–2012 were observed in Italy and Spain, although in the case of Spain the case numbers rose again in 2012 (Greece not tested due to the effect of the outbreak in 2008). No increasing trends were observed in any country and many countries had too few cases to enable trend analysis.

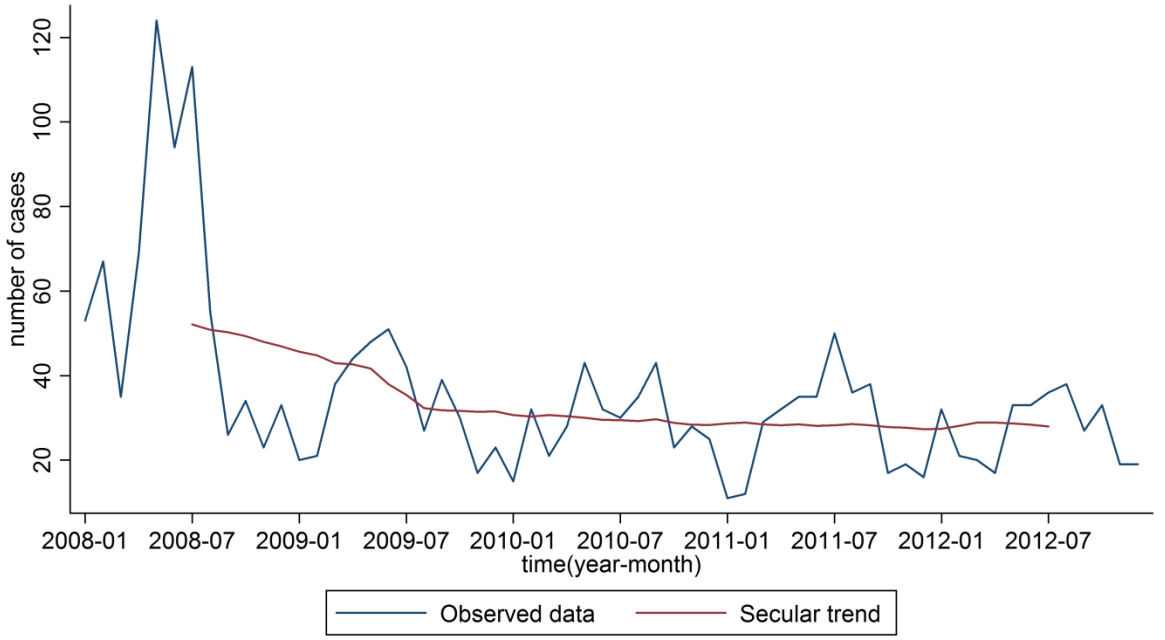
Six MSs provided data on hospitalisation for all or some of their cases. On average, 78.0 % of the confirmed brucellosis cases were hospitalised, but hospitalisation status was provided for only 51.2 % of the confirmed cases in the EU.

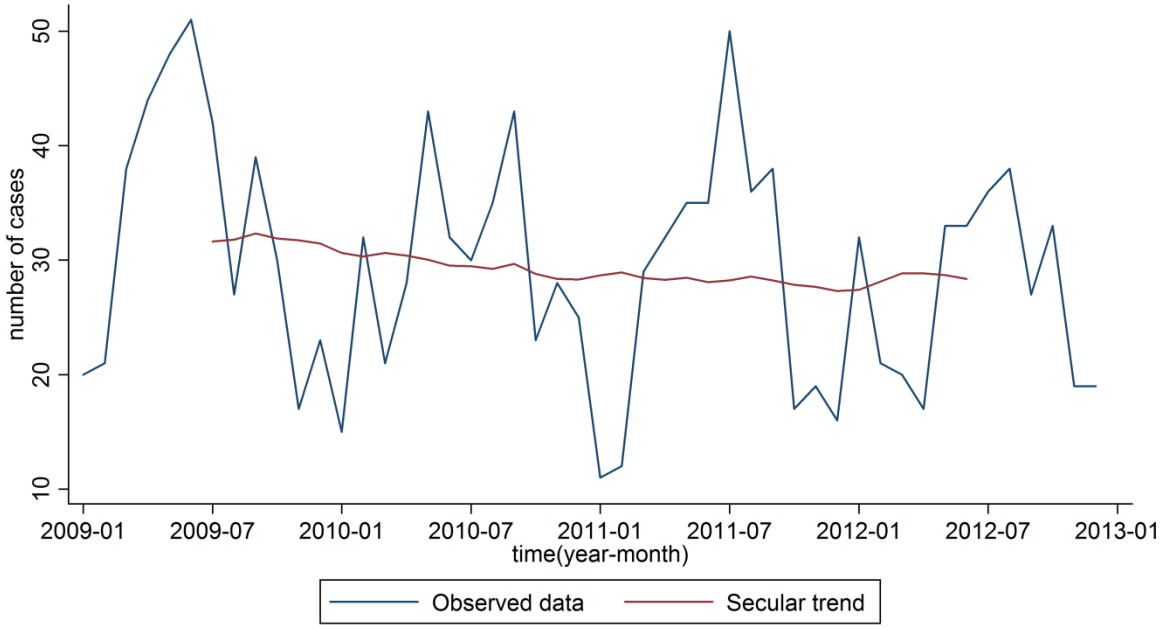
Seven MSs provided information on the outcome of the cases. One death due to brucellosis was reported in Portugal in 2012. This resulted in an EU case fatality rate of 0.93 % among the 108 confirmed cases for which this information was reported (32.9 % of all confirmed cases).

Species information was provided for 99 of the 332 confirmed cases reported in the EU and Norway. Of these, 83.8 % were reported to be *B. melitensis*, 10.1 % *B. abortus*, 3.0 % *B. suis* and 3.0 % other *Brucella* species.

[39] Karagiannis I, Mellou K, Gkolfinopoulou K, Dougas G, Theocharopoulos G, Vourvidis D, Ellinas D, Sotolidou M, Papadimitriou T and Vorou R, 2012. Outbreak investigation of brucellosis in Thassos, Greece, 2008. Euro Surveillance, 17(11):pii=20116. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20116

Figure BR2. Trend in reported confirmed cases of human brucellosis in the EU, 2008-2012 (top) and 2009-2012 (bottom)





Source: 25 MSs: Austria, Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Cyprus, Estonia, Latvia and Malta reported zero cases throughout the period. Luxembourg data were excluded as only cases per year were reported. Denmark does not have a surveillance system for this disease.

3.6.2. *Brucella* in food

In 2012, one MS (Belgium) reported investigations on *Brucella* in raw cow's milk for manufacture. Belgium tested all dairy herds following brucellosis outbreaks in March–May 2012 and one herd was found to be infected with *Brucella suis* biovar 2, using an ELISA of tank milk. This raw milk from cows was intended for the manufacture of heat-treated products at a processing plant. Findings of *Brucella* spp. were also reported by Italy in samples of 'milk from other animal species or unspecified', at processing plant.

All data on *Brucella* in food submitted by MSs are presented in the Level 3 Tables.

3.6.3. *Brucella* in animals

Cattle

The status regarding freedom from bovine brucellosis (Officially Brucellosis Free, OBF) and the occurrence of the disease in MSs and non-MSs, in 2012, is presented in Figures BR3 and BR4. As in 2011, Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, Poland, Slovakia, Slovenia and Sweden, as well as Norway and Switzerland, were OBF in accordance with EU legislation. In 2012, Latvia was also declared OBF (Decision 2012/204/EU). Liechtenstein has the same status (OBF) as Switzerland. Moreover, in the non-MS Iceland, which has no special agreement concerning animal health (status) with the EU, brucellosis (*B. abortus, B. melitensis, B. suis*) has never been reported. In the United Kingdom, England, Scotland and Wales in Great Britain have been classified as OBF (Decision 2003/467/EC[40]), as also has the Isle of Man (Decision 2011/277/EU[41]). In Italy, the region of Valle d'Aosta was recognised as OBF during 2012 (Decision 2012/204/EU) so there are now 10 regions and 11 provinces OBF in Italy. In Portugal, six of the nine islands of the Azores (Pico, Graciosa, Flores, Corvo, Faial and Santa Maria) are OBF (Decision 2003/467/EC and Decision 2009/600/EC[42]), while in 2012 all administrative regions within the superior administrative unit of Algarve were declared OBF (Decision 2012/204/EU). In Spain, two provinces of the Canary Islands (Santa Cruz de Tenerife and Las Palmas) are OBF (Decision 2009/600/EC).

All data submitted by MSs and other reporting countries are presented in the Level 3 Tables.

[40] Commission Decision 2003/467/EC of 23 June 2003 establishing the official tuberculosis, brucellosis, and enzootic-bovine-leukosis-free status of certain Member States and regions of Member States as regards bovine herds, OJ L 156, 25.6.2003, p. 74–78.

[41] Commission Implementing Decision 2011/277/EU of 10 May 2011 amending Annex II to Decision 93/52/EEC as regards the recognition of certain regions in Italy as officially free of brucellosis (*B. melitensis*) and amending the Annexes to Decision 2003/467/EC as regards the declaration that certain regions of Italy, Poland and the United Kingdom are officially free of bovine tuberculosis, bovine brucellosis and enzootic bovine leukosis. OJ L 122, 11.5.2011, p. 100–106.

[42] Commission Decision 2009/600/EC of 5 August 2009 amending Decision 2003/467/EC as regards the declaration that certain Member States and regions thereof are officially free of bovine brucellosis. OJ L 204, 6.8.2009, p. 39–42.

Figure BR3. Status of countries regarding bovine brucellosis, 2012

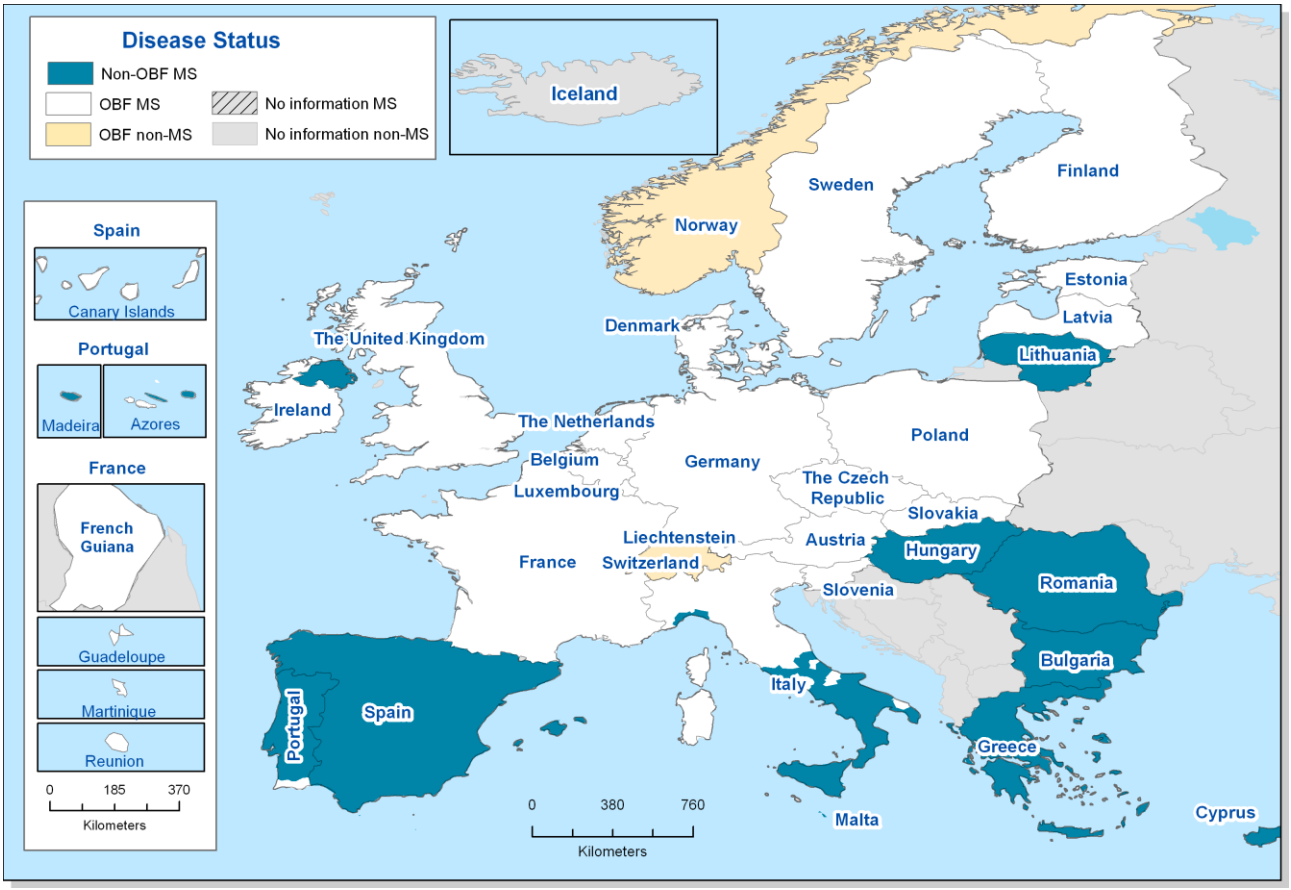
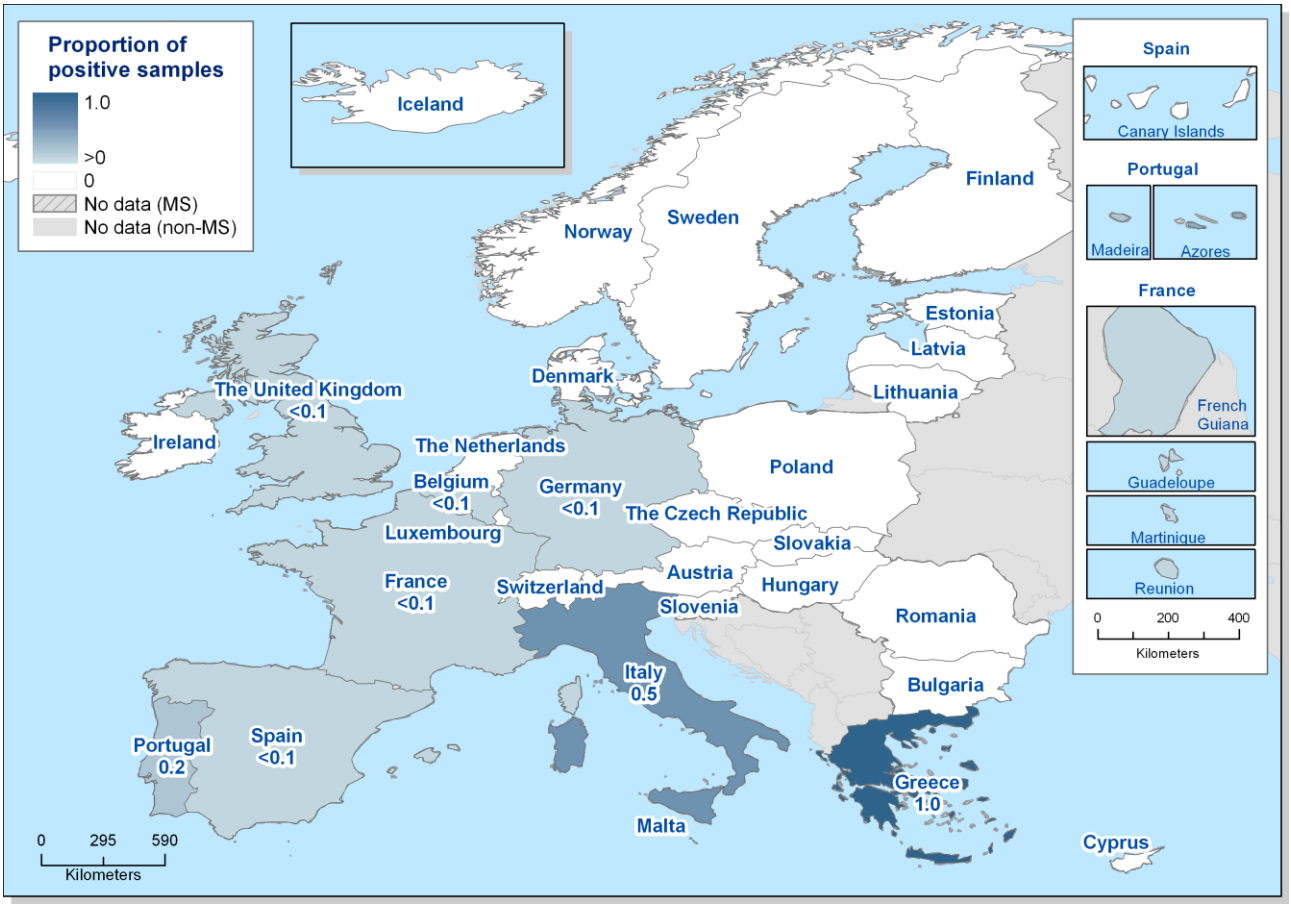


Figure BR4. Proportion of existing cattle herds infected with or positive for* Brucella*, country based-data, 2012



Trend indicators for brucellosis

To assess the annual EU trends in bovine and ovine/caprine brucellosis and to complement the MS-specific figures, two epidemiological trend indicators have been used since 2005.

The first indicator, **'% existing herds infected/positive'**, is 'the number of infected herds' (or 'the number of positive herds', respectively) divided by 'the number of existing herds in the country'. This indicator describes the situation in the whole country during the reporting year.

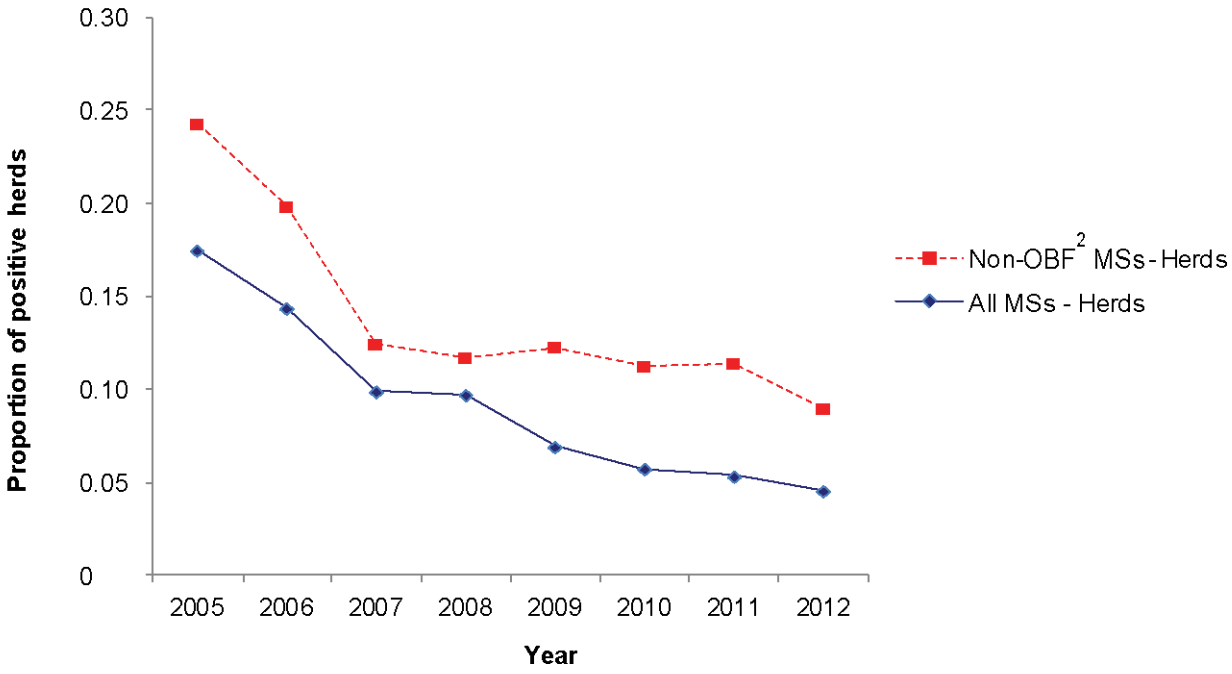
The second indicator, **'**% **tested herds positive'** is 'the number of herds test-positive' divided by 'the number of tested herds'. This indicator gives a more precise picture of the testing results and also estimates the herd prevalence during the whole reporting year. This information is available only from countries with EU co-financed eradication programmes.

Infected herds are all herds under control, which are not free or officially free at the end of the reporting period. This figure summarises the results of different activities (notification of clinical cases, routine testing, meat inspection, follow-up investigations and tracing). Infected herds are reported by countries and regions that do not receive EU co-financing for eradication programmes.

Positive herds are herds with at least one positive animal during the reporting year, independent of the number of times the herds have been checked. Positive herds are reported from countries and regions that receive EU co-financing for eradication programmes.

Over the years 2005–2012, the overall proportion of existing brucellosis-infected or -positive cattle herds in the EU decreased steadily to very low levels, and since 2007 bovine brucellosis has been rare, with the proportion of infected or positive herds in 2012 being 0.05 % (Figure BR5). The percentage of existing infected or positive herds in the non-OBF MSs also decreased between 2005 and 2007, then stabilised until 2011, after which it further decreased in 2012. In 2012, bovine brucellosis was rare also in the non-OBF MSs (0.09 %).

***Figure BR5. Proportion of existing cattle herds infected with or positive for* Brucella*, 2005-2012*[1]**



1. Missing data from OBF MS: Germany (2008) and non-OBF MSs: Hungary (2005), Malta (2006) and Lithuania (2007). Romania included data for the first time in 2007 and Bulgaria in 2008.
2. OBF: Officially Brucellosis Free.

Officially Bovine Brucellosis-Free Member States and non-Member States

During 2012, bovine brucellosis was not detected in cattle herds in 13 of the 16 OBF MSs or in Iceland, Norway and Switzerland. However, in total, out of the 1,281,730 existing herds in the OBF MSs, 9 herds were infected with *Brucella*: 6 in Belgium, 2 in France and 1 in Germany.

Non-Officially Bovine Brucellosis-Free Member States

In 2012, the 11 non-OBF MSs reported a total population of 1,315,895 bovine herds, of which 0.09 % were found to be infected with or positive for bovine brucellosis, and this level was comparable to the level reported in 2007–2011.

Greece was the only non-OBF MS without an EU co-financed eradication programme in which positive herds (391) were detected during 2012. The percentage of positive existing cattle herds in Greece was 0.97 %, which was higher than in 2011 (264 positive herds; 0.86 %). The remaining six non-co-financed non-OBF MSs (Bulgaria, Cyprus, Hungary, Lithuania, Malta and Romania) reported no infected or positive cattle herds out of 877,413 existing bovine herds in 2012.

As regards non-OBF MSs with eradication programmes co-financed by the EU, compared with 2011, there was an overall decrease in both indicators (the proportions of positive herds among the existing herds and among the tested herds): from 0.39 % and 0.60 %, respectively, in 2011 to 0.25 % and 0.39 %, respectively, in 2012 (Table BR3). Also at the MS level, in all four co-financed non-OBF MSs both indicators decreased, in comparison with 2011. For further details see the Level 3 Tables.

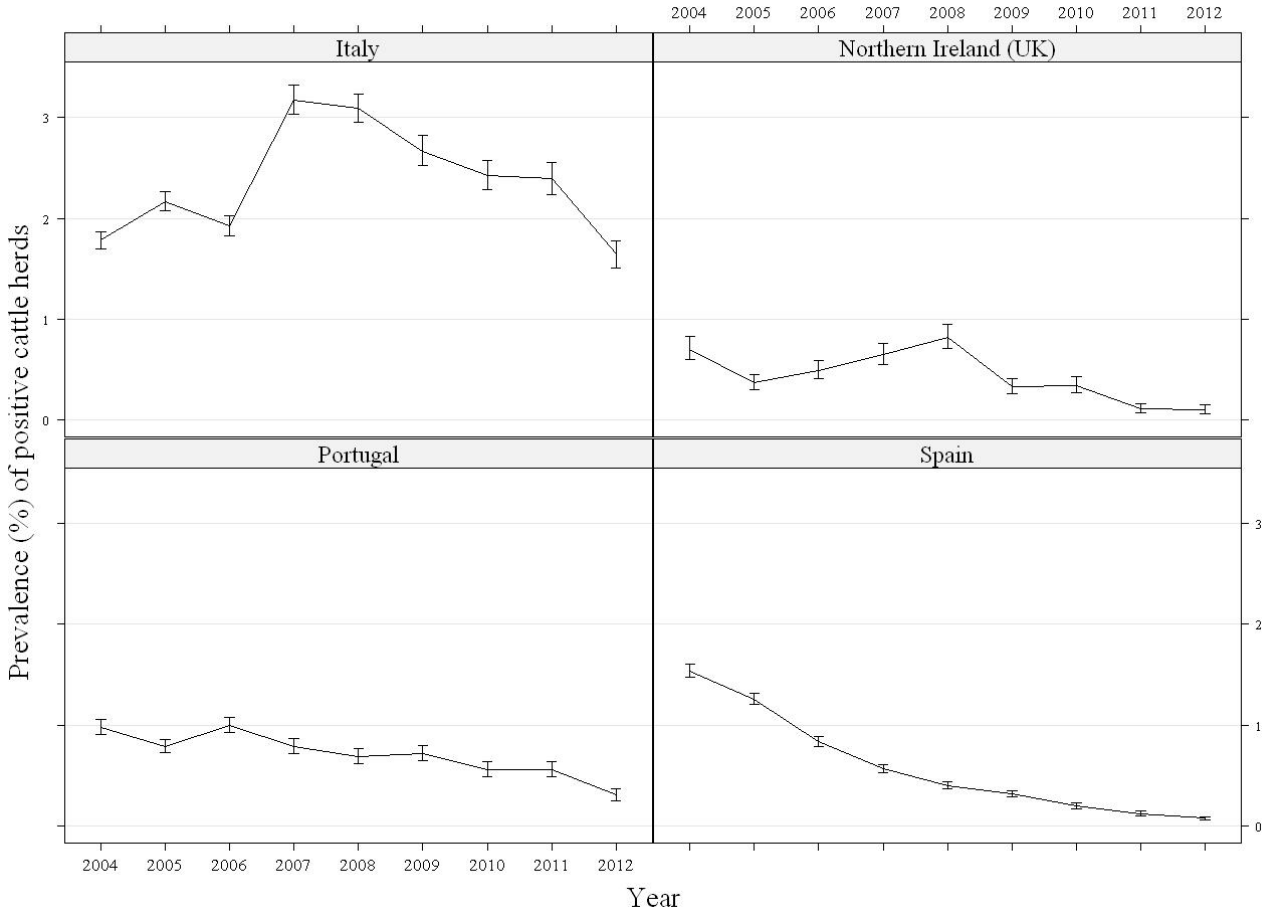
Table BR3. Brucella *in cattle herds in four co-financed non-OBF MSs[1], 2012*

Non-officially free MSs	No of existing herds	No of tested herds	No of positive herds	% existing herds positive	% tested herds positive
Italy[2]	112,080	35,055	576	0.51	1.64
Portugal[3]	57,704	35,020	108	0.19	0.31
Spain[4]	123,372	109,719	83	0.07	0.08
United Kingdom[5]	25,776	22,691	23	0.09	0.10
Total (4 MSs)	**318,932**	**202,485**	**790**	**0.25**	**0.39**

1. Only tested and positive herds from regions that have co-financed eradication programmes are included. The number of existing herds includes all herds from all regions in the MS.
2. In Italy 10 regions and 11 provinces are OBF. In the provinces that are OBF or do not have a co-financed eradication programme, none of the 68,594 existing herds was found to be infected.
3. In Portugal the Azores islands of Santa Maria, Pico, Graciosa, Faial, Flores and Corvo as well as all administrative regions (distritos) within the superior administrative unit (região) of Algarve are OBF and none of their 2,775 existing herds was found infected. No specific data were available for Madeira.
4. In Spain the two provinces of the Canary Islands, Santa Cruz de Tenerife and Las Palmas, are OBF and none of their 1,130 existing herds was found to be infected.
5. Only Northern Ireland data are presented.

The MS-specific trends in positive tested herds in four co-financed non-OBF MSs from 2004 to 2012 are shown in Figure BR6. Since 2004, the prevalence of bovine brucellosis test-positive cattle herds (the second epidemiological indicator) appears to have decreased or remained at a low level in most of the co-financed non-OBF MSs (Northern Ireland, Portugal and Spain). The exception is Italy, where a considerable increase in prevalence was observed between 2006 and 2007, which has been followed by a decrease since 2008 to 1.64 % in 2012. Several Italian provinces were declared OBF between 2004 and 2012, and in some other provinces the occurrence was so low that they did not receive co-financing for eradication programmes. Therefore, the Italian data, as they originate from non-OBF co-financed regions, reflect the results of regions having the highest prevalence instead of the situation in the whole country. Italy did not report any positive herds in its OBF regions in 2012.

Figure BR6. Prevalence and 95 % CI[1] of* Brucella *test-positive cattle herds, at MS level[2], in four non OBF co-financed MSs, 2004–2012



1. Vertical bars indicate the exact binomial 95 % Confidence Interval.
2. For Italy the displayed prevalence reflects the results from non-OBF co-financed regions instead of the situation in the whole country.

Sheep and goats

The status of the countries regarding freedom from ovine and caprine brucellosis caused by *B. melitensis* (Officially *Brucella melitensis* Free, ObmF) and the occurrence of the disease in MSs and non-MSs in 2012 are presented in Figures BR7 and BR8. In 2012, as in 2011, Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden and the United Kingdom, as well as Norway and Switzerland, were ObmF in accordance with EU legislation. Liechtenstein has the same status (ObmF) as Switzerland. Moreover, in the non-MS Iceland, which has no special agreement concerning animal health status with the EU, brucellosis (*B. abortus, B. melitensis, B. suis*) has never been reported.

Regions have previously been granted ObmF status also in France (64 departments), Portugal (the Azores Islands), and Spain (two provinces of the Canary Islands and the Balearic Islands). In addition, Italy has 11 regions and 8 provinces ObmF.

All data submitted by MSs are presented in the Level 3 Tables.

Figure BR7. Status of countries regarding ovine and caprine brucellosis, 2012

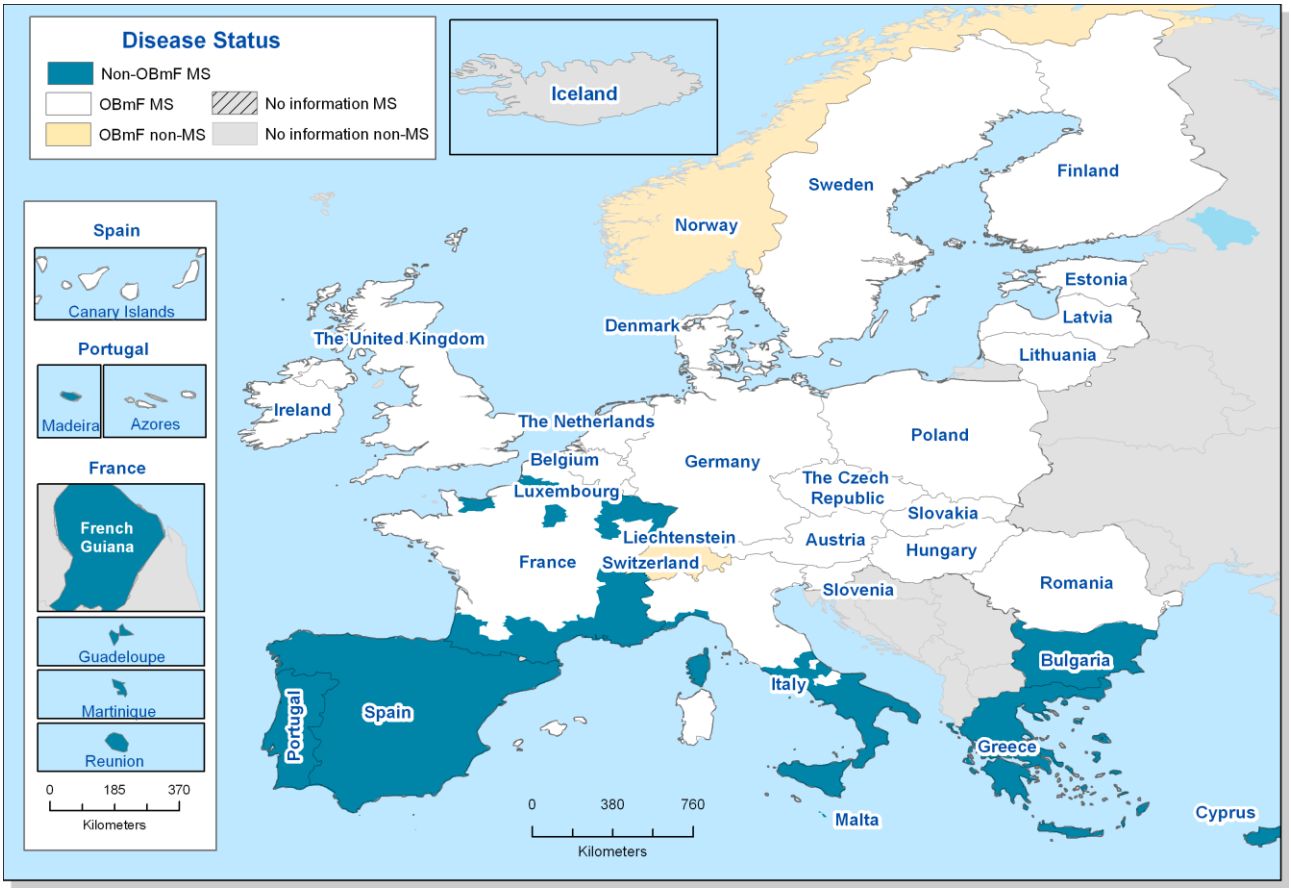
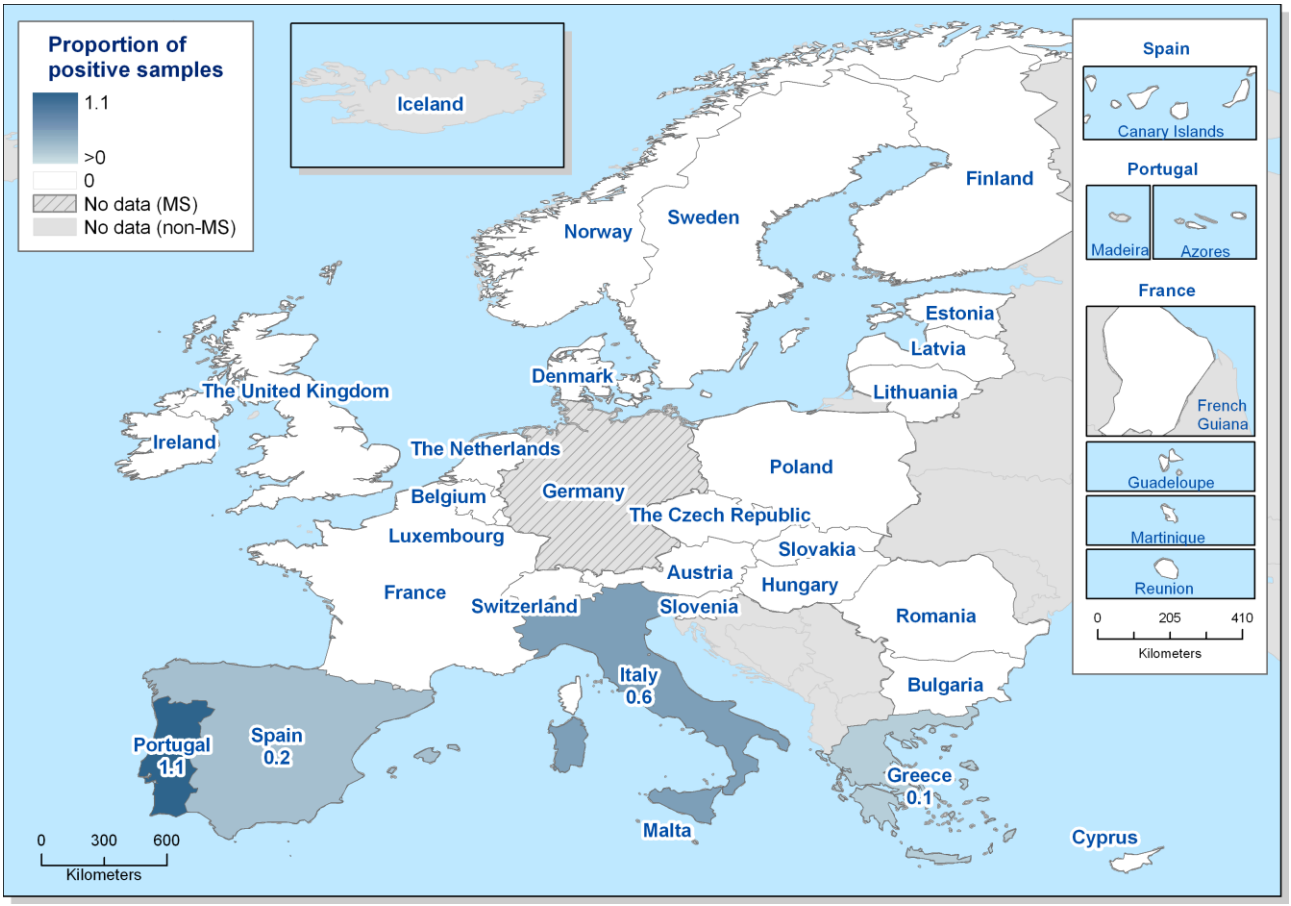
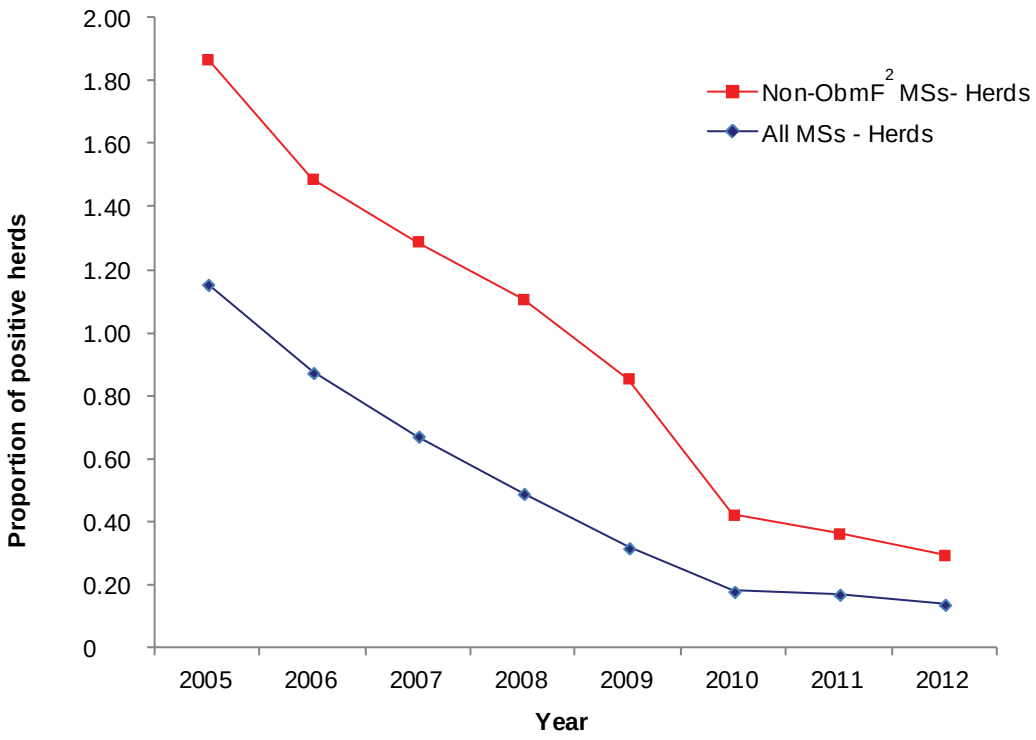


Figure BR8. Proportion of existing sheep and goat herds infected with or positive for* Brucella*, country-based data, 2012



Over the years 2005–2012, the overall proportion of existing sheep and goat herds infected with or positive for *B. melitensis* in the EU was at a very low level, decreased until 2010 and then stabilised at a level of 0.17 % in 2011, with a further slight decrease in 2012 (0.14 %). A slight decrease was observed in the proportion of existing sheep and goat herds infected with or positive for *B. melitensis* in the non-ObmF MSs from 2010 (0.42 %) to 2011 (0.36 %) and 2012 (0.30 %) (Figure BR9).

Figure BR9. Proportion of existing sheep and goat herds infected with or positive for* Brucella*, 2005-2012[1]



1. Data missing from Bulgaria (2005-2007), Germany (2005-2007, 2012), Hungary (2005), Lithuania (2005, 2007, 2010), Luxembourg (2005-2006, 2008-2009, 2011), Malta (2005-2006) and Romania (2005-2006, 2008). Romania reported data at animal level in 2008.
2. ObmF: Officially *B. melitensis* Free.

Officially *B. melitensis*-Free Member States and non-Member States

During 2012, brucellosis due to *B. melitensis* was not detected in any of the 630,342 sheep and goat herds in the 18 reporting ObmF MSs (Germany did not report), or in Iceland, Norway or Switzerland.

Non-Officially *B. melitensis*-Free Member States

In 2012, the eight non-ObmF MSs reported a total of 573,860 sheep and goat herds, of which 0.30 % were found to be infected with or positive to *B. melitensis,* and this level was comparable to the level reported in 2011 (Figure BR9).

The three non-ObmF MSs without EU co-financed eradication programmes (Bulgaria, France and Malta) reported no infected or positive sheep and goat herds out of 245,739 existing ones in 2012.

As regards non-ObmF MSs with eradication programmes co-financed by the EU, compared with 2011, there was an overall slight decrease in both indicators (the proportions of positive herds among the existing herds and among the tested herds): from 0.74 % and 1.16 %, respectively, in 2011 to 0.52 % and 0.81 %, respectively, in 2012 (Table BR4). Also at the MS level, in Italy, Portugal and Spain both indicators decreased. In the Greek islands, where an eradication programme is implemented, Greece had a prevalence of existing *B. melitensis*-positive sheep and goat herds of 0.12 %, which was lower than in 2011 (0.25 %), whereas the proportion of positive herds among the tested herds increased from 5.38 % in 2011 to 8.64 % in 2012. Cyprus was the only non-ObmF with an EU co-financed eradication programme that reported no positive sheep and goat herds in 2012.

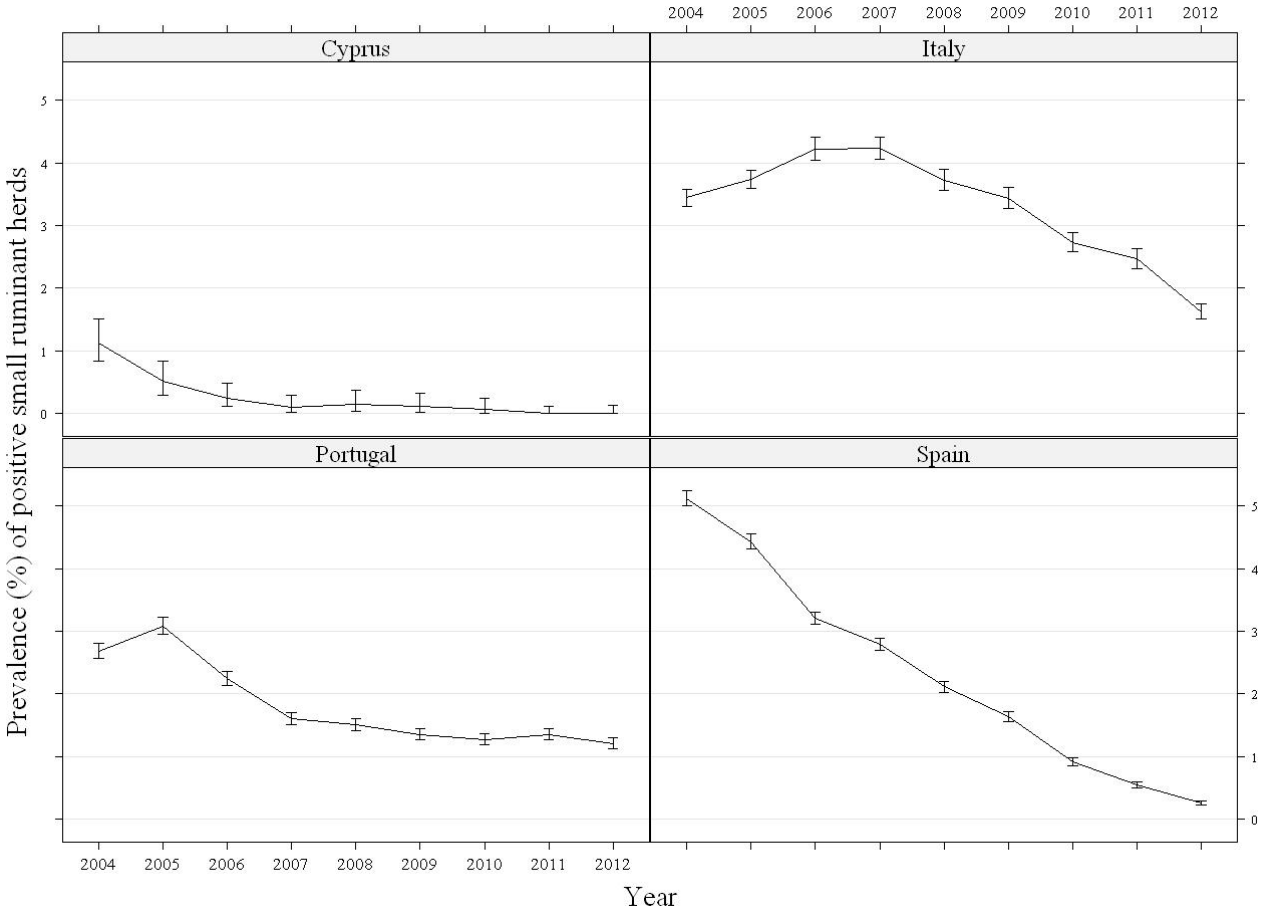
Table BR4. Brucella *in sheep and goat herds in co-financed non-ObmF MSs[1], 2012*

Non-officially free MSs	No of existing herds	No of tested herds	No of positive herds	% existing herds positive	% tested herds positive
Cyprus	3,367	2,921	0	0	0
Greece[2]	28,246	382	33	0.12	8.64
Italy[3]	115,471	39,431	642	0.56	1.63
Portugal[4]	65,283	61,695	746	1.14	1.21
Spain[5]	115,754	104,888	272	0.23	0.26
Total (5 MSs)	**328,121**	**209,317**	**1,693**	**0.52**	**0.81**

1. Only tested and positive herds from regions that have co-financed eradication programmes are included. The number of existing herds includes all herds from all regions in the MS.
2. The ovine and caprine *B. melitensis* eradication programme covers only the islands of Greece. For The remaining country regions, the mainland, a mass vaccination programme was carried out in 2012 with co-financing by the EU.
3. In Italy 11 regions and 8 other provinces are ObmF. In these areas that are ObmF or do not have a co-financed eradication programme, 5 of the 72,640 existing herds were found infected.
4. In Portugal the Azores islands are ObmF and none of the 953 existing sheep and goat herds was found infected.
5. In Spain the two provinces of the Canary Islands (Santa Cruz de Tenerife and Las Palmas) and the Balearic Islands are ObmF. In 2012, none of the 8,546 existing herds in these areas tested positive.

The MS-specific trends in tested herds positive in four co-financed non-ObmF MSs from 2004 to 2012 are shown in Figure BR10. Since 2004, the prevalence of sheep and goat herds testing positive for *B. melitensis* (the second epidemiological indicator) has decreased in Cyprus, and more markedly in Spain. Following an increase between 2004 and 2005, a decrease was observed in the proportion of positive tested herds in Portugal between 2005 and 2009. In the following years the proportion of positive tested herds stabilised. In Italy, an increase was observed from 2004 to 2006, which was followed by a continuous decrease up to, and including, 2012 (Figure BR10). This increase in positive tested herds was due to progress made in the eradication programme, whereby the declared ObmF provinces and regions are no longer counted in co-financed programmes. Therefore, Italian data, as they originate from non-ObmF co-financed regions, reflect the results of regions having the highest prevalence instead of the situation in the whole country.

Figure BR10. Prevalence and 95 % CI[1] of* Brucella melitensis *test-positive sheep and goat herds, at MS level[2], in four non-ObmF co-financed MSs, 2004-2012



1. Vertical bars indicate the exact binomial 95 % Confidence Interval.
2. For Italy the displayed prevalence reflects the results from non-ObmF co-financed regions instead of the situation in the whole country.

Other animals

In 2012, 18 MSs and 2 non-MSs provided data on the occurrence of *Brucella* spp. in animals other than cattle, goats and sheep. The data originated from a wide range of sources including clinical investigations, surveillance, monitoring, surveys and control and eradication programmes. In addition, results from other specific local studies are reported for smaller numbers of animals.

B. suis was found in hares, in pigs and in wild boar, *B. canis* in dogs, *B. melitensis* in wild Alpine chamois and wild Alpine ibex and *Brucella* spp. in pigs, hares, wild boar, dogs, water buffaloes, zoo animals and wild 'other animals'.

All data submitted by MSs and other reporting countries are presented in the Level 3 Tables.

3.6.4. Discussion

Brucellosis is a rare infection in humans in the EU. The highest notification rates and the majority of the indigenous cases were reported from Mediterranean countries that are still not OBF in animals. There were also indigenous cases reported in OBF and OBmF countries, but these are normally due to immigrants from endemic areas or import of dairy products from endemic areas[43]. The EU trend in human brucellosis cases in the last five years was dominated by a large outbreak in one MS in 2008. When removing the effect of this outbreak, no significant increasing or decreasing trend could be observed at the EU level. Significant decreasing trends by country were, however, observed in two MSs, Italy and Spain, which is in accordance with the findings on the animal side. Almost four out of five of the human brucellosis cases (of the 51.2 % of cases for which hospitalisation information was available) had been hospitalised, but only one fatal case was reported in 2012.

There was one *Brucella*-positive finding in a sample of raw milk reported by one MS. However, the one strong-evidence food-borne outbreak reported from France (two human cases, implicated food vehicle: cheese) and the four food-borne outbreaks for which there was weak evidence (involving 11 hospitalised cases) reported from Greece in 2012 illustrate the health risk still associated with consumption of food contaminated with *Brucella*.

Concomitant with the significant decreasing EU trend in human brucellosis cases, the prevalence of both bovine and small ruminant brucellosis has continued to decrease within the EU. Both bovine and small ruminant brucellosis-infected herds are mostly geographically concentrated in southern European MSs. In 2012, brucellosis remained a rare event at the EU level in cattle herds (0.05 %) while the prevalence in sheep and goat herds was at a very low level (0.14 %). Bovine brucellosis in non-OBF MSs decreased between 2005 and 2007 and then stabilised at around 0.11 % in 2011, with a further small decrease at 0.09 % in 2012. Analogously, small ruminant brucellosis in the non-ObmF MSs decreased every year between 2005 and 2012, reaching a prevalence of 0.30 % in 2012. The decrease in small ruminant brucellosis prevalence in co-financed non-ObmF MSs was statistically significant for the years 2004–2012.

Much of the overall decrease in bovine and small ruminant brucellosis at EU level, as well as within co-financed MSs, appears to have been driven by Italy and Spain, which are also the two MSs having a significant decreasing trend for *Brucella* infection in humans. On the other hand, the non-OBF/non-ObmF MSs Greece and Portugal, which reported the highest prevalence of *Brucella* in cattle (Greece: 0.97 %) and in sheep and goats (Portugal: 1.14 %) respectively, among the reporting MSs for 2012, reported also the highest notification rates of confirmed human brucellosis cases.

In 2012, 18 MSs and 2 non-MSs provided data on the occurrence of *Brucella* spp. in animals other than cattle, goats and sheep. *B. suis* was found in hares, in pigs and in wild boar, *B. canis* in dogs, *B. melitensis* in wild Alpine chamois and wild Alpine ibex and *Brucella* spp. in pigs, hares, wild boar, dogs, water buffaloes, zoo animals and wild 'other animals'.

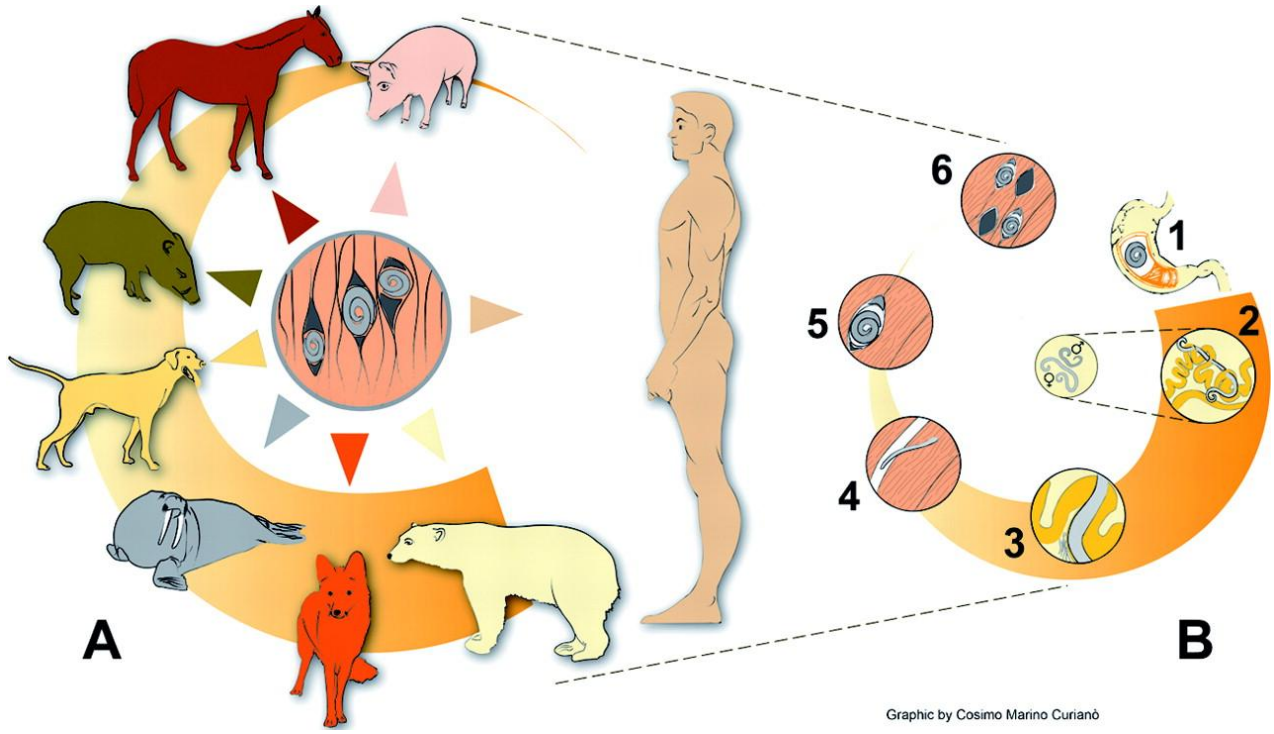
[43] Pappas G, Papadimitriou P, Akritidis N, Christou L and Tsianos EV, 2006. The new global map of human brucellosis. The Lancet Infectious Diseases, 6(2), 91-99.

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.7. *Trichinella*

Trichinellosis is a zoonotic disease caused by parasitic nematodes of the genus *Trichinella*. The parasite has a wide range of host species, mostly mammals. *Trichinella* spp. undergoes all stages of the life cycle, from larva to adult, in the body of a single host (Figure TR1).

***Figure TR1. Life cycle of* Trichinella**



Source: Gottstein B, Pozio E and Nöckler, 2009. Epidemiology, Diagnosis, Treatment, and Control of Trichinellosis. Clinical Microbiology Reviews, 22, 127-145.

Trichinella spp. life cycle. (A) Main sources of *Trichinella* spp. infections in humans (including pigs, horses, wild boar, dogs, walruses, foxes and bears). (B) *Trichinella* spp. cycle in the host body. In the enteric phase, muscle tissues are digested in the stomach, and larvae are released (1); larvae penetrate the intestinal mucosa of the small intestine and reach the adult stage within 48 hours post infection (p.i.), and male and female mate (2); female worm releases newborn larvae in the lymphatic vessels (from the fifth day p.i. onwards; the length of newborn production, from one week to several weeks, is under the influence of host immunity) (3); in the parenteral phase, the newborn larvae reach the striated muscle and actively penetrate in the muscle cell (4); larvae grow to the infective stage in the nurse cell (the former muscle cell) (5); and, after a period of time (weeks, months, or years), a calcification process occurs (6). (Modified from www.iss.it/site/*Trichinella*/index.asp with the permission of the publisher)

In Europe, trichinellosis has been described as a re-emerging disease over recent decades. Worldwide, nine species and three genotypes have been described: *Trichinella spiralis* (*T. spiralis*), *T. nativa, T. britovi, T. murrelli, T. nelsoni, T. pseudospiralis, T. papuae, T. zimbabwensis* and *T. patagoniensis, Trichinella* T6, *Trichinella* T8 and *Trichinella* T9. The majority of human infections in Europe are caused by *T. spiralis,* and *T. britovi*, while a few cases caused by *T. pseudospiralis* and *T. nativa* have also been described. In a human outbreak caused by the consumption of horse meat imported from the United States of America to France in 1985, the aetiological agent was *T. murrelli*.

Humans typically acquire the infection by eating raw or inadequately cooked meat infested with infectious *Trichinella* larvae. The most common sources of human infection are pig meat, wild boar meat and other game meat. Horse and dog meat as well as meat from many other animals have also transmitted the infection. Horse meat was identified as the source of infection in a number of human outbreaks recorded in the EU from the mid-1970s until 2005, including some of the largest outbreaks recorded in decades. Freezing of the meat minimises the infectivity of the parasite, although some *Trichinella* species/genotypes (*T. nativa, T. britovi* and *Trichinella* genotype T6) have demonstrated resistance to freezing.

The clinical signs of acute trichinellosis in humans are characterised by two phases. In the first stage of trichinellosis symptoms may include nausea, diarrhoea, vomiting, fatigue, fever and abdominal discomfort. However, this phase is often mild or asymptomatic. Thereafter, in a second phase, symptoms including muscle pains, headaches, fever, swelling of the eyes, aching joints, chills, cough, itchy skin and diarrhoea or constipation may follow. In more severe cases, difficulties with coordinating movements as well as heart and breathing problems may occur. A small proportion of people die from *Trichinella* infection. Systematic clinical signs usually appear about 8–15 days after consumption of infested meat.

An overview of the data reported in 2012 is presented in the following tables and figures.

Table TR1. Overview of countries reporting data on* Trichinella spp.*, 2012

Data	Total number of reporting MSs	Countries
Humans	26	**All MSs** except DK **Non-MSs:** CH, NO
Animals	27	**All MSs** **Non-MSs:** CH, IS, NO

Note: The overview table contains all data reported by MSs and non-MSs.

3.7.1. Trichinellosis in humans

In 2012, 378 cases of trichinellosis were reported by 26 MSs. Of these cases, 301 (79.6 %) were reported as confirmed (Table TR2). Only 11 of the 26 MSs had notified cases. The difference between the total number of cases and the number of confirmed cases may be due to not all outbreak cases being laboratory confirmed and the remaining cases being considered epidemiologically linked to the confirmed cases.

The number of human trichinellosis cases increased by 12.3 % in the EU in 2012 compared with 2011 but was still at a much lower level than in 2008-2009, when several hundred trichinellosis cases were reported from both Bulgaria (in 2009) and Romania (Table TR2). The EU notification rate, in 2012, was 0.06 cases per 100,000 population, and the highest notification rates were reported in Latvia (2.01 cases per 100,000), followed by Lithuania, Romania and Bulgaria (0.93, 0.70 and 0.41 cases per 100,000, respectively). These four countries accounted for 82.4 % of all confirmed cases reported in 2012. Only one case of trichinellosis was reported as travel-associated and was related to travel to another EU country. The remaining cases were either known to be domestically acquired or were of unknown origin (Figure TR2).

The temporal trend of trichinellosis in the EU, in 2008-2012, was greatly influenced by a number of smaller and larger outbreaks, particularly in the first two years of the period (Figure TR3, top). Romania, for example, reported 31 outbreaks with a total of 406 cases (probable and confirmed) in 2009[44], but only three outbreaks, with a total of 145 cases (probable and confirmed), in 2010[45]. When removing the years 2008-2009 (Figure TR3, bottom), no increasing or decreasing EU trend could be observed for the remainder of the period (2010-2012). Decreasing trends by country, in 2008-2012, were observed in Lithuania and Romania, while an increasing trend was observed in Latvia, mainly as a result of outbreaks in 2011 and 2012 in one of the eastern regions (Antra Bormane, Centre for Disease Prevention and Control of Latvia, personal communication, October 2013). A noticeable increase in reported cases was also observed in Italy in the last two years, but there were too few cases reported over the whole period for trend analysis to be possible.

Five of the 11 MSs which reported cases in 2012 provided information on hospitalisation for all of their cases (corresponding to 73.1 % of all confirmed cases reported in the EU). On average, 80.5 % of the cases were hospitalised. No deaths due to trichinellosis were reported in 2012 from the seven MSs that provided

[44] EFSA (European Food Safety Authority) and ECDC (European Centre for Disease Prevention and Control), 2011. The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2009. EFSA Journal 2011;9(3):2090, 378 pp. doi:10.2903/j.efsa.2011.2090

[45] EFSA (European Food Safety Authority) and ECDC (European Centre for Disease Prevention and Control), 2012. The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2010. EFSA Journal 2012;10(3):2597, 442 pp. doi:10.2903/j.efsa.2012.2597

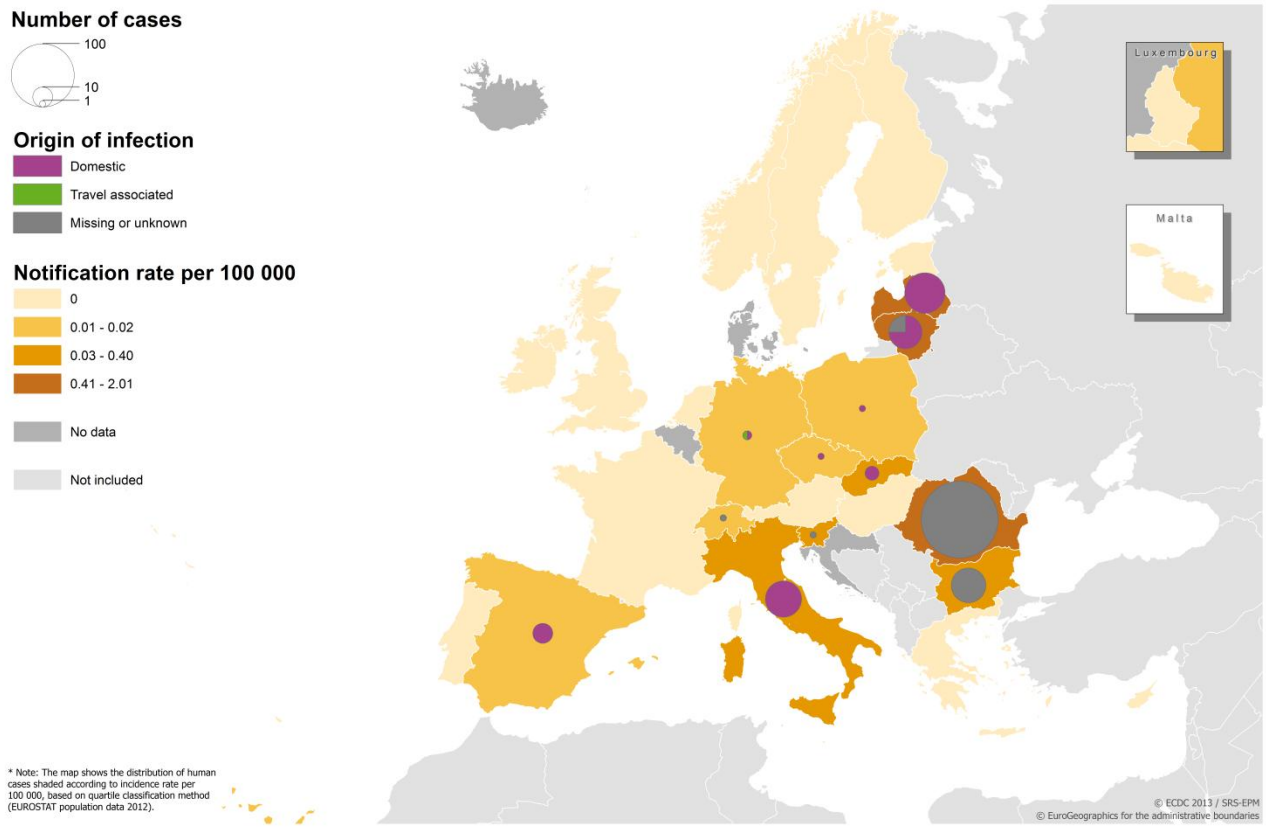
information. The species of *Trichinella,* detected in 2012, were *T. spiralis* for 72 cases and *T. britovi* for 25 cases. For the remainder of cases no species information was provided.

Table TR2. Reported cases of human trichinellosis in 2008-2012, and notification rate for confirmed cases in the EU, 2012

Country	2012				2011	2010	2009	2008
	Report Type[1]	Cases	Confirmed cases	Confirmed cases/ 100,000	Total confirmed cases			
Austria	C	0	0	0	1	5	0	0
Belgium[2]	U	0	0	–	0	3	0	5
Bulgaria	A	30	30	0.41	27	14	407	67
Cyprus	U	0	0	0	0	0	0	0
Czech Republic	U	1	1	0.01	0	0	0	0
Denmark[3]	–	–	–	–	–	–	–	–
Estonia	U	0	0	0	0	0	0	0
Finland	U	0	0	0	0	0	0	0
France	A	0	0	0	2	0	9	3
Germany	C	2	2	<0.01	3	3	1	1
Greece	U	0	0	0	0	4	2	0
Hungary	U	0	0	0	0	0	9	5
Ireland	U	0	0	0	0	0	0	0
Italy	C	33	33	0.05	6	0	1	0
Latvia	C	45	41	2.01	50	9	9	4
Lithuania	C	30	28	0.93	29	77	20	31
Luxembourg	U	0	0	0	0	0	0	0
Malta	U	0	0	0	0	0	0	0
Netherlands	C	0	0	0	1	0	1	1
Poland	C	1	1	<0.01	10	14	18	4
Portugal	U	0	0	0	0	0	0	0
Romania	C	220	149	0.70	107	82	265	503
Slovakia	C	5	5	0.09	13	2	0	18
Slovenia	C	1	1	0.05	1	0	1	1
Spain	C	10	10	0.02	18	10	7	27
Sweden	U	0	0	0	0	0	0	0
United Kingdom	U	0	0	0	0	0	0	0
EU Total		**378**	**301**	**0.06**	**268**	**223**	**750**	**670**
Iceland[3]	–	–	–	–	–	–	–	–
Liechtenstein	–	–	–	–	–	–	–	–
Norway	U	0	0	0	0	0	0	0
Switzerland[4]	C	1	1	0.01	0	1	4	–

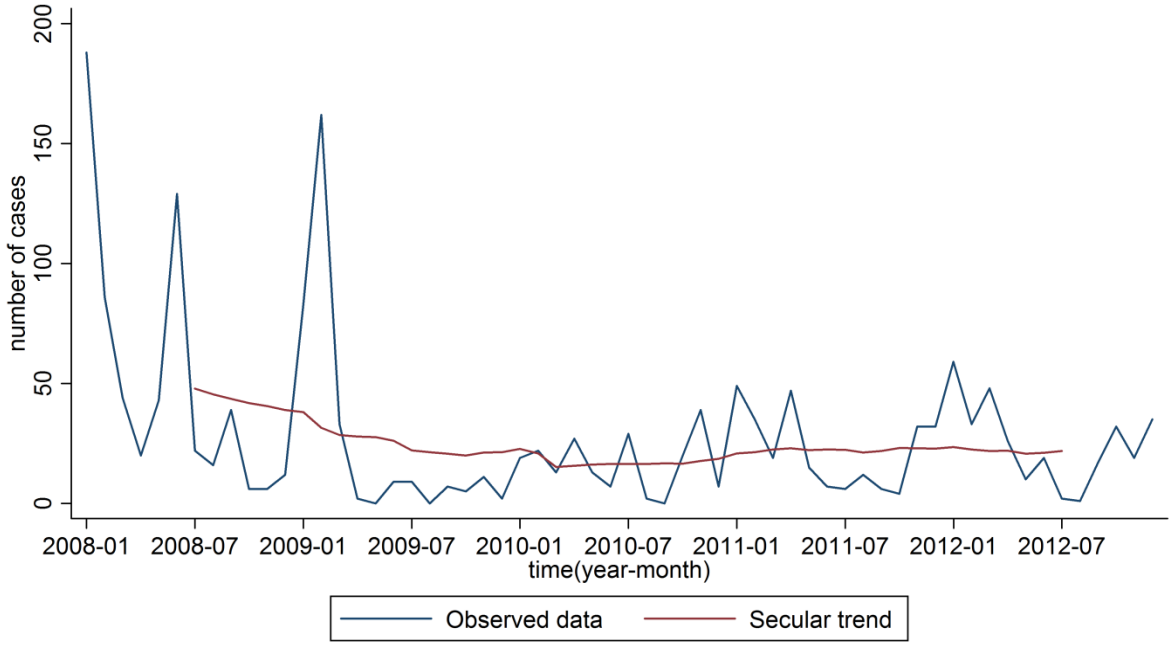
1. A: aggregated data report; C: case-based report; –: no report; U: unspecified.
2. Disease not under formal surveillance.
3. No surveillance system.
4. Switzerland provided data directly to EFSA.

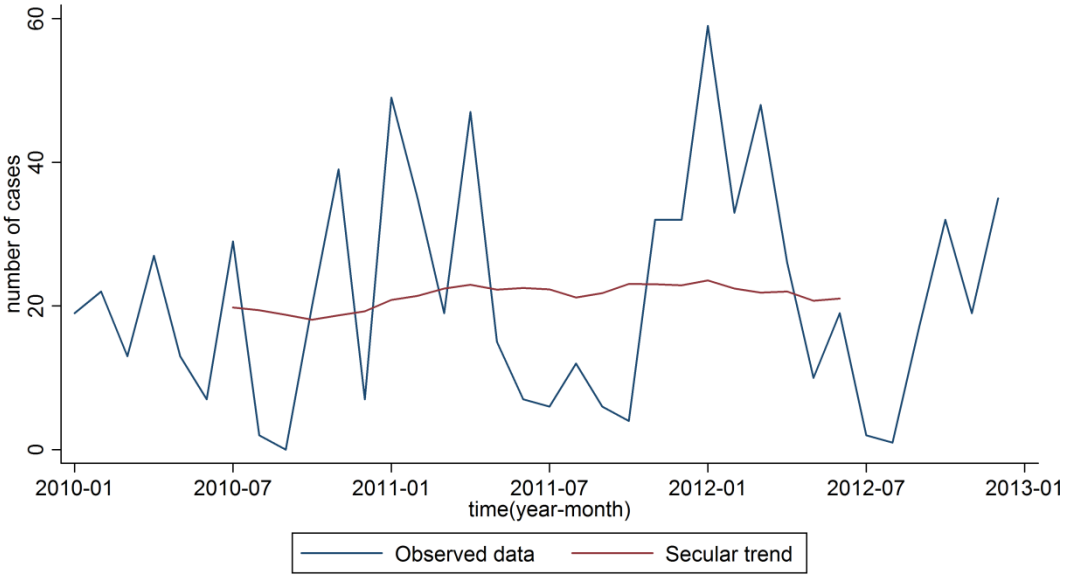
Figure TR2. Notification rates and origin of infection in human trichinellosis in the EU/EFTA, 2012



Note: The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

Figure TR3. Trend in reported confirmed cases of human trichinellosis in the EU, 2008-2012 (top) and 2010-2012 (bottom)





Source: 25 MSs: Austria, Bulgaria, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Belgium and Denmark do not have any formal surveillance system for the disease.

3.7.2. *Trichinella* in animals

All MSs and three non-MSs submitted data on *Trichinella* in animals for 2012, and these data are presented in Tables TR3–TR6 and Figures TR4–TR6. In the following sections, investigations with fewer than 25 units tested are included, unless stated otherwise. Moreover, results from suspect and/or selective samplings were taken into account when analysing *Trichinella* in hunted wild boar and in wildlife other than wild boar. All reported data are presented in the Level 3 Tables.

The results are presented for the most important animal species that serve as sources of human trichinellosis cases in MSs. According to Commission Regulation (EC) No 2075/2005[46], carcases of domestic swine, horses, wild boar and other farmed or wild animal species, susceptible to *Trichinella* infestation, are systematically sampled at slaughter as part of meat inspection and tested for *Trichinella*. Thus, most of the reported data are derived from meat inspection. Animals (both domestic and wild) slaughtered for own consumption are outside the scope of the mentioned Regulation but subject to national rules, which may differ between MSs. Another source of data is the monitoring of *Trichinella* in wildlife animal species not intended for human consumption.

In 2012, 26 MSs and 3 non-MSs provided information on *Trichinella* in farm animals (pigs, farmed wild boar and horses). Nine MSs isolated *Trichinella* from farm animals: Romania reported 50.6 % of all these positive findings, followed by Spain with 34.6 % of the positive findings. The prevalence of *Trichinella* in farm animals was highest in farmed wild boar (0.09 %), followed by pigs (0.00016 %). Out of the187,352 investigated horses in the EU, one (0.0005 %) was found to be *Trichinella* positive.

Twenty-six MSs and the three non-MSs provided data on *Trichinella* in pigs (breeding and fattening pigs). Nine MSs reported positive findings, giving an overall EU prevalence of 0.00016 % (Table TR3), which is similar to the prevalence observed in 2011 (0.00017 %).

Romania accounted for 51.5 % of all the *Trichinella*-positive findings in pigs in 2012, in a similar way as in 2010 and 2011 (Figure TR4). All positive findings from pigs were from non-controlled housing conditions. In total, 73.6 % (245) of the positive results from pigs were reported as *Trichinella* spp. In addition, there were 56 reports of *T. spiralis* and 32 reports of *T. britovi* (Table TR3).

Eight MSs reported data on samplings of farmed wild boar. One positive boar (0.11 %) was detected in Italy and four were detected in Finland (1.29 %) (Table TR4). The prevalence (0.09 %) was lower in 2012 than in 2011 (0.4 %) and at the same level as in 2010 (0.07 %).

In 2012, 18 MSs and 3 non-MSs reported data on horses; in total, 187,352 were tested for *Trichinella* and one was found positive in Spain (0.001 %).

Twenty-two MSs and two non-MSs provided data on hunted wild boar (Table TR5). Fourteen MSs reported positive findings, giving an overall EU animal-level prevalence of 0.13 %, similar to 2011. At the animal level, Poland, Spain and Romania accounted for 40.3 %, 22.4 % and 9.8 % of the positives, respectively. The highest animal-level prevalence was reported by Bulgaria (10.6 %) (Figure TR5). As in pigs, most (71.8 %) results were reported as *Trichinella* spp. but there were also 182 reports of *T. spiralis*, 119 reports of *T. britovi*, six reports of *T. pseudospiralis* and four reports of *T. nativa*.

Twenty MSs and one non-MS provided data on wildlife other than wild boar (Table TR6). Fifteen MSs reported positive findings. Overall, in 2012, Finland was responsible for 52.7 % of reported positive findings in wildlife other than wild boar (Figure TR6). As in 2011, 15 MSs reported data on *Trichinella* in foxes. Of these, 11 MSs had positive results. Most of positive foxes were reported as *Trichinella* spp., but there were also findings of *T. britovi, T. nativa* and *T. spiralis*.

Seven MSs reported data on *Trichinella* in bears, with a total prevalence within these countries of 3.7 %. Positive bears were from Estonia, Finland, Romania and Sweden. *T. nativa* was most commonly reported from bears, but there were also a number of reports of *T. britovi*, *T. spiralis* and *Trichinella* spp.

[46] Commission Regulation (EC) No 2075/2005 of 5 December 2005 laying down specific rules on official controls for *Trichinella* in meat. OJ L 338, 22.12.2005, p. 60-82.

In addition, *Trichinella* were detected from raccoon dogs, badgers, lynx, martens, wolverines and wolves.

Figure TR4. Findings of* Trichinella *in pigs, 2012

Note: In France, the positive units were from free-range pigs from Corsica.
In Germany, the positive pig was not raised under controlled housing conditions; it was raised in a privately owned fenced free-range area.

Table TR3. Findings of* Trichinella *in pigs, animal-level data, 2012

Country	Species (n. of isolates)	Sample unit	N	Pos	% Pos	Additional information
Austria		Fattening pigs	5,396,345	0	0	
Belgium		Fattening pigs	11,724,297	0	0	
Bulgaria		Breeding animals	47	0	0	Pigs not raised under controlled housing conditions
		Breeding animals	2,215	0	0	Pigs raised under controlled housing conditions
	T. spp. (6)	Fattening pigs	22,075	6	0.02718	Pigs not raised under controlled housing conditions
		Fattening pigs	184,876	0	0	Pigs raised under controlled housing conditions
Cyprus		Breeding animals	14,442	0	0	Pigs raised under controlled housing conditions
		Fattening pigs	630,910	0	0	
Czech Republic		Fattening pigs	2,769,396	0	0	
Denmark		Breeding animals	423,338	0	0	Pigs raised under controlled housing conditions
		Fattening pigs	18,883,606	0	0	Pigs raised under controlled housing conditions
Estonia		Fattening pigs	436,421	0	0	Pigs not raised under controlled housing conditions
Finland		Breeding animals	49,637	0	0	Pigs not raised under controlled housing conditions
		Fattening pigs	2,108,797	0	0	Pigs not raised under controlled housing conditions
France		Breeding animals	343,105	0	0	
	T. britovi (5)	Fattening pigs	326,085	5	0.00153	Pigs not raised under controlled housing conditions. The positive units were from free-range pigs from Corsica
		Fattening pigs	81,043	0	0	Pigs raised under controlled housing conditions
Germany	*T. spiralis* (1)		59,291,100	1	0.000002	The positive pig was not raised under controlled housing conditions; it was raised in a privately owned fenced free-range area

Table continued overleaf.

Table TR3 (continued). Findings of* Trichinella *in pigs, animal-level data, 2012

Country	Species (n. of isolates)	Sample unit	N	Pos	% Pos	Additional information
Greece		Breeding animals	23,406	0	0	Pigs raised under controlled housing conditions
	T. britovi (16)	Fattening pigs	7,133	16	0.22431	Pigs not raised under controlled housing conditions
		Fattening pigs	1,163,843	0	0	Pigs raised under controlled housing conditions
Hungary		Fattening pigs	4,058,146	0	0	
Ireland			4,110	0	0	
		Breeding animals	97,038	0	0	
		Fattening pigs	2,874,569	0	0	
Italy		Breeding animals	3,202	0	0	Pigs raised under controlled housing conditions
		Fattening pigs	13,114	0	0	
		Fattening pigs	9,695,873	0	0	Pigs raised under controlled housing conditions
Latvia			406,438	0	0	
Lithuania	*T.* spp.(2)	Fattening pigs	779,118	2	0.00026	Pigs not raised under controlled housing conditions
Luxembourg		Fattening pigs	2,024	0	0	Pigs not raised under controlled housing conditions
		Fattening pigs	138,303	0	0	Pigs raised under controlled housing conditions
		Breeding animals	70	0	0	Pigs raised under controlled housing conditions
Netherlands		Fattening pigs	14,689,622	0	0	Pigs raised under controlled housing conditions
Poland	*T. spiralis* (7), *T.* spp. (7)		19,917,895	14	0.00007	Pigs not raised under controlled housing conditions
		Fattening pigs	208	0	0	

Table continued overleaf.

Table TR3 (continued). Findings of* Trichinella *in pigs, animal-level data, 2012

Country	Species (n. of isolates)	Sample unit	N	Pos	% Pos	Additional information
Portugal			17,020	0	0	
		Breeding animals	35,982	0	0	
		Breeding animals	322	0	0	Pigs not raised under controlled housing conditions
		Breeding animals	7,413	0	0	Pigs raised under controlled housing conditions
		Fattening pigs	2,914,230	0	0	
		Fattening pigs	27,038	0	0	Pigs not raised under controlled housing conditions
		Fattening pigs	520,812	0	0	Pigs raised under controlled housing conditions
Romania[1]		Breeding animals	105	0	0	Pigs not raised under controlled housing conditions
		Breeding animals	20,410	0	0	Pigs raised under controlled housing conditions
	T. britovi (11), *T. spiralis* (47), *T.* spp. (115)	Fattening pigs	179,469	171	0.09528	Pigs not raised under controlled housing conditions
		Fattening pigs	3,356,471	0	0	Pigs raised under controlled housing conditions
Slovakia			689,142	0	0	
Slovenia		Unspecified	253,412	0	0	
Spain	*T. spiralis* (1)		32,987	1	0.00303	Pigs not raised under controlled housing conditions slaughtered for own consumption
	T. spp. (115)	Fattening pigs	40,783,578	115	0.00028	Pigs not raised under controlled housing conditions
Sweden		Unspecified	2,585,665	0	0	
United Kingdom		Breeding animals	177,751	0	0	Pigs raised under controlled housing conditions
EU Total		**Animal**	**208,163,654**	**331**	**0.00016**	
Iceland		Fattening pigs	72,146	0	0	
Norway		Fattening pigs	1,602,000	0	0	Pigs raised under controlled housing conditions
Switzerland			2,561,131	0	0	

Note: Data presented include only investigations with sample size ≥25.

1. In Romania both *T. britovi* and *T. spiralis* were found in two samples.

Table TR4. Findings of Trichinella *in farmed wild boar, animal-level data, 2012*

Country	Description	Species	N	Pos	% Pos
Austria	Official sampling, Surveillance, Census		731	0	0
Bulgaria	Official sampling, Surveillance, Census		639	0	0
Denmark	Official sampling, Surveillance, Census		654	0	0
Finland	Official sampling, Surveillance	*T. pseudospiralis*	311	4	1.29
France	Official sampling, Surveillance, Objective sampling		861	0	0
Italy	Official sampling, Monitoring, Census	*T. pseudospiralis*	970	1	0.10
Romania	Official sampling, Surveillance, Objective sampling		78	0	0
United Kingdom	Official sampling, Surveillance, Census		1,478	0	0
Total (8 MSs)			**5,722**	**5**	**0.09**

Note: Data presented include investigations with sample size <25.

Figure TR5. Finding of Trichinella *in hunted wild boar, 2012*

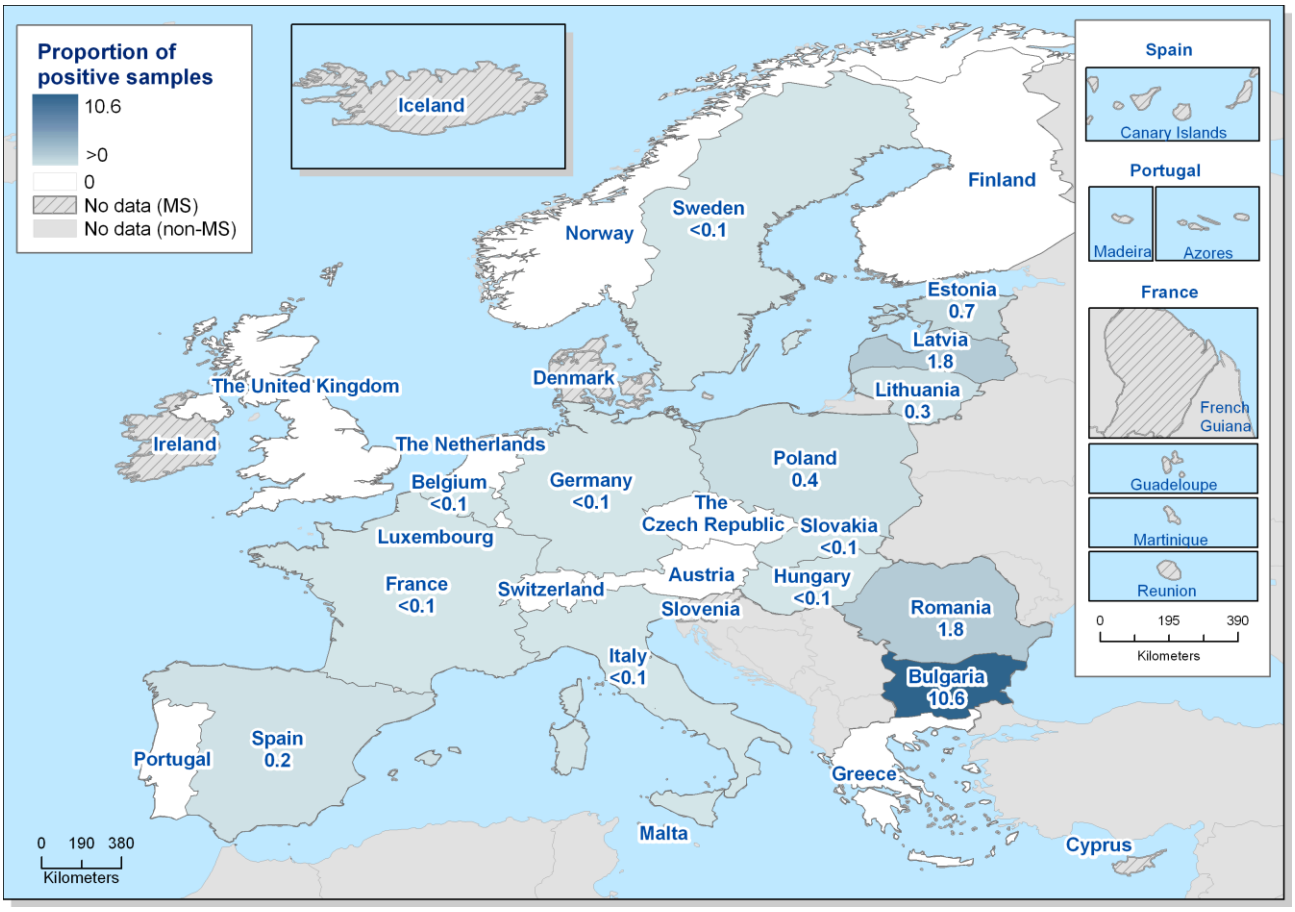


Table TR5. Findings of Trichinella *in hunted wild boar, animal-level data, 2012*

Country	Description	Species (n. of isolates)	N	Pos	% Pos
Austria	Official sampling, Control and eradication programmes, Census		33,426	0	0
Belgium	Official sampling, Surveillance, Census	*Trichinella* spp., unspecified (2)	11,691	2	0.017
Bulgaria	Industry sampling, Surveillance, Census, hunters samples	*T. britovi* (6), *Trichinella* spp., unspecified (73)	747	79	10.576
Czech Republic	Surveillance		98,852	0	0
Estonia	Official sampling, Surveillance, Census	*T. britovi* (20), *T. nativa* (1), *T. pseudospiralis* (2), *Trichinella* spp., unspecified (3)	3,976	26	0.654
	Census[1]	*T. britovi* (2), *T. nativa* (1), *Trichinella* spp., unspecified (1)	190	3	1.579
Finland	Official sampling, Surveillance		9	0	0
France[2]	Official sampling, Surveillance, Objective sampling	*T. britovi* (2)	40,746	2	0.005
Germany	Official sampling	*T. spiralis* (6)	178,662	6	0.003
Greece	Official sampling, Surveillance, Census		19	0	0
Hungary	Official sampling, Surveillance, Census	*T. britovi* (12), *T. spiralis* (3), *Trichinella* spp., unspecified (1)	69,171	16	0.023
Italy	Official sampling, Monitoring, Census[3]		58,604	2	0
	Clinical investigations	*T. britovi* (1)	2,137	1	0.047
	Official sampling, Monitoring	*T. britovi* (1), *Trichinella* spp., unspecified (1)	2,455	1	0.041
	Survey - national survey		3,938	0	0
Latvia	Official sampling, Surveillance, Census	*Trichinella* spp., unspecified (68)	3,836	68	1.773
Lithuania	Official and industry sampling, Surveillance, Objective sampling	*T. spiralis* (9), *Trichinella* spp., unspecified (73)	26,655	82	0.308
Luxembourg	Official sampling, Surveillance, Objective sampling		1,561	0	0
Netherlands	Official sampling, Surveillance, Census		3,903	0	0
Poland	Not applicable, Survey-national survey, Census	*T. spiralis* (131), *Trichinella* spp., unspecified (311)	108,605	442	0.407
Portugal	Official and industry sampling, Surveillance, Census		270	0	0
	Official sampling, Surveillance		2	0	0
Romania[4]	Official sampling, Surveillance, Objective sampling	*T. britovi* (57), *T. spiralis* (19), *Trichinella* spp., unspecified (33)	6,017	107	1.778

Table continued overleaf.

Table TR5 (continued). Findings of* Trichinella *in hunted wild boar, animal-level data, 2012

Country	Description	Species (n. of isolates)	N	Pos	% Pos
Slovakia	Official sampling, Monitoring, Objective sampling	*T. britovi* (7), *T. nativa* (2), *Trichinella* spp., unspecified (1)	14,377	10	0.070
Spain	Official sampling, Surveillance, Census	*T. britovi* (10), *T. spiralis* (14), *Trichinella* spp., unspecified (221)	123,597	245	0.198
Sweden	Official sampling, Monitoring, Objective sampling	*T. britovi* (1), *T. pseudospiralis* (4)	66,399	5	0.008
United Kingdom	Official sampling, Surveillance, Census		308	0	0
EU Total			**860,153**	**1,097**	**0.128**
Norway	Monitoring, Selective sampling		1	0	0
Switzerland	Surveillance		3,439	0	0

Note: Data presented include investigations with sample size <25.

1. In Estonia, in one sample both *T. britovi* and *T. nativa* were found. Samples originated from other MSs.
2 In France, the positive units were from one wild boar hunted in Alpes-Maritimes (France), the other one was hunted in Spain.
3. In Italy, one positive finding was from a pig not identified and living in the wild.
4. In Romania, both *T. britovi* and *T. spiralis* were found in two samples.

Table TR6. Findings of* Trichinella *in wildlife other than wild boar, 2012

Country	Foxes				Bears				Raccoon dogs				Other wildlife[1]			
	Description	N	Pos	% Pos	Description	N	Pos	% Pos	Description	N	Pos	% Pos	Description	N	Pos	% Pos
Austria		-	-	-		-	-	-		-	-	-	Unspecified	28	0	0
Belgium	Official sampling, Monitoring, Objective sampling	506	2	0.4		-	-	-		-	-	-		-	-	-
Bulgaria	Monitoring, Industry sampling, Census	4	3	75.0	Surveillance, Industry sampling, Census	2	0	0		-	-	-	Surveillance, Official/Industry sampling, Census	4	2	50.0
Denmark	Objective sampling	768	0	0		-	-	-	Monitoring, Objective sampling	111	0	0	Official sampling, Objective sampling	17	0	0
Estonia		-	-	-	Surveillance, Official sampling, Census	74	8	10.8		-	-	-	Surveillance, Official sampling, Census	26	11	42.3
Finland	Monitoring	152	27	17.8	Surveillance, Official sampling	46	1	2.2	Monitoring	259	85	32.8	Monitoring	463	214	46.2
France		-	-	-		-	-	-		-	-	-	Official sampling, Suspect sampling	1	1	100
Germany	Official sampling	1,705	38	2.2		-	-	-		-	-	-	Official sampling	89	0	0
Hungary	Monitoring, Official sampling, Objective sampling	615	12	2.0		-	-	-		-	-	-		-	-	-
Ireland	Monitoring, Official sampling, Convenience sampling	418	2	0.5		-	-	-		-	-	-		-	-	-
Italy[2]	Clinical investigations, Monitoring, Survey - national survey	3,405	10	0.3	Monitoring, Survey - national survey	5	0	0		-	-	-	Clinical investigations, Monitoring, Survey - national survey	200	5	2.5
Latvia	Monitoring	177	100	56.5		-	-	-	Monitoring	57	17	29.8		8	5	62.5
Lithuania	Monitoring, Objective sampling	6	2	33.3		-	-	-		-	-	-		-	-	-
Luxembourg	Monitoring, Official sampling, Objective sampling	32	0	0		-	-	-		-	-	-		-	-	-

Table continued overleaf.

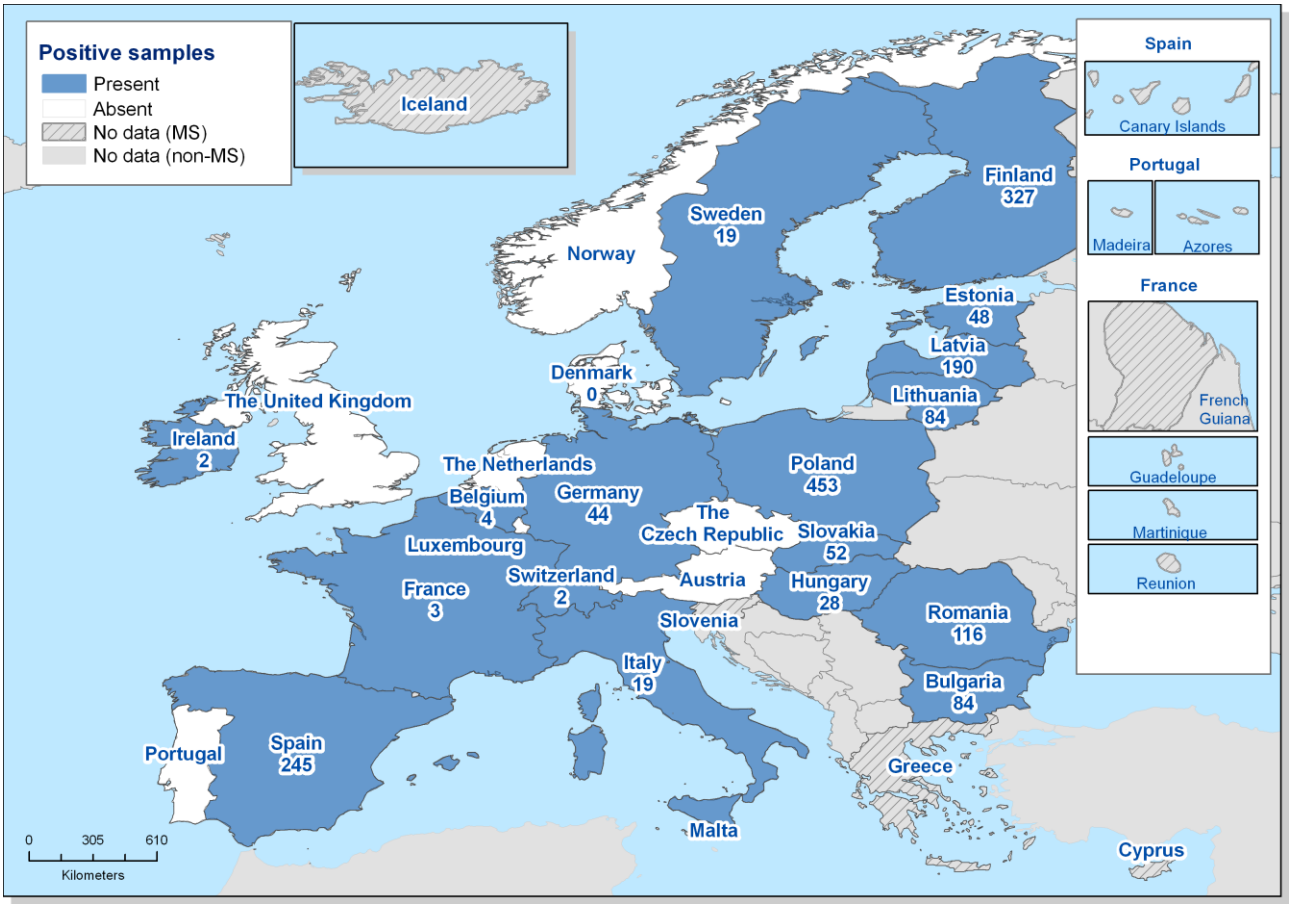
Table TR6 (continued). Findings of* Trichinella *in wildlife other than wild boar, 2012

Country	Foxes				Bears				Raccoon dogs				Other wildlife[1]			
	Description	N	Pos	% Pos	Description	N	Pos	% Pos	Description	N	Pos	% Pos	Description	N	Pos	% Pos
Poland	Monitoring, Census	259	11	4.2		-	-	-		-	-	-		-	-	-
Romania		-	-	-	Surveillance, Official sampling, Objective sampling	58	9	15.5		-	-	-		-	-	-
Slovakia	Monitoring, Official sampling, Selective sampling	425	42	9.9	Monitoring, Official sampling, Objective sampling	26	0	0	Monitoring, Official sampling, Selective sampling	1	0	0	Monitoring, Official sampling, Selective sampling	3	0	0
Spain		-	-	-		-	-	-		-	-	-	Official sampling, Census	184	0	0
Sweden	Monitoring, Official sampling, Convenience sampling	72	0	0	Monitoring, Official sampling, Convenience sampling	303	1	0.3	Monitoring, Official sampling, Convenience sampling	3	0	0	Monitoring, Official sampling, Convenience sampling	324	13	4.0
United Kingdom	Monitoring, Official sampling, Convenience sampling	420	0	0		-	-	-		-	-	-	Monitoring, Official sampling, Convenience sampling	90	0	0
EU Total		**8,964**	**249**	**2.8**		**514**	**19**	**3.7**		**431**	**102**	**23.7**		**1,437**	**251**	**17.5**
Norway		-	-	-		-	-	-		-	-	-	Monitoring, Official sampling, Selective sampling	1	0	0

Note: Data presented include investigations with sample size <25.
In Switzerland two lynx were found to be positive for *Trichinella britovi*, but the number of the tested wildlife was not reported.

1. Other 'wildlife' includes badgers, beavers, birds (including falcons), cantabrian chamois, deer, hedgehogs, jackals, lynx, martens, muskrats, other mustelids, otter, raccoons, wolverine and wolves.
2. Italy reported for the same sampling context different sampling strategies: 'census' and 'unspecified' and sampler: 'official sampling' and 'not applicable'.

Figure TR6. Findings of* Trichinella *in wildlife (including hunted wild boar), 2012



Note: In Switzerland two lynx were found positive for *Trichinella britovi*, but the number of the tested wildlife was not reported.

3.7.3. Discussion

The number of reported human trichinellosis cases increased by 12.3 % in the EU in 2012 compared with 2011. The majority of the confirmed cases, in 2012, were reported from five MSs: Bulgaria, Italy Latvia, Lithuania and Romania. Four of these countries (Bulgaria, Latvia, Lithuania and Romania) and Spain reported in total 25 food-borne outbreaks due to *Trichinella* in 2012, affecting 150 persons, of whom 84 were hospitalised. On average, 80.5 % of all the confirmed human trichinellosis cases were hospitalised; however, no deaths due to trichinellosis were reported in 2012.

All human cases, with information on travel status, had acquired the infection within the EU. The two main sources of human trichinellosis in the EU are pork (pig meat), produced from backyard pigs that are not examined for *Trichinella,* and wild boar meat. In Romania, which usually reports the highest number of human cases in the EU, the slaughtering and consumption of meat from backyard pigs occurs mostly in the winter months, especially before Christmas. This explains the seasonal pattern, with a peak in reported cases in January and February (Lavinia Cipriana Zota, National Institute of Public Health, Romania, personal communication, July 2013).

Trichinella was very rarely detected in 2012 from pigs in the EU, and the positive findings reported by all MSs were from pigs from non-controlled housing conditions. The reported data derive mostly from official meat inspection, which does not always cover pigs raised in backyards and slaughtered for own consumption. In pigs raised indoors, the risk of infection is mainly related to the lack of compliance with rules on the treatment of animal waste. In such farms, infection could occur due to the breakdown of the biosecurity barriers around the farm, allowing the introduction of infected rodents[46]. The overall EU prevalence of *Trichinella*-positive pigs was 0.00016 %. Romania was responsible for the majority of *Trichinella* findings in pigs in 2012.

Eighteen MSs and three non-MSs reported data on horses and one (0.0005 %) was found to be positive for *Trichinella,* in 2012.

Eight MSs provided data on samplings of farmed wild boar and the proportion of positive farmed wild boar was higher than the prevalence in pigs, which is expected as controlled housing conditions are typically not applied to the farming of wild boar.

Trichinella is often reported in wildlife species by some Eastern and Northern European MSs where the parasite is circulating in wildlife populations. The overall *Trichinella* prevalence in hunted wild boar in 2012, was higher than in pigs and in farmed wild boar. The prevalence in wildlife, other than in wild boar, was noticeably high during 2012 in some Northern European MSs where positive findings were found in foxes, bears, raccoon dogs, lynx and other species.

Twenty-five food-borne outbreaks caused by *Trichinella* were reported by five MSs, of which nine were supported by strong evidence and were linked to the consumption of pig meat and wild boar meat, and/or products thereof. The food-borne outbreaks, supported by strong evidence, were reported by two MSs, Romania and Spain, which also reported positive findings in pigs and wild boar.

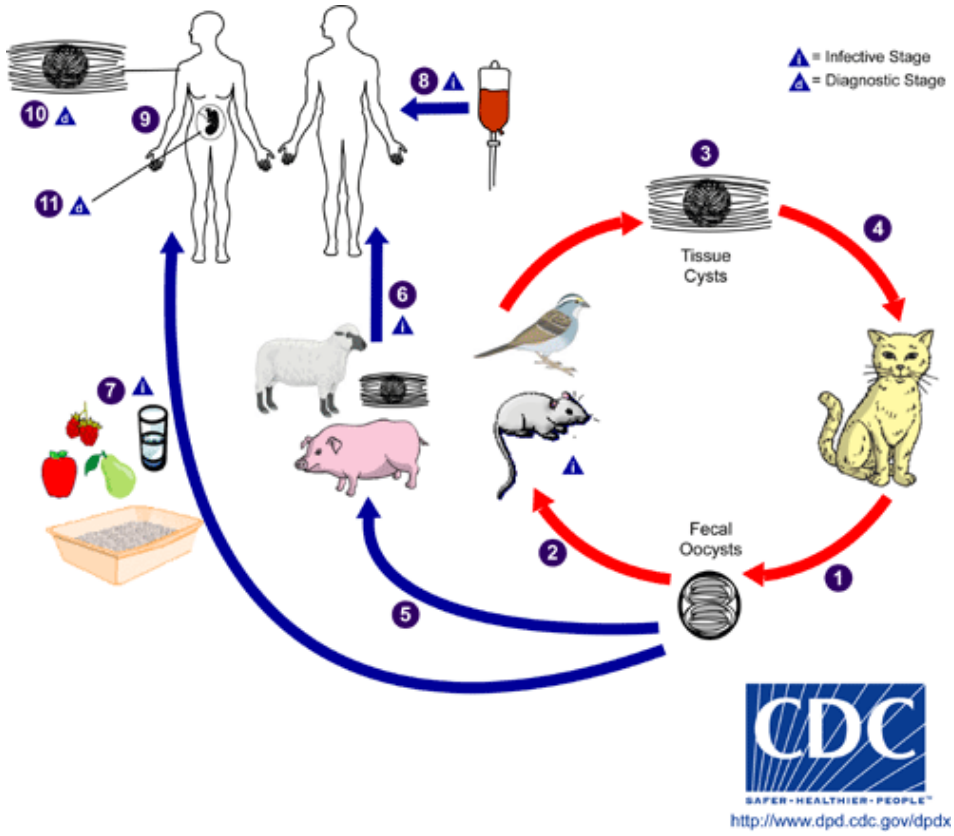
There is no sign of a decreasing trend in *Trichinella* in wildlife, even though this is the case in pigs; thus, it is vital to continue educating hunters to enable them to ensure the safety of meat from hunted game, and raise their awareness about the risks of eating undercooked bear, badger, lynx, wild boar or other carnivore or omnivore game meat.

[46] European Food Safety Authority, 2011. Scientific Report on Technical specifications on harmonised epidemiological indicators for public health hazards to be covered by meat inspection of swine. EFSA Journal 2011;9(10):2371, 125 pp. doi:10.2903/j.efsa.2011.2371

3.8. *Toxoplasma*

Toxoplasma infection is common in animals and humans. The causative agent is an obligate intracellular protozoan parasite, *Toxoplasma gondii*. Nearly all warm-blooded animals can act as intermediate hosts, and seemingly all animals may be carriers of tissue cysts of this parasite (Figure TO1). However, the parasite only matures in domestic and wild cats, which are the definitive hosts.

***Figure TO1. Life cycle of* Toxoplasma gondii**



Source: http://www.dpd.cdc.gov/dpdx/HTML/Toxoplasmosis.htm

Humans may be infected through the consumption of undercooked meat containing intermediate cysts or food/water contaminated with oocysts from cat faeces or from handling contaminated soil or cat litter trays. Most human infections are asymptomatic or cause mild flu-like symptoms resulting in long-lasting immunity. Lymphadenitis accompanied by fever and headache is the most frequent clinical sign of infection in humans. About 50 %-80 % of the European population are estimated to be infected. Occasionally the parasite may cause a serious foetal infection resulting in abortion or congenital lesions in the child's brains, eyes or other organs, particularly if the mother acquires her first infection during the first trimester of pregnancy.

In animals, *Toxoplasma* is an important cause of abortion in sheep and goats, but may be controlled by proper management practices and vaccination.

3.8.1. *Toxoplasma* in animals

In total 15 MSs and two non-MSs provided data on *Toxoplasma* in animals from the years 2011-2012 (Table TO1). Only the data covering at least 25 samples are summarised in the following tables, whereas all the reported data are presented in the level 3 tables. The data on the human toxoplasmosis cases in 2011 and 2012 are not included in this report.

Most of the reporting countries provided information on the type of specimen taken and the analytical method used in testing. This facilitated a better interpretation of the data. Some countries tested meat or other tissues for the presence of *Toxoplasma* cysts, while other countries tested serologically blood or meat juice

samples for the presence of *Toxoplasma* antibodies. Furthermore, some results derive from monitoring and specific national surveys while other results are from clinical investigations. Because of the use of different tests and analytical methods as well as different sampling schemes, the results from different countries are not directly comparable.

Furthermore, the prevalence of *Toxoplasma* infection in farm animals is strongly influenced by the age of the tested animals and the type of husbandry conditions applied at the farm.

Only four MSs provided data on *Toxoplasma* in pigs for the years 2011-2012, which covered more than 25 samples (Table TO2). Most of these data derived from monitoring, objective sampling or specific surveys. Germany and Poland tested for the tissue cysts, Germany finding no positive samples out of 837 samples tested, while Poland detected five (1 %) positive samples for the cysts from the 500 investigated in 2012. The Netherlands and the United Kingdom both reported less than 1 % of the samples positive for *Toxoplasma* antibodies from farm level monitoring.

Six MSs reported data on *Toxoplasma* in cattle with more than 25 samples for the years 2011-2012 (Table TO3). Both Germany and Poland found low to moderate levels of samples positive for tissue cysts. Several MSs reported a very high proportion of serologically positive samples from clinical investigations of cattle at farm.

More MSs and non-MSs reported information on *Toxoplasma* in sheep and goats, likely because of the clinical importance of the parasite in these animal species (Table TO4). High proportions of serological samples were found positive by many countries, particularly from clinical investigations and suspect sampling. Finland, Germany, the Netherlands and Norway also detected tissue cysts in samples from sheep, these samples deriving mainly from clinical investigations.

Several MSs and non-MSs provided data on *Toxoplasma* in cats and dogs, mainly from clinical investigations, and found often positive samples (Table TO5).

In addition, six MSs and one non-MS provided data (over 25 samples) on other animal species, reporting *Toxoplasma* positive samples from horses, hares, muskrats, coypu, foxes, wild boar, pigeons, water buffaloes and deer (Table TO6). Particularly, in wild boar, high proportions of seropositive samples were detected by Italy and Poland. France tested imported (from outside EU) horse meat at border inspections and found that 31.2% of the slaughter batches tested positive. Among the investigations covering less than 25 samples, *Toxoplasma* positive findings were detected from zoo animals, finches, wallabies, mouflons, rabbits, wild birds and poultry.

Table TO1. Overview of countries reporting data for* Toxoplasma, *2012-2011

Data	Total number of reporting MSs	Countries
Human	2012 - 24	**All MSs** except AT, DK, IT **Non-MSs:** IS, NO
	2011 - 24	**All MSs** except AT, DK, IT **Non-MSs:** IS, NO
Animal	2012 - 17	**All MSs** except AT, BG, DE, EE, FR, GR, LT, LU, MT, PT **Non-MSs:** CH, NO
	2011 - 21	**All MSs** except EE, FR, GR, HU, LT, MT **Non-MSs:** CH, NO

Note: The overview table contains all data reported by MSs and non-MSs.

Table TO2. Findings of Toxoplasma *in pigs, 2011-2012*

Country	Description	Sample unit	Analytical method	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Germany	At farm, domestic production	Animal	Microbiological test[1]	559	0	0	278	0	0
Netherlands	At farm, monitoring	Animal, blood	ELISA	780	7	0.9	-	-	-
Poland	At slaughterhouse, survey, objective sampling[2]	Animal, organ/tissue	Direct agglutination	500	61	12.2	500	51	10.2
	Testing of samples found positive with direct agglutination	Animal, organ/tissue	PCR	61	5	8.2	-	-	-
United Kingdom	At farm, monitoring, convenience sampling, Great Britain	Animal, blood	Direct agglutination	154	1	0.6	-	-	-

Note: Data presented only for sample sizes ≥25.

1. Microscopy followed by immuno histo-chemistry.
2. 2011 at farm, monitoring, selective sampling.

Table TO3. Findings of Toxoplasma *in cattle, 2011-2012*

Country	Description	Sample unit	Analytical method	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Germany	Calves (under 1 year), at farm, domestic production	Animal	Microbiological test[1]	299	0	0	148	0	0
	Dairy cows, at farm, domestic production	Animal	Microbiological test	33	0	0	26	0	0
	Total, at farm, domestic production	Animal	Microbiological test	496	11	2.2	235	3	1.3
Ireland	At farm, domestic production, clinical investigations, suspect sampling	Animal, blood	Latex agglutination[2]	50	0	0	32	0	0
Italy	At farm, domestic production, clinical investigations	Animal	ELISA[3]	21	0	0	159	4	2.5
Poland	At slaughterhouse, survey, objective sampling	Animal, organ/ tissue[4]	Direct agglutination	400	80	20.0	400	59	14.8
	Testing of samples found positive with direct agglutination	Animal, organ/ tissue	PCR	80	14	17.5	-	-	-
Spain	At farm, monitoring, convenience sampling	Herd, blood[5]	ELISA	40	0	0	68	0	0
United Kingdom	At farm, clinical investigations, suspect sampling, Northern Ireland	Animal, blood	Latex agglutination	34	25	73.5	-	-	-

Note: Data presented only for sample sizes ≥25.

1. Microscopy followed by immuno histo-chemistry.
2. 2011, microbiological test.
3. 2011, national survey, analytical method not given.
4. 2011, monitoring, selective sampling, animal - blood sample.
5. 2011, animal.

Table TO4. Findings of* Toxoplasma *in sheep and goats, 2011-2012

Country	Description	Sample unit	Analytical method	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Sheep									
Finland	At farm, clinical investigations	Animal	Histology, Immuno Histo Chemistry, PCR	166	0	0	81	2	2.5
France	At farm, clinical investigations, convenience sampling	Animal, blood	Modified agglutination	-	-	-	223	170	76.2
Germany	Unspecified, at farm, domestic production	Animal	Microbiological test[1]	588	19	3.2	198	8	4.0
Ireland	At farm, domestic production, clinical investigations, suspect sampling	Animal, blood	Latex agglutination[2]	972	93	9.6	1,012	103	10.2
Italy	At farm, domestic production, clinical investigations	Animal	ELISA	70	51	72.9	-	-	-
	At farm, domestic production, survey	Animal	ELISA[3]	582	2	0.3	199	102	51.3
	At farm, domestic production, survey	Animal	Several methods	128	57	44.5	131	24	18.3
Latvia	At farm, clinical investigations, suspect sampling	Animal, blood	Latex agglutination	-	-	-	57	33	57.9
Malta	At farm, monitoring, selective sampling	Animal, blood	ELISA	-	-	-	400	311	77.8
Netherlands	At farm, monitoring	Animal, blood		89	36	40.4	0	0	0
	At farm, clinical investigation	Animal, organ/tissue[4]		467	8	1.7	564	0	0
Spain	At farm, clinical investigations, suspect sampling	Animal, blood	ELISA, direct agglutination	-	-	-	44	11	25.0
	At farm, monitoring, convenience sampling	Animal, blood	ELISA	-	-	-	6,327	2,041	32.3
United Kingdom	At farm, clinical investigations, suspect sampling, Northern Ireland	Animal, blood	Latex agglutination	533	455	85.4	-	-	-
	At farm, monitoring, convenience sampling	Animal, blood	Latex agglutination	533	455	85.4	655	285	43.5
Norway	At farm, domestic production, clinical investigation	Animal sample - blood	Direct agglutination	50	26	52.0	-	-	-
	At farm, domestic production, clinical investigation	Animal sample - organ/tissue	Immuno Histo Chemistry	48	13	27.1	-	-	-

Table continued overleaf.

Table TO4* (continued). *Findings of* Toxoplasma *in sheep and goats, 2011-2012

Country	Description	Sample unit	Analytical method	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Goat									
Germany	Unspecified, at farm, domestic production	Animal	Microbiological test	71	0	0	55	0	0
Italy	At farm, domestic production, survey[5]	Animal	ELISA	25	1	4.0	25	0	0
	At farm, domestic production, clinical investigations	herd/flock, animal sample	-	-	-	-	49	0	0
Malta	At farm, monitoring, selective sampling	Animal, blood	ELISA	-	-	-	409	273	66.7
Netherlands	At farm, monitoring	Animal, blood	-	31	1	3.2	0	0	0
	At farm, clinical investigations	Animal, organ/tissue[4]		221	4	1.8	214	0	0
Spain	At farm, clinical investigations, suspect sampling	Animal, blood	ELISA, direct agglutination	-	-	-	32	18	56.3
United Kingdom	At farm, monitoring, convenience sampling	Animal, blood	Latex agglutination	44	7	15.9	46	25	54.3
	At farm, clinical investigations, suspect sampling	Animal	Several methods	46	1	2.2	-	-	-
Sheep and goats									
Cyprus	At farm, clinical investigation, suspect sampling	Animal, blood	ELISA	111	34	30.6	111	34	30.6
Italy	At farm, domestic production, survey	Animal	-	-	-	-	41	0	0

Note: Data presented only for sample sizes ≥25.

1. Microscopy followed by immuno histo-chemistry.
2. 2011, microbiological test.
3. 2011, analytical method unknown.
4. 2011, blood samples, ELISA method.
5. 2011, at farm, domestic production, analytical method unknown.

Table TO5. Findings of Toxoplasma *in cats and dogs, 2011-2012*

Country	Description	Sample unit	Analytical method	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Cats									
Finland	Clinical investigation	Animal	Histology, Immuno Histo Chemistry, PCR	335	4	1.2	335	4	1.2
Germany	Domestic production	Animal	Microbiological test[1]	761	3	0.4	686	3	0.4
Italy	Domestic production, clinical investigation	Animal		-	-	-	38	0	0
Latvia	Clinical investigation	Animal, blood	Latex agglutination	68	6	8.8	75	18	24.0
Netherlands	Surveillance	Animal, blood	ELISA	-	-	-	450	91	20.2
Poland	Clinical investigation	Animal, blood	Immunofluorescence antibody	101	63	62.4	107	80	74.8
	Clinical investigation	Animal, faeces	Immunofluorescence antibody	-	-	-	31	0	0
Portugal		Animal, blood	Direct agglutination	-	-	-	89	23	25.8
Slovakia	Clinical investigation, suspect sampling	Animal, blood		-	-	-	120	18	15.0
	Clinical investigations[2], suspect sampling	Animal, faeces	Flotation method	261	1	0.4	77	5	6.5
Switzerland	Clinical investigation	Animal		252	1	0.4	484	2	0.4
Dogs									
Finland	Clinical investigation	Animal	Histology, Immuno Histo Chemistry, PCR	739	0	0	620	0	0
France	Clinical investigation, convenience sampling, Corsica	Animal	Modified agglutination test	-	-	-	281	183	65.1
Germany	Domestic production	Animal	Microbiological test	325	0	0	159	5	3.1
Italy	Domestic production, clinical investigation	Animal	Immunofluorescence antibody[3]	185	90	48.6	197	83	42.1
Latvia	Clinical investigation	Animal, blood	Latex agglutination			3.8	54	13	24.1
Netherlands	Clinical investigation	Animal	ELISA	52	1	1.9	77	9	11.7
Slovakia	Clinical investigation, suspect sampling	Animal, blood	Complement fixation[3]	39	8	20.5	40	5	12.5
Spain	Clinical investigation, suspect sampling[4]	Animal, blood	ELISA	939	329	35.0	39	1	2.6

Note: Data presented only for sample sizes ≥25.

1. Microscopy followed by immuno histo-chemistry.
2. 2011, monitoring.
3. 2011, analytical method unknown.
4. 2011, monitoring, convenience sampling.

Table TO6. Findings of Toxoplasma *in other animal species, 2011-2012*

Country	Description	Sample unit	Analytical method	2012			2011		
				N	N pos	% pos	N	N pos	% pos
Finland	Hares, clinical investigation	Animal	Histology, Immuno Histo Chemistry, PCR	96	10	10.4	-	-	-
France	Horses, border control, imported, monitoring, objective sampling	Slaughter batch, meat	Modified agglutination	269	84	31.2	-	-	-
	Muskrats, wild, surveillance, convenience sampling	Animal, blood	Modified agglutination	-	-	-	546	148	27.1
	Coypu, surveillance, convenience sampling	Animal, blood	Modified agglutination	-	-	-	193	60	31.1
Germany	Horses, at farm, domestic production	Animal	Microbiological test	60	0	0	43	0	0
	Foxes, domestic production	Animal	Microbiological test	-	-	-	377	1	0.3
Italy	Wild boar, survey	Animal	Immuno fluorescence antibody[1]	218	185	84.9	267	1	0.4
	Wild boar, wild, clinical investigation	Animal	ELISA	35	0	0	183	8	4.4
	Pigeons, survey	Animal		-	-	-	30	24	80.0
	Rodents, wild, survey	Animal		-	-	-	56	0	0
	Water buffaloes, at farm, survey	Animal		-	-	-	34	2	5.9
Poland	Deer, from hunting	Animal, organ/tissue	Direct agglutination	34	3	8.8	-	-	-
	Deer, from hunting	Animal, organ/tissue	PCR	43	5	11.6	-	-	-
	Wild boar, from hunting	Animal, organ/tissue	Direct agglutination	586	201	34.3	-	-	-
	Wild boar, from hunting	Animal, organ/tissue	PCR	105	8	7.6	-	-	-
Slovakia	Hares, monitoring, suspect sampling	Animal, blood	Complement fixation	95	0	0	-	-	-
	Rodents, laboratory animals, monitoring, suspect sampling	Animal		-	-	-	120	0	0
Norway	Foxes, farmed, export control, selective sampling	Animal, blood		-	-	-	110	0	0

Note: Data presented only for sample sizes ≥25.

1. 2011, analytical method unknown.

3.8.2. Discussion

The importance of *Toxoplasma* as a risk for human health was recently highlighted by EFSA's opinions on modernisation of meat inspection, where *Toxoplasma* was identified as a relevant hazard to be addressed in revised meat inspection systems for pigs, sheep, goats, farmed wild boar and farmed deer[48,49,50]. *Toxoplasma* was reported by the MSs from pigs, sheep, goats, hunted wild boar and hunted deer, in 2011 and 2012. In addition, positive findings were detected in cats (the natural hosts), cattle and dogs as well as several other animal species, indicating the wide distribution of the parasite among different animal and wildlife species.

[48] EFSA Panels on Biological Hazards (BIOHAZ), on Contaminants in the Food Chain (CONTAM), and on Animal Health and Welfare (AHAW), 2011. Scientific Opinion on the public health hazards to be covered by inspection of meat (swine). EFSA Journal 2011;9(10):2351, 198 pp. doi:10.2903/j.efsa.2011.2351

[49] EFSA BIOHAZ Panel (EFSA Panel on Biological Hazards), 2013. Scientific Opinion on the public health hazards to be covered by inspection of meat from sheep and goats. EFSA Journal 2013;11(6):3265, 186 pp. doi:10.2903/j.efsa.2013.3265

[50] EFSA BIOHAZ Panel (EFSA Panel on Biological Hazards), 2013. Scientific Opinion on the public health hazards to be covered by inspection of meat from farmed game. EFSA Journal 2013;11(6):3264, 181 pp. doi:10.2903/j.efsa.2013.3264

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.9. Rabies

Rabies is a neurological disease caused by a rhabdovirus of the genus *Lyssavirus*. This virus can infect all warm-blooded animals and is generally transmitted through contact with saliva from infected animals, in Europe typically from foxes and racoon dogs, but also from domestic carnivores, via bites. The disease causes swelling in the central nervous system of the host and is normally fatal.

The majority of rabies cases are caused by the classical sylvatic rabies virus (RABV, species). In addition, four species of *Lyssavirus* virus are detected in bats in Europe: WCB (West Caucasian Bat virus), BBLV (Bokeloh Bat *Lyssavirus*), EBLV-1 (European Bat *Lyssavirus*) and EBLV-2, of which the last three were reported in 2012. Although rare in Europe, bats can transmit rabies to other mammals, including humans.

Symptoms in humans include a sense of apprehension, headache and fever, leading to death. Although occurring worldwide, rabies is uncommon in humans. Human cases are extremely rare in the EU, and mostly relate to travel to endemic countries. However, those working with bats and other wildlife are encouraged to seek advice on vaccination against rabies.

In animals, the pathogenicity and infectivity of the virus vary greatly among different species. Infected animals may exhibit a wide range of symptoms, including drooling, difficulty in swallowing, irritability, strange behaviour, alternating excitative and apathy stages and increasing paralysis of the lower jaw and hind parts. Animals may excrete the virus during the incubation period, up to 14 days prior to the onset of clinical symptoms.

Table RA1 presents the countries reporting data for 2012.

Table RA1. Overview of countries reporting data on* Lyssavirus*, 2012

Data	Total number of reporting MSs	Countries
Human	27	**All MSs** **Non-MSs:** CH, IS, NO
Animal	24	**All MSs** except CY, IE, MT **Non-MSs:** CH, NO

Note: The overview table contains all data reported by MSs and non-MSs.

3.9.1. Rabies in humans

Generally, very few cases of rabies in humans are reported in the EU, and most MSs have not had any indigenous cases for decades. In 2012, Romania reported one domestically acquired case in a five-year-old girl. The girl had been bitten by a stray dog in a village in eastern Romania. She was initially misdiagnosed and died in February 2012[51]. In addition, in May 2012, one travel-associated case of rabies was reported in the EU, from the United Kingdom (Table RA2). The patient was a woman, resident in the United Kingdom, who visited her country of origin, India, where she was bitten by a dog[52]. Another case was reported from Switzerland: a USA citizen, who probably contracted the disease in July 2012, after previous exposure to a bat in the USA[53].

[51] http://www.promedmail.org/direct.php?id=20120308.1064096

[52] http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1317134331244

[53] Deubelbeiss AN, Trachsel Ch, Bachli EB, Kuffer A, Budka H, Eniseyskiy P, Zimmermann H, Wallace RM, Farley S and Zanoni RG, 2013. Imported human rabies in Switzerland, 2012: a diagnostic conundrum. Journal of Clinical Virology, 57, 178-181.

Table RA2. Human rabies cases in the EU, 2008-2012

Year	Country	Case
2008	France	1 case (French Guyana)
	Romania	1 case (fatal)
	United Kingdom	1 imported case
2009	Romania	1 fatal case. A 69-year-old woman from a rural area was bitten by a fox. The patient did not visit a hospital or report it to the veterinary authorities
2010	Romania	2 fatal cases. One 10- and one 11-year-old girl, both from rural areas. Possible transmission was in one case a cat bite and in the other was unknown
2011	Portugal	1 fatal case imported from Guinea-Bissau. Case was a 41-year-old woman bitten by a dog. No vaccine was available in the country at the time of the bite. The person visited the hospital in Portugal two and a half months after the bite
2012	Romania	1 fatal case. A five year-old girl was bitten by a stray dog in a village in eastern Romania and was initially mis-diagnosed; she died in February 2012.
	United Kingdom	1 fatal case. A British woman died of rabies in May 2012 in the United Kingdom, contracted from a dog in India.
	Switzerland	1 fatal case. An American citizen died of rabies in July 2012; he was bitten by a bat in California three months before the symptoms started.

3.9.2. Rabies in animals

Rabies is a notifiable disease in all MSs. In 2012, 12 MSs had their annual or multiannual plan of rabies eradication co-financed by the EC (Decision 2011/807/EU). Eradication plans comprise oral vaccination of wild animals, sampling of wild and domestic animals (suspected of having been infected by rabies and/or those found dead) for rabies, and surveillance and monitoring of wild animals for vaccine efficacy.

The vaccination programmes can be conducted nation-wide or in at-risk areas only and these programmes may vary in frequency: ordinary vaccination campaigns (twice a year) or extraordinary campaigns (as many campaigns as required depending on the epidemiological situation). For rabies surveillance, the majority of the samples from wild and domestic animals are taken based on suspicion of rabies infection, including animals found dead. In addition, countries carrying out oral vaccination programmes of wildlife monitor the efficacy of vaccination campaigns. This involves the sampling of healthy (rabies unsuspected) hunted foxes and raccoon dogs randomly and homogeneously sampled from the vaccination areas. These hunted animals are tested for vaccine intake and for specific immunity, as well as for the presence of the rabies virus.

With the exception of Cyprus, Ireland and Malta, all MSs and two non-MSs (Norway and Switzerland) provided information on rabies in animals (Table RA1). Six MSs and one non-MS (Norway) reported rabid wild animals other than bats (Table RA4), and four of these MSs also reported rabies in domestic animals; two MSs reported rabies only in domestic animals (Table RA3). Six MSs reported rabies-infected bats (Table RA5).

In October 2012, 25 years after the last reported case, Greece detected one rabid fox in the northern part of the Greek territory, followed by the detection of eight additional cases (six rabid foxes and two rabid dogs) before the end of 2012. Italy did not report any rabies cases in animals in 2012, indicating that the rabies epidemic that the country experienced in 2008-2011 may be over.

In 2012, 712 animals other than bats tested positive for either classical rabies virus or unspecified *Lyssavirus* in eight MSs and one non-MS. The number of cases reported in 2012 increased compared with 2011, when 512 cases where detected in animals other than bats (Figure RA1).

Three MSs and one non-MS reported their findings at the regional level, two of them covering rabies surveillance of the whole national territory (Figure RA2).

Lyssavirus was speciated for around 75 % of the 745 rabies-positive animals (including bats) reported, while the remaining 187 cases were reported as unspecified *Lyssavirus*.

Domestic animals

In 2012, 23 MSs and 2 non-MSs (Norway and Switzerland) reported data on rabies testing in domestic animals (Table RA3).

Overall, 180 domestic animals, in six MSs, were found to be infected with either classical rabies virus or unspecified *Lyssavirus*. Except for the Netherlands, classical rabies was not reported in domestic animals in Central and Western EU MSs. The number of countries which reported positive findings in domestic animals increased in comparison with the previous year (three MSs). At the EU level, the number of cases reported in farm animals increased in 2012 compared with previous year, and this is mainly explained by an increase in the number of cases reported by Romania. In 2012, Poland and Romania recorded the vast majority of positive findings in domestic animals, accounting for 96 % of all domestic animals found infected.

Wildlife

In 2012, 21 MSs and 2 non-MS (Norway and Switzerland) reported data on rabies in wild animals other than bats (Table RA4).

Overall, 532 wild animals (excluding bats) testing positive, for either classical rabies virus or unspecified *Lyssavirus,* were reported by Lithuania, Poland, Bulgaria, Greece, Romania and Slovenia; most of the cases (around 97 %) were reported by Poland and Romania. Norway also reported one positive polar fox in the Svalbard archipelago.

There was a decrease in cases in wildlife compared with 2010, when 725 cases were reported by MSs and the two reporting non-MSs, but an increase compared with 2011, when 385 cases were reported. Rabies findings in foxes (504) increased compared with 2011 when 336 foxes were reported to be infected; in 2012 the rabid foxes reported by Romania accounted for 60 % of all foxes found infected with rabies.

Four raccoon dogs were found positive for rabies in 2012, and this figure is lower than that reported in 2011, when 11 rabid raccoon dogs were reported. Twenty-four cases occurred in other wildlife species, more than half of them in martens.

Bats

In 2012, 19 MSs and 1 non-MS (Switzerland) reported data on rabies in bats (Table RA5). Bats infected with rabies virus were found in six MSs (France, Germany, Hungary, the Netherlands, Poland and Spain) (Figure RA3). These countries also reported positive findings in bats in 2010 and 2011. France and Germany reported one finding each, of the Bokeloh Bat *Lyssavirus*. Of the reported findings of *Lyssavirus* in bats in the EU almost half (45.5 %) were found in the Netherlands.

> The Bokeloh Bat *Lyssavirus* (BBLV) was found in *Myotis nattereri* in north-eastern France for the first time in July 2012. This French isolate showed 98.7 % nucleotide identity with the first BBLV strain isolated in 2010 in Germany. Distribution investigations of *Lyssavirus* in the bat lead to detection of the infectious virus in the salivary glands, which suggested a possible transmission pathway for the virus.
>
> Source: France National Zoonoses Summary Report, 2012.

Sweden (since 1988) and the United Kingdom (since 1987) have had a passive surveillance programme for EBLV in bats. No cases were detected in 2012, 2011 and 2010. Sweden, in addition, implemented an active surveillance programme for rabies in bats in 2008.

For additional information on rabies in animals, refer to the Level 3 Tables.

Table RA3. Number of tested animals and positive cases of rabies in domestic animals, 2012

Country	Description of sampling strategy[1]	Classical rabies (RABV) virus or unspecified *Lyssavirus* (u. *L.*)											
		Farm animals[2]				Cats[3]				Dogs[3]			
		N	RABV Pos	u. *L.* Pos	all *L.* Total Pos	N	RABV Pos	u. *L.* Pos	all *L.* Total Pos	N	RABV Pos	u. *L.* Pos	all *L.* Total Pos
Austria	Suspect sampling	14	0	0	0	58	0	0	0	53	0	0	0
Belgium	Selective sampling	346	0	0	0	13	0	0	0	15	0	0	0
Bulgaria	Suspect sampling and objective sampling	1	0	0	0	2	0	0	0	10	0	0	0
Czech Republic	Selective sampling	3	0	0	0	140	0	0	0	96	0	0	0
Denmark	Suspect sampling and clinical investigations	-	-	-	-	2	0	0	0	1	0	0	0
Estonia	Suspect sampling and clinical investigations	13	0	0	0	22	0	0	0	12	0	0	0
Finland	Suspect sampling	1	0	0	0	11	0	0	0	24	0	0	0
France	Suspect sampling	14	0	0	0	564	0	0	0	659	0	0	0
Germany	Unspecified	112	0	0	0	218	0	0	0	222	0	0	0
Greece	Selective sampling and surveillance	7	0	0	0	2	0	0	0	38	2	0	2
Hungary	Unspecified	45	0	0	0	347	0	0	0	285	0	0	0
Italy	Clinical investigations, monitoring and unspecified	122	0	0	0	261	0	0	0	344	0	0	0
Latvia	Suspect sampling	15	1	0	1	39	0	0	0	23	1	0	1
Lithuania	Suspect sampling, unspecified	26	0	1	1	74	0	1	1	78	0	0	0
Luxembourg	Suspect sampling	3	0	0	0	1	0	0	0	-	-	-	-
Netherlands	Suspect sampling	689	0	0	0	14	0	0	0	11	1	0	1
Poland	Suspect sampling and selective sampling	60	6	5	11	1,065	9	5	14	666	7	6	13
Portugal	Suspect sampling	-	-	-	-	-	-	-	-	2	0	0	0
Romania	Surveillance	414	0	57	57	154	0	30	30	329	0	0	48
Slovakia	Suspect sampling, clinical investigation and objective sampling	8	0	0	0	94	0	0	0	148	0	0	0
Slovenia	Suspect sampling, surveillance	20	0	0	0	55	0	0	0	30	0	0	0
Spain	Suspect sampling and monitoring	-	-	-	-	23	0	0	0	-	-	-	-
Sweden	Suspect sampling and surveillance	-	-	-	-	3	0	0	0	2	0	0	0
United Kingdom	Suspect sampling, selective sampling and monitoring	-	-	-	-	4	0	0	0	2	0	0	0
EU Total		**1,899**	**7**	**63**	**70**	**3,108**	**9**	**36**	**45**	**2,997**	**11**	**6**	**65**
Norway	Suspect sampling and clinical investigations	-	-	-	-	1	0	0	0	-	-	-	-
Switzerland	Unspecified, clinical investigations	9	0	0	0	7	0	0	0	31	0	0	0

Note: Data from imported animals are not included in the table. No exclusion was made on the sample size. RABV: rabies virus; u. *L.*: unspecified *Lyssavirus;* all. *L.:* total *Lyssavirus* reported.
1. The description of the sampling strategy refers to farm animals, cats and dogs.
2. Data include: cattle (bovine animals), pigs, unspecified poultry, unspecified, sheep, goats, domestic solipeds.
3. Including both pets and stray cats and dogs.

Table RA4. Number of tested animals and positive cases of rabies in wild animals other than bats, 2012

Country	Description of sampling strategy[1]	Classical rabies (RABV) virus or unspecified *Lyssavirus* (u. *L.*)											
		Foxes				Raccoon dogs				Other wild[2]			
		N	RABV Pos	u. *L.* Pos	all *L.* Total Pos	N	RABV Pos	u. *L.* Pos	all *L.* Total Pos	N	RABV Pos	u. *L.* Pos	all *L.* Total Pos
Austria	Suspect sampling	2,842[3]	0	0	0	-	-	-	-	43	0	0	0
Belgium	Selective sampling and monitoring	48	0	0	0	-	-	-	-	-	-	-	-
Bulgaria	Objective sampling and monitoring	461	0	1	1	-	-	-	-	322	0	0	0
Czech Republic	Selective sampling, monitoring and unspecified	3,196	0	0	0	-	-	-	-	66	0	0	0
Denmark	Suspect sampling, survey - national survey and clinical investigations	2	0	0	0	-	-	-	-	13	0	0	0
Estonia	Suspect sampling, control and eradication programmes	54	0	0	0	73	0	0	0	14	0	0	0
Finland	Census, monitoring and surveillance	155	0	0	0	248	0	0	0	237	0	0	0
France	Suspect sampling and monitoring	43	0	0	0	-	-	-	-	28	0	0	0
Germany	Unspecified	3,518	0	0	0	-	-	-	-	93	0	0	0
Greece	Selective sampling, monitoring and surveillance	140	7	0	7	-	-	-	-	47	0	0	0
Hungary	Objective sampling, monitoring and unspecified	4,136	0	0	0	-	-	-	-	41	0	0	0
Italy	Monitoring and unspecified	5,021	0	0	0	-	-	-	-	753	0	0	0
Latvia	Suspect sampling and monitoring	123	0	0	0	56	0	0	0	29	0	0	0
Lithuania	Suspect sampling and monitoring	198	0	1	1	103	0	2	2	92	0	0	0
Luxembourg	Objective sampling and monitoring	27	0	0	0	-	-	-	-	-	-	-	-
Netherlands	Suspect sampling	3	0	0	0	-	-	-	-	1	0	0	0
Poland	Suspect sampling, census, and monitoring	21,696	189	0	189	71	2	0	2	185	5	7	12
Romania	Monitoring and surveillance	2,280	302	0	302	-	-	-	-	66	6	6	12
Slovakia	Suspect sampling, control and eradication programmes, objective sampling, surveillance	3,371	0	0	0	5	0	0	0	35	0	0	0
Slovenia	Suspect sampling, monitoring and surveillance	1,992	3	0	3	-	-	-	-	61	0	0	0
Spain	Suspect sampling and monitoring	15	0	0	0	-	-	-	-	41	0	0	0
Sweden	Suspect sampling and surveillance	3	0	0	0	-	-	-	-	-	-	-	-
EU Total		**46,482**	**501**	**2**	**503**	**556**	**2**	**2**	**4**	**2,124**	**11**	**13**	**24**
Norway[4]	Suspect sampling, clinical investigations, objective sampling and monitoring	120	0	0	1	-	-	-	-	5	0	0	0
Switzerland	Clinical investigations and unspecified	10	0	0	0	1	0	0	0	4	0	0	0

Note: RABV: rabies virus; u. *L.*: unspecified *Lyssavirus;* all. *L.*: total *Lyssavirus* reported. Zoo animals and unspecified species are not included in the table. Fifty zoo animals were tested for rabies in 2012 (three in Romania and 47 in the United Kingdom), but with no positive findings. The Czech Republic (36 samples), Italy (155 samples), Latvia (one sample), Poland (221 samples) and Slovakia (two samples) reported other wild animals tested for rabies, but only one positive finding was reported by Poland.

1. Sampling strategy refers to foxes, raccoon dogs and other wildlife.
2. Data included are from Alpine chamois, budgerigars, badgers, beavers, chinchillas, chipmunks, deer, dormice, ermine, elk, ferrets, guinea pigs, hares, hamster, hedgehogs, jackals, lynxes, martens, mice, mink, monkeys, moose, moles, mouflons, muskrats, unspecified mustelids, otters, other wild carnivores, other mustelids, bears, polar bears, polecats, rabbits, rats, raccoons, reindeer, rodents, seals, squirrels, voles, weasel, wild boar, wild cats (*Felis silvestris*), wolverines, wolves and other wild animals. Pets other than dog and cat pets are also included here.
3. Of these, 2,747 samples were foxes tested in context of monitoring, objective sampling.
4. In 2012 one red fox from mainland Norway was investigated and found to be negative for rabies. From the Svalbard area, 119 polar foxes (*Vulpes lagopus*) were investigated. One polar fox tested positive for rabies. No information on the type of virus detected was reported.

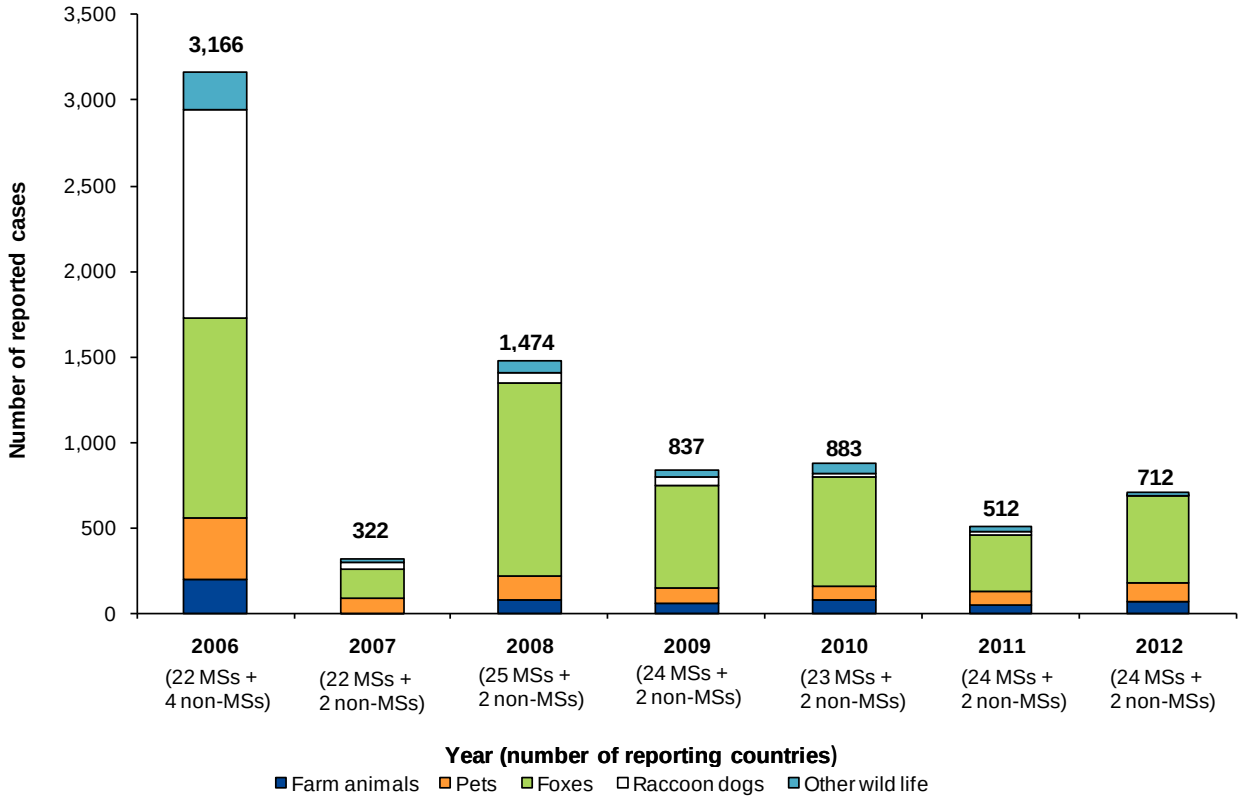
Table RA5. Number of tested animals and positive cases of rabies in bats, 2012

Country	Description of sampling strategy	European Bat Lyssavirus (EBLV-1 and EBLV-2) or unspecified Lyssavirus (u. *L.*)			
		N	EBLV-1 or EBLV-2	u. *L.*	all *L.*
			Pos	Pos	Total Pos
Austria	Surveillance, passive	17	0	0	0
Belgium	Selective sampling, monitoring	108	0	0	0
Bulgaria	Objective sampling, monitoring	1	0	0	0
Czech Republic	Selective sampling, monitoring	11	0	0	0
Estonia	Suspect sampling, control and eradication programmes	2	0	0	0
Finland	Suspect sampling, monitoring	32	0	0	0
France[1]	Suspect sampling, monitoring	228	4	0	5
Germany[2]	Unspecified	325	4	2	7
Greece	Selective sampling, monitoring	2	0	0	0
Hungary	Unspecified, monitoring	15	1	0	1
Italy	Unspecified, monitoring	3	0	0	0
Luxembourg	Objective sampling, monitoring	1	0	0	0
Netherlands	Suspect sampling, monitoring	194	0	15	15
Poland	Suspect sampling	107	1	2	3
Romania	Suspect sampling, surveillance	1	0	0	0
Slovakia	Suspect sampling, surveillance	1	0	0	0
Slovenia	Census, monitoring	162	0	0	0
Spain	Suspect sampling, monitoring	93	1	1	2
Sweden	Suspect sampling, surveillance	112	0	0	0
United Kingdom	Suspect sampling, monitoring; Selective sampling, surveillance	573	0	0	0
EU Total		**1,971**	**11**	**20**	**33**
Switzerland	Unspecified, clinical investigations	15	0	0	0

Note: EBLV-1 and EBLV-2: European Bat *Lyssavirus* 1 or 2; u. *L.*: unspecified *Lyssavirus.* all. *L.:* total *Lyssavirus* reported.

1. In France, one of the positive was for Bokeloh Bat *Lyssavirus*. This has been included in the total number of positives.
2. In Germany, one of the positive was for Bokeloh Bat *Lyssavirus*. This has been included in the total number of positives.

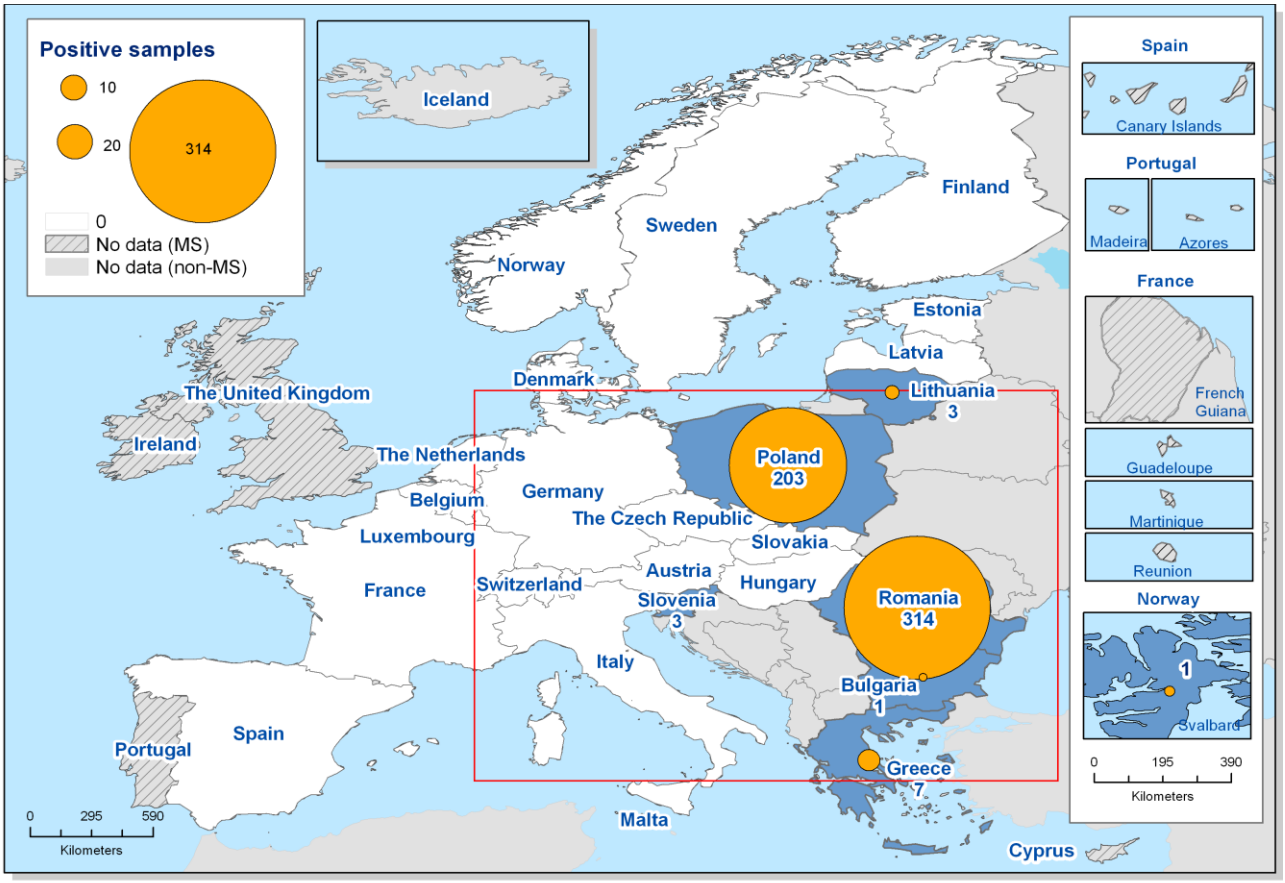
Figure RA1. Reported cases[1] of classical rabies or unspecified* Lyssavirus *in animals other than bats, in the Member States and non-MSs, 2006-2012

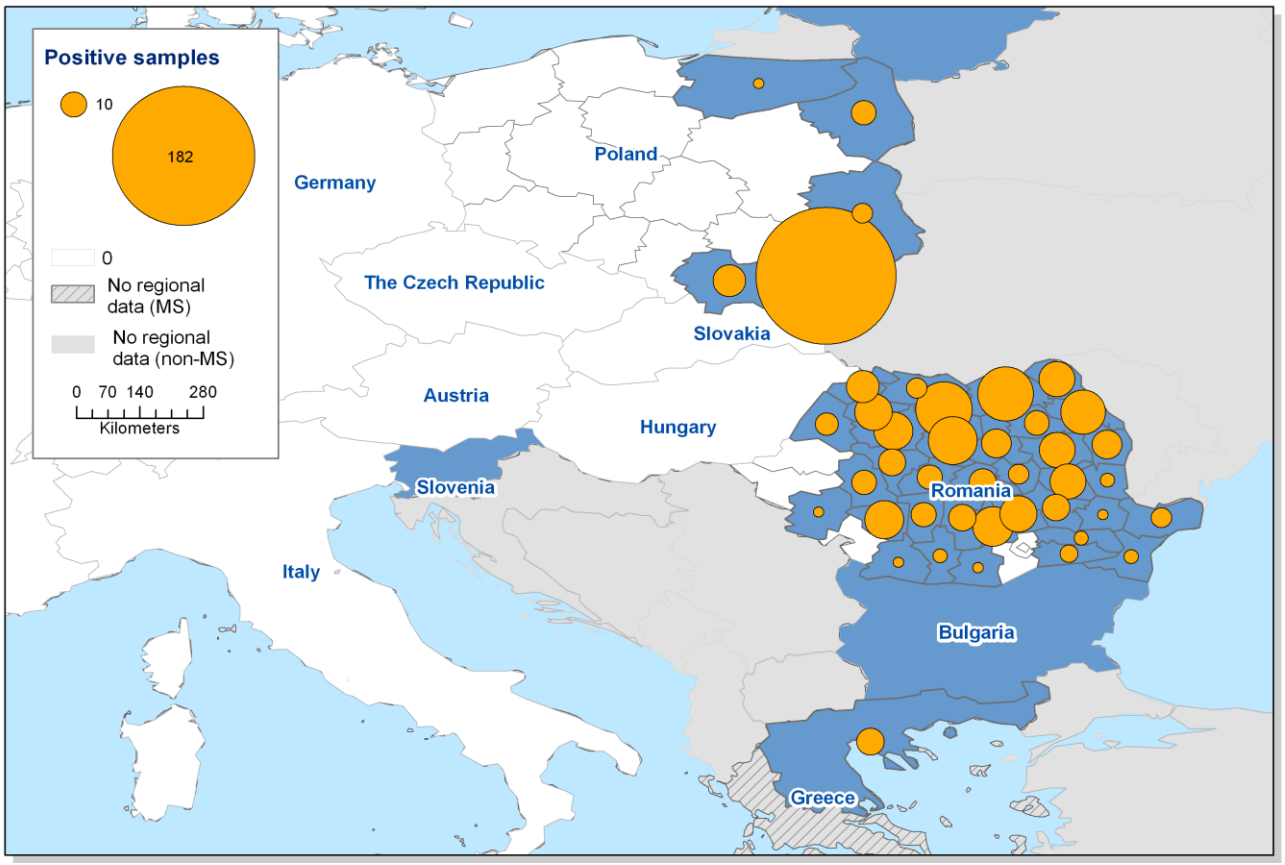


Note: The number of reporting MSs and non-MSs is indicated at the bottom of each bar. The total number of rabid cases is reported at the top of each bar.

1. Imported cases are not included.

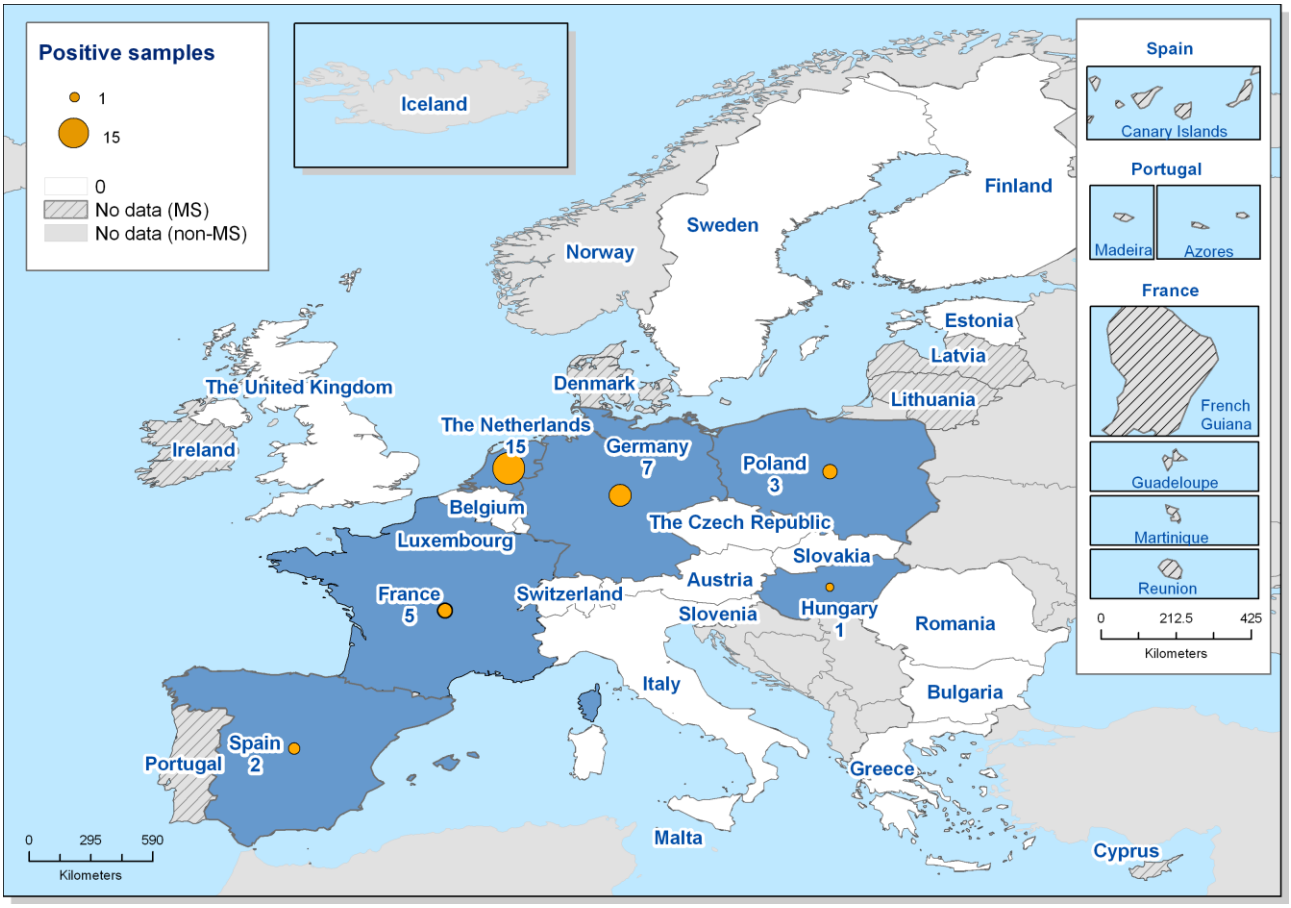
Figure RA2. Classical rabies or unspecified* Lyssavirus *cases in wild animals other than bats, 2012





Note: In 2012, one red fox from mainland Norway was investigated and found negative for rabies. From the Svalbard area, 119 polar foxes (*Vulpes lagopus*) were investigated. One polar fox was found positive for rabies.
The blue highlighted areas indicate MSs, non-MS or regions reporting rabies cases in wild animals other than bats.

Figure RA3. European Bat* Lyssavirus *(EBLV) or unspecified* Lyssavirus *cases in bats, 2012



Note: The blue highlighted areas indicate MSs reporting rabies cases in bats.

3.9.3. Discussion

Human rabies is a rare and vaccine-preventable zoonosis in Europe but the disease is invariably fatal in infected unvaccinated humans. Every year, one or two human cases are reported in European citizens, either travel related or indigenous. In 2012, one indigenous case and one case in a patient who travelled to a country where rabies is endemic were reported in the EU. This highlights the importance of public information and education about the risk of contracting rabies if bitten by animals while travelling to rabies-endemic countries or to MSs which have not eradicated the disease in their animal population.

In 2012, except for the Netherlands, classical rabies was not reported in domestic animals in Central and Western EU MSs, but this disease still occurs in wildlife and, albeit less frequently, in domestic animals, in the Baltic MSs and some Eastern and Southern MSs. Most of the latter MSs are now carrying out rabies eradication plans which are co-financed by the EU. In some of these MSs, cases occurred mostly in regions bordering Eastern European non-EU countries affected by rabies epidemics.

The general decreasing trend in the total number of rabies cases in animals observed in previous years was reversed in 2012, as there was an increase in the rabies cases reported in animals. In the EU, the number of cases reported in farm animals and foxes increased. In 2012, Greece detected rabies in domestic and wild animals 25 years after the last recorded case which could be the result of ongoing epidemics in neighbouring countries[54].

Poland and Romania accounted for the vast majority of positive findings in 2012 in all domestic animals and wild animals other than bats.

As in previous years, 2010 and 2011, the same six Central and Western MSs reported *Lyssavirus* cases from bats. These findings should be interpreted with caution because the extent of bat rabies surveillance is often not comparable between countries and/or sometimes no tests are carried out[55].

Three MSs and one non-MS reported their findings at regional level. Two MSs submitted regional data on rabies surveillance, covering the entire national area. Reporting of surveillance data, including negative findings, at regional level is important for evaluating rabies trends over time.

[54] Hellenic Center for Disease Control and Prevention. E-bulletins - Epidemiology of rabies in the countries sharing borders with Greece. Available online: http://www2.keelpno.gr/blog/?p=4060&lang=en

[55] The World Health Organization Rabies Bulletin Europe. Rabies Information System of the WHO Collaboration Center for Rabies Surveillance and Research. Available online: http://www.who-rabies-bulletin.org/About_Rabies/Bats/Information_Bat%20rabies_%20Europe.pdf

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.10. Q fever

Q fever, or query fever, is a zoonotic disease caused by the bacterium *Coxiella burnetii.* Goats, sheep and cattle are the primary domestic animal reservoirs, and the bacteria are excreted in milk, urine and faeces and in high numbers in the amniotic fluid, aborted tissues and placenta at birth. Clinical disease in these animals is rare, although abortion in goats, sheep and cattle as well as metritis and infertility in cattle have been associated with *C. burnetii* infections. Humans are considered accidental hosts.

C. burnetii can survive for long periods in the environment and is very resistant to physical and chemical stress. Humans are most often infected when inhaling airborne dust contaminated by placental material, birth fluids or faeces. Low levels of organisms may cause infection. Infection by ingestion of contaminated milk may also be possible.

Only about 40 % of people infected with *C. burnetii* show clinical signs. Symptoms of acute Q fever may include fever, severe headache, muscle pain, discomfort, sore throat, chills, sweats, non-productive cough, nausea, vomiting, diarrhoea, abdominal pain and chest pain. The fever usually lasts for one to two weeks and may be followed by life-long immunity. Acute Q fever is fatal in less than 2 % of cases. Chronic Q fever is uncommon, but may develop in persons with a previous history of acute Q fever. A serious complication of chronic Q fever is inflammation of the heart valves, and case fatality rate even with appropriate treatment is about 10 %[56].

Table QF1 presents the countries reporting data for 2012.

Table QF1. Overview of countries reporting data on Q fever, 2011-2012

Data	Total number of reporting MSs	Countries
Human	2012 - 24	**All MSs** except AT, DK, IT **Non-MSs:** IS, NO
	2011 - 24	**All MSs** except AT, DK, IT **Non-MSs:** IS, NO
Animal	2012 - 18	**All MSs** except BG, DE, EE, FR, GR, LT, LU, MT, PT **Non-MSs:** CH, NO
	2011 - 21	**All MSs** except EE, FR, GR, HU, LT, MT **Non-MSs:** CH, NO

Note: The overview table contains all data reported by MSs and non-MSs.

3.10.1. Q fever in humans

In 2012, 24 MSs provided information on Q fever in humans. Belgium and Spain have a sentinel surveillance system, which in Spain covers an estimated 25 % of the population. Seven MSs (Estonia, Finland, Lithuania, Luxembourg, Malta, Poland and Slovakia) reported no human cases. A total of 643 confirmed cases of Q fever in humans were reported in the EU and 17 in Switzerland (Table QF2). The EU notification rate was 0.17 per 100,000 population. There was an overall 15.3 % decrease in the number of reported confirmed cases compared with 2011 (759 cases). The largest decrease in reported cases (72 %) was observed in the United Kingdom but case numbers were small. Cases in the Netherlands continued to decrease in 2012 compared with 2011 (-21 %) and were 63 in 2012 compared with 2,354 in 2009. The highest case numbers were reported from Germany and France (198 and 168 respectively). However, the highest notification rate was observed in Spain (0.50 cases per 100,000 population).

[56] Maurin M and Raoult D, 1999. Q fever. Clinical Microbiology Reviews, 12, 518–553.

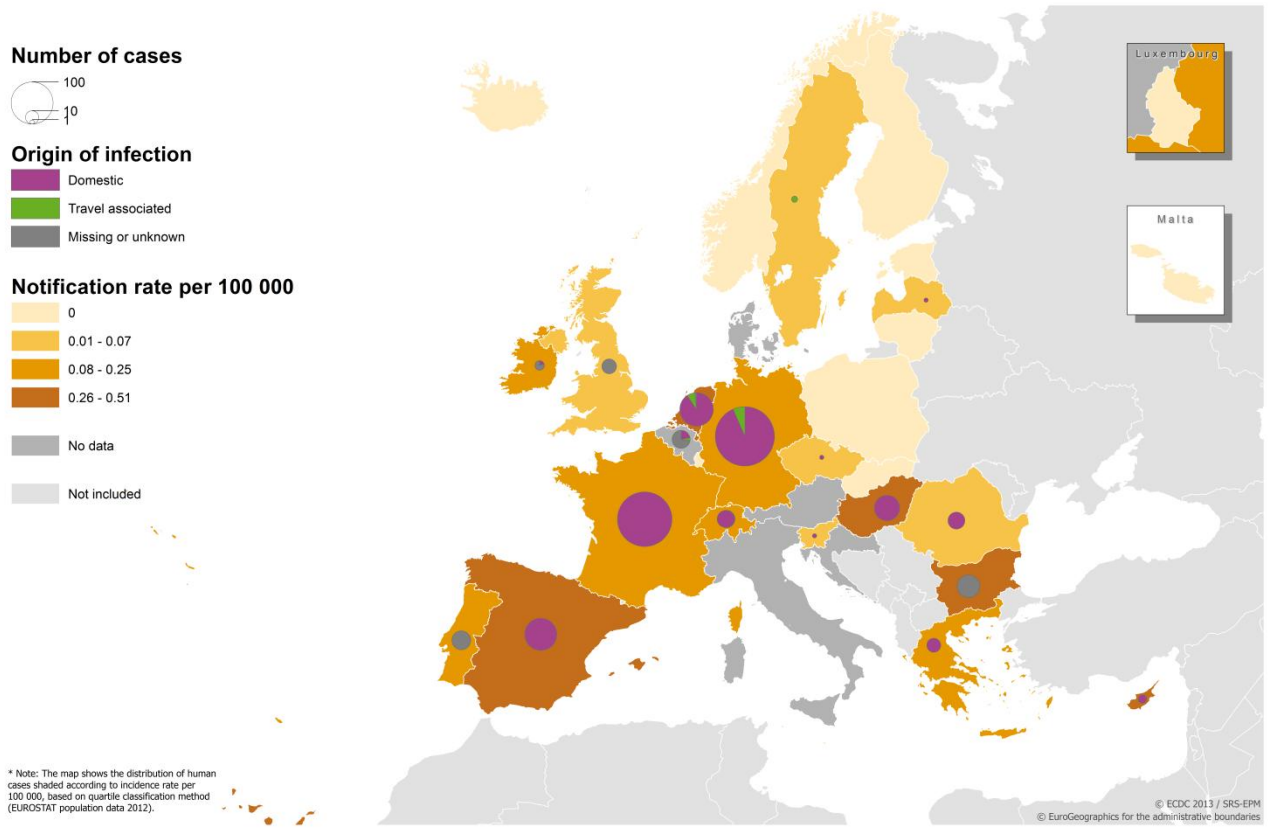
Table QF2. Reported cases of human Q fever in 2008-2012, and notification rates for confirmed cases in 2012

Country	2012				2011	2010	2009	2008
	Report Type[1]	Cases	Confirmed cases	Confirmed cases/ 100,000	Confirmed cases			
Austria[2]	–	–	–	–	–	–	–	–
Belgium[3]	C	18	18	–	6	30	33	27
Bulgaria	A	29	29	0.40	12	14	22	17
Croatia	–	–	–	–	–	–	–	–
Cyprus	C	4	4	0.46	5	4	2	31
Czech Republic	C	1	1	0.01	1	0	0	0
Denmark[2]	–	–	–	–	–	–	–	–
Estonia	U	0	0	0	0	0	0	0
Finland	C	0	0	0	4	5	1	2
France	C	168	168	0.26	228	286		
Germany	C	200	198	0.24	287	326	191	370
Greece	C	11	11	0.10	3	1	3	3
Hungary	C	36	36	0.37	36	68	19	11
Ireland	C	6	5	0.11	4	9	17	10
Italy	–	–	–	–	–	–	–	–
Latvia	C	1	1	0.05	1	2	0	1
Lithuania	U	0	0	0	0	0	0	0
Luxembourg	U	0	0	0	0	0	0	0
Malta	U	0	0	0	0	0	0	0
Netherlands	C	63	63	0.38	80	504	2,354	1039
Poland	A	0	0	0	0	0	3	4
Portugal	C	26	20	0.19	5	13	14	12
Romania	C	16	16	0.07	6	7	2	3
Slovakia	U	0	0	0	0	0	0	0
Slovenia	C	1	1	0.05	0	1	0	0
Spain[4]	C	58	58	0.50	33	69	34	119
Sweden	C	2	2	0.02	5	11	5	7
United Kingdom	C	12	12	0.02	43	30	19	56
EU Total		**652**	**643**	**0.17**	**759**	**1,380**	**2,719**	**1,712**
Iceland	U	0	0	0	0	0	0	0
Liechtenstein	–	–	–	–	–	–	–	0
Norway	U	0	0	0	0	0	0	0

1. A: aggregated data report; C: case-based report; U: unknown; –: no report.
2. Not notifiable, no surveillance system exists.
3. Sentinel surveillance; coverage unknown and notification rate cannot be estimated.
4. Surveillance system covers only 25 % of the total population.

The large majority of cases in the EU were locally acquired (Figure QF1). Only Belgium, Germany, the Netherlands and Sweden reported travel-associated cases, but these all represented less than 10 % of the total cases, except in Sweden (both cases imported). Of the 21 travel-associated cases reported in total, 9 were acquired within another EU country.

Figure QF1. Notification rates and origin of infection in human Q fever in the EU, 2012

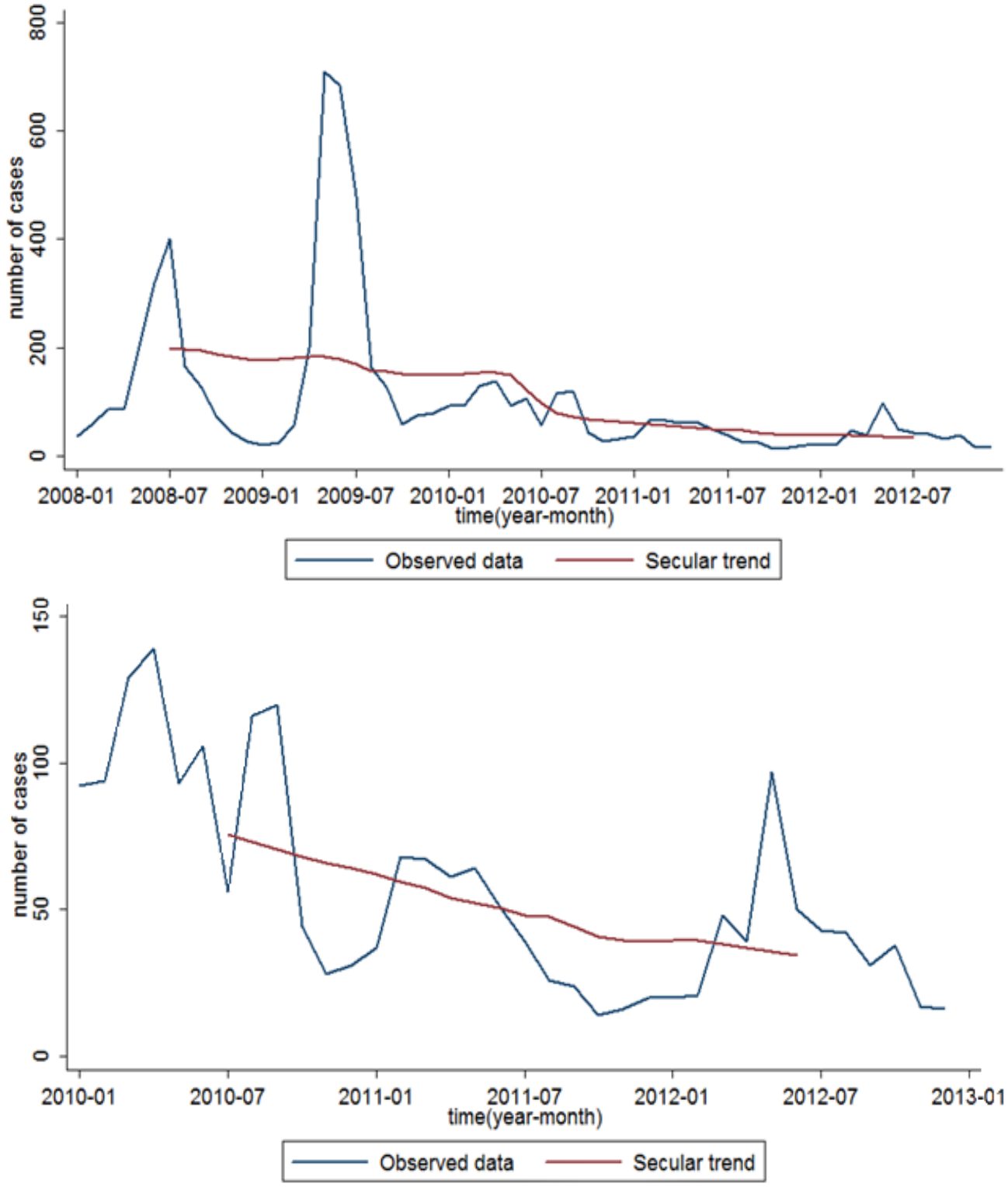


Note: The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

There was a decreasing EU trend of confirmed Q fever cases in 2008–2012 (Figure QF2, top). The peaks in 2008 and 2009 were attributed to a large outbreak occurring in the Netherlands between 2007 and 2010 but which is now considered over. The specific epidemiology of Q fever during the outbreak was most likely related to intensive dairy goat farming, resulting in Q fever-related abortion waves as early as in 2005, in the proximity of densely populated areas in the south of the Netherlands. From 2007 to 2010, more than 4,000 human cases were notified[57]. Trend analysis was also performed on the period 2010–2012, to remove the effect of the outbreak, and the decreasing trend was even more obvious (Figure QF2, bottom). There is a seasonal variation in Q fever cases, and the peak occurs mostly between April and August. Decreasing trends in 2008–2012 by country were observed in two MSs: the Netherlands and Spain. An increasing trend was observed in Hungary but the trend line was influenced by the higher case number reported in 2010. Many countries had too few cases to enable trend analysis. One death due to Q fever was reported in Germany in 2012. This resulted in an EU case-fatality rate of 0.28 % among the 361 confirmed cases for which this information was reported (56.1 % of all confirmed cases).

[57] Van der Hoek W, Morroy G, Renders NH, Wever PC, Hermans MH, Leenders AC and Schneeberger PM, 2012. Epidemic Q fever in humans in the Netherlands. Advances in Experimental Medicine and Biology, 984, 329–364.

Figure QF2. Trend in reported confirmed cases of human Q fever in the EU, 2008-2012 (top) and 2010-2012 (bottom)



Source: TESSy data from 20 MSs (Belgium, Cyprus, Czech Republic, Finland, Germany, Greece, Hungary, Ireland, Netherlands, Poland, Portugal, Romania, Slovenia, Spain and Sweden. Estonia, Lithuania, Luxembourg, Malta and Slovakia reported zero cases throughout the period). Austria, Bulgaria, Denmark, France, Italy, Latvia and United Kingdom were excluded since they either did not report over the whole period or reported cases that were not confirmed or had an unknown month of occurrence.

3.10.2. Q fever in animals

In total, 22 MSs and 2 non-MSs provided data on Q fever (*C. burnetii*) in animals from the years 2011-2012 (Table QF1). Only data coming from at least 25 samples are summarised in the following tables, whereas all the reported data are presented in the Level 3 Tables.

Most of the reporting countries provided information on the type of specimen taken and the analytical method used in testing. This facilitated a better interpretation of the data. Some countries tested tissues, such as aborted fetuses, stillborn animals, placental or vaginal swabs, for direct detection of *C. burnetii*, while other countries serologically tested blood (serum) or milk samples for the presence of *C. burnetii* antibodies. Most of the results came from clinical investigations and suspect sampling but some results originated from serological monitoring and specific surveys. Because of this use of different tests and analytical methods as well as different sampling schemes, the results from different countries are not directly comparable.

In total, 15 MSs and 1 non-MS reported investigations of Q fever in cattle with more than 25 samples for the years 2011–2012 (Table QF3). Many of these investigations tested high numbers of animals, and most of the results came from clinical investigations or sampling of suspect animals which had aborted, or from farms with abortions. However, some results were from monitoring activities. All reporting countries reported positive findings. Finland detected one positive animal from monitoring covering fewer than 25 samples. Four MSs reported very high proportions of positive samples (up to 86.3 %) from the serological testing of blood (serum) at animal level or milk at herd level. None of the countries reported clinically affected[58] cattle herds.

Fifteen MSs and two non-MSs provided information on tests of sheep and goats (Table QF4) for 2011–2012 (with more than 25 samples). The majority of the results were from clinical investigations. Q fever was frequently detected in both sheep and goats, but not by all reporting countries. Finland and Slovakia did not report any positive findings from goats, while eight countries did not find positive sheep or sheep herds. Poland reported testing of substantial numbers of sheep and goats for both years and only found one positive goat in 2011 out of the 1,102 tested animals.

Cyprus, Spain and Hungary reported a few clinically affected herds of cattle, goats or sheep.

In addition, four MSs and one non-MS provided data (over 25 samples) from other animal species (Table QF5), reporting positive samples only from pigs and wild boar. Among the investigations covering fewer than 25 samples, Q fever was detected in alpacas.

[58] A herd is defined as clinically affected based on a combination of results from PCR and serological tests as described respectively for cattle and sheep/goats in the reporting manual: European Food Safety Authority, 2013. Manual for Reporting on Zoonoses, Zoonotic Agents and Antimicrobial Resistance in the framework of Directive 2003/99/EC and on some other pathogenic microbiological agents for information derived from the year 2012. Supporting publication 2013: EN-408, 116 pp.

Table QF3. Findings of Q fever in cattle, 2011-2012

Country	Description	Sample unit	Analytical method	2012				2011			
				N	N pos	% pos	Herds	N	N pos	% pos	Herds
Austria	At farm, clinical investigations, suspect sampling	Animal, blood	Complement fixation	508	13	2.6	-	441	11	2.5	-
Belgium	At farm, clinical investigations, suspect sampling[1]	Animal, blood[1]	ELISA	422	108	25.6	-	1,052	756	71.9	-
	At farm, clinical investigations, suspect sampling	Animal, foetus/stillbirth	Real-Time PCR	9,699	147	1.5	-	7,120	108	1.5	-
Bulgaria	at farm, monitoring, objective sampling	Animal, blood	Complement fixation	-	-	-	-	1,256	97	7.7	-
Czech Republic	At farm, surveillance, suspect sampling, aborted animal	Animal, blood	ELISA	4,456	1,306	29.3	0	4,882	406	8.3	-
Denmark	Dairy cows - adult, at farm, surveillance, suspect sampling	Animal, blood	ELISA	139	33	23.7	-	178	13	7.3	-
	Dairy cows - adult, at farm, clinical investigations, suspect sampling	Animal, milk	ELISA	111	11	9.9	-	-	-	-	-
	Dairy cows - adult, at farm, surveillance, suspect sampling	Herd, milk	ELISA	74	48	64.9	-	47	36	76.6	-
Finland	At farm, clinical investigations, suspect sampling	Animal, blood	ELISA	292	0	0	0	59	0	0	-
Germany	Dairy cows - at farm, domestic production	Animal	Microbiological standard tests	-	-	-	-	553	44	8.0	-
	At farm, domestic production	Herd[2]	ELISA	878	123	14.0	123	10,251	1,699	16.6	-
	At farm, domestic production	Herd[2]	Microbiological standard tests	302	20	6.6	20	459	12	2.6	-
	At farm, domestic production	Herd[2]	PCR	579	32	5.5	32	1,497	90	6.0	-

Table continued overleaf.

Table QF3 (continued). Findings of Q fever in cattle, 2011-2012

Country	Description	Sample unit	Analytical method	2012				2011			
				N	N pos	% pos	Herds	N	N pos	% pos	Herds
Ireland	At farm, domestic production, clinical investigations, suspect sampling	Animal, blood	ELISA	402	20	5.0	0	272	28	10.3	0
Italy	Dairy cows - at farm, domestic production, clinical investigations	Animal	ELISA	30	0	0	0	-	-	-	-
	At farm, domestic production, clinical investigations	Animal	Several methods	612	4	0.7	0	2,060	2	<0.1	0
	At farm, domestic production, survey	Animal	ELISA and other methods	2,779	44	1.6	0	617	40	6.5	0
	At farm, domestic production, monitoring	Animal	Several methods	29	0	0	0	-	-	-	-
	At farm, domestic production, monitoring	Herd	Several methods	121	27	22.3	0	-	-	-	-
		Herd	Several methods	29	6	20.7	0	-	-	-	-
Latvia	At farm, clinical investigations, suspect sampling	Animal, blood	ELISA	336	49	14.6	-	-	-	-	-
Poland	At farm, clinical investigations	Animal, blood	Complement fixation	53	4	7.5	-	-	-	-	-
	at farm, monitoring, objective sampling	Animal, blood	Complement fixation	712	0	0	0	814	4	0.5	0
Slovakia	At farm, clinical investigations, suspect sampling	Animal, blood	Complement fixation	57	0	0	-	-	-	-	-
	At farm, monitoring, suspect sampling	Animal, blood	Complement fixation[3]	3,274	78	2.4	0	3,797	95	2.5	0

Table continued overleaf.

Table QF3 (continued). Findings of Q fever in cattle, 2011-2012

Country	Description	Sample unit	Analytical method	2012				2011			
				N	N pos	% pos	Herds	N	N pos	% pos	Herds
Slovenia	At farm, monitoring, objective sampling	Holding, milk	Real-Time PCR	124	34	27.4	-	-	-	-	-
	At farm, clinical investigations, suspect sampling	Animal, blood	ELISA	-	-	-	-	107	0	0	-
Sweden	Adult, dairy cows, at farm, survey, selective sampling	Herd, milk	ELISA, indirect ELISA (I-ELISA)	-	-	-	-	119	86	72.3	-
	Adult, dairy cows, at farm, survey, selective sampling	Herd, milk	Real-Time PCR	-	-	-	-	117	89	76.1	-
United Kingdom	At farm, survey, convenience sampling	Animal, placental swab	Real-Time PCR	-	-	-	-	124	9	7.3	-
	At farm, monitoring, objective sampling	Herd, milk	Real-Time PCR	-	-	-	-	95	82	86.3	-
Norway	At farm, surveillance, suspect sampling	Animal, blood	ELISA	55	0	0.0	0				
Switzerland	Clinical investigations	Animal		3,782	49	1.3	-	2,579	58	2.2	-

Note: Herds: clinically affected herds.
Data presented only for sample sizes ≥25.

1. 2011, monitoring, objective sampling, herd blood.
2. 2011, the sampling unit is animal.
3. 2011, the analytical method not defined.

Table QF4. Findings of Q fever in sheep and goats, 2011-2012

Country	Description	Sample unit	Analytical method	2012				2011			
				N	N pos	% pos	Herds	N	N pos	% pos	Herds
Goat											
Austria	At farm, clinical investigations, suspect sampling	Animal, blood	Complement fixation	46	3	6.5	-	43	2	4.7	-
Belgium	At farm, clinical investigations, suspect sampling	Animal, blood	ELISA	1,676	796	47.5	-	-	-	-	0
	At farm, domestic production, survey[1]	Animal, foetus/stillbirth	Real-Time PCR	1,069	110	10.3	-	39	2	5.1	0
	At farm, monitoring, selective sampling, milk-producing herds	Herd, milk	Real-Time PCR	108	12	11.1	0	0	0	0	0
Cyprus	At farm, clinical investigations, convenience sampling	Animal	PCR	37	2	5.4	-	71	29	40.8	1
Finland	Mixed herds, at farm, survey, objective sampling	Animal, blood	ELISA	-	-	-	-	676	0	0	0
Germany	At farm, domestic production	Animal	ELISA	-	-	-	-	1,462	108	7.4	-
	At farm, domestic production	Herd[4]	PCR	41	2	0	2.0	57	0	0	-
	At farm, domestic production	Herd	Microbiological standard tests	33	4	12.1	4.0	-	-	-	-
Italy	At farm, domestic production, clinical investigations	Herd	Immunofluorescence antibody	31	14	45.2	0	0	0	0	0
	At farm, domestic production , survey	Animal		-	-	-	-	49	6	12.2	0
	At farm, domestic production	Animal		-	-	-	-	2,372	428	18.0	0
Netherlands	At farm, clinical investigations	Animal, organ/tissue	Immuno Histo Chemistry	221	0	0	-	0	0	0	0
	At farm, monitoring	Herd, milk	Immuno Histo Chemistry	346	26	7.5	-	0	0	0	0
Poland	At farm, clinical investigations	Animal, vaginal swab	PCR	-	-	-	-	214	0	0	0
	At farm, monitoring, objective sampling	Animal, blood	Complement fixation	1,311	0	0	-	1,102	1	<0.1	0
Slovakia	At farm, monitoring, suspect sampling	Animal, blood	Complement fixation	116	0	0	-	0	0	0	0
Spain	At farm, monitoring, convenience sampling	Animal, blood	ELISA	284	133	46.8	-	0	0	0	0
United Kingdom	At farm, monitoring, objective sampling	Animal, blood	ELISA	-	-	-	-	226	105	46.5	1
Switzerland	Clinical investigations	Animal		180	18	10.0	-	116	7	6.0	0

Table continued overleaf.

Table QF4 (continued). Findings of Q fever in sheep and goats, 2011-2012

Country	Description	Sample unit	Analytical method	2012				2011			
				N	N pos	% pos	Herds	N	N pos	% pos	Herds
Sheep											
Austria	At farm, clinical investigations, suspect sampling	Animal, blood	Complement fixation	1,120	6	0.5	-	83	7	8.4	-
Belgium	At farm, clinical investigations, suspect sampling	Animal, blood	ELISA	77	5	6.5	-	-	-	-	-
	At farm, clinical investigations, suspect sampling	Animal, foetus/stillbirth	Real-Time PCR	503	1	0.2	-	143	1	0.7	-
Bulgaria	At farm, monitoring, objective sampling	Animal, blood	Complement fixation	-	-	-	-	640	71	11.1	-
Cyprus	At farm, clinical investigations, convenience sampling	Animal	PCR	71	25	35.2	3	71	25	35.2	3
Finland	Mixed herds, at farm, survey, objective sampling	Animal, blood	ELISA	-	-	-	-	5,197	0	0	-
Germany	At farm, domestic production	Herd[4]	ELISA	66	10	15.2	10	5,560	234	4.2	-
	At farm, domestic production	Herd[4]	Microbiological test	155	13	8.4	13	108	2	1.9	-
	At farm, domestic production	Herd[4]	PCR	182	9	4.9	9	5,523	323	5.8	-
Ireland	At farm, domestic production, clinical investigations, suspect sampling	Animal, placental swab	ELISA	-	-	-	-	29	0	0	-
Italy	At farm, domestic production, clinical investigations	Herd	Immunofluorescence antibody[1]	88	40	45.5	0	54	22	40.7	-
	At farm, domestic production, clinical investigations	Animal		-	-	-	-	45	0	0	-
	At farm, domestic production, survey	Animal		-	-	-	-	341	15	4.4	-
Netherlands	At farm, clinical investigations	Animal, organ/tissue[2]	Immuno Histo Chemistry[2]	467	0	0	0	564	0	0	-
	At farm, monitoring	Herd, milk	Immuno Histo Chemistry	32	1	3.1	-	0	0	0	-
Poland	At farm, clinical investigations	Animal, blood	Complement fixation	3,249	0	0	0	3,450	0	0	-

Table continued overleaf.

Table QF4 (continued). Findings of Q fever in sheep and goats, 2011-2012

Country	Description	Sample unit	Analytical method	2012				2011			
				N	N pos	% pos	Herds	N	N pos	% pos	Herds
Romania	At farm, clinical investigations, objective sampling	Animal, blood	I-ELISA	-	-	-	-	31	0	0	-
Slovakia	At farm, monitoring, suspect sampling	Animal, blood	Complement fixation	46	0	0	-	-	-	-	-
Spain	At farm, monitoring, convenience sampling	Animal, blood	ELISA	185	0	0	-	-	-	-	-
Sweden	Over 1 year age, at farm, domestic production, survey, objective sampling	Herd, vaginal swabs	Real-Time PCR	-	-	-	-	80	0	0	-
Norway	At farm, domestic production, clinical investigation, suspect sampling[3]	Animal, blood	ELISA	25	0	0	-	39	0	0	-
Switzerland	Clinical investigations	Animal		247	6	2.4	0	150	0	0	-
Sheep and goats											
Italy	At farm, domestic production, clinical investigations	Animal	Complement fixation[1]	315	0	0	0	66	0	0	-
	At farm, domestic production, clinical investigations	Animal	ELISA	953	160	16.8	0	-	-	-	-
	At farm, domestic production, monitoring	Animal	Several methods	1,617	0	0	0	-	-	-	-
	At farm, domestic production, survey	Animal	ELISA[1]	1,525	253	16.6	0	150	14	9.3	-
	At farm, domestic production, survey	Animal	PCR - Real-time PCR	28	0	0	0	-	-	-	-
	At farm, domestic production, survey	Animal	Several methods	110	5	4.5	0	-	-	-	-

Note: herds: clinically affected herds.
Data presented only for sample sizes ≥25.

1. 2011, analytical method not defined.
2. 2011, placental swabs, PCR method.
3. 2011, import control, selective sampling.
4. 2011, the sampling unit is animal.

Table QF5. Findings of Q fever in other animal species, 2011-2012

Country	Description	Sample unit	Analytical method	2012				2011			
				N	N pos	% pos	herds	N	N pos	% pos	herds
Germany	Pigs, at farm, domestic production	Herd[1]	PCR	50	0	0	50	60	1	1.67	-
	Pigs, at farm, domestic production	Animal	Microbiological test	-	-	-	-	43	0	0	-
	Horses, at farm, domestic production	Animal	PCR	-	-	-	-	36	0	0	-
Italy	Wild boar, domestic production, survey	Animal	Immunofluorescence antibody	192	14	7.29	0	-	-	-	-
	Water buffaloes, at farm, domestic production, survey	Animal	ELISA[2]	33	0	0	0	151	0	0	0
	Water buffaloes, at farm, domestic production, survey	Animal	Nested PCR	127	0	0	0	-	-	-	-
Slovakia	Hares, from hunting, monitoring, suspect sampling	Animal, blood	Complement fixation	95	0	0	-	-	-	-	-
Sweden	Moose, from hunting, surveillance, objective sampling	Animal, blood	Complement fixation	-	-	-	-	99	0	0	-
Norway	Alpacas, farmed, border control, monitoring, selective sampling	Animal, blood	ELISA	60	0	0	0	115	0	0	0

Note: Herds: clinically affected herds.
Data presented only for sample sizes ≥25.

1. 2011, the sampling unit is animal.
2. 2011, analytical method not specified.

3.10.3. Discussion

In 2012, the number of confirmed human cases of Q fever decreased by 15.3 % compared with 2011. France, together with the Netherlands and Germany, accounted for 65 % of the total number of confirmed cases reported in 2012. A decreasing trend was noted in the Netherlands and Spain, while Hungary showed an increasing tendency. This is, however, probably also influenced by modified diagnostic processes and improved surveillance (Katalin Krisztalovics, Hungarian National Centre for Epidemiology, personal communication, 14/11/2013). Interestingly, an outbreak was reported from Hungary (Baranya county, southern Hungary) in June 2013, with 91 cases affected mainly by pneumonia (http://www.promedmail.org/direct.php?id=20130607.176053).

The number of MSs providing data on Q fever in cattle, sheep and goats has continued to be high, reflecting increased interest in Q fever following recent outbreaks in humans in the EU. All but one of the 22 reporting MSs found animals positive for *C. burnetii,* which demonstrates that the pathogen is widely distributed in the EU. Positive findings were often detected in cattle, sheep as well as in goats. However, since the results were not derived from harmonised sampling schemes, the situations in different MSs cannot be directly compared. Very few clinically affected herds were reported. In general, the quality of the data provided by the MSs has improved as most countries gave detailed information on the sampling schemes and the specimens investigated and analytical methods used.

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.11. West Nile virus

West Nile virus (WNV) is a mosquito-borne zoonotic arbovirus belonging to the genus *Flavivirus* in the family *Flaviviridae*. This flavivirus is found in temperate and tropical regions of the world. The virus was first isolated in 1937 from East Africa and has since spread to other parts of Africa, Eastern and Southern Europe, Asia, the Middle East, and North America. West Nile fever was first recognised in Europe in the 1960s[59] and re-appeared in 1996[60]. Viruses of lineage 1 were the first identified in Europe, but viruses of lineage 2 have also been reported in Europe since 2004 in birds and more recently in humans[61].

The main mode of WNV transmission is via various species of mosquitoes (mainly *Culex* spp.), which are the prime vectors, with birds being the most commonly infected animals and serving as the reservoir hosts. WNV also infects various mammal species (including humans and equines), which are considered dead-end hosts. Infection with the virus can trigger a range of symptoms in humans, from none at all to mild, flu-like symptoms to encephalitis, a potentially fatal inflammation of the brain.

In Europe, clinical signs of WNV are mostly seen in horses. Approximately 10 % of horses infected with WNV present neurological disorders. In Europe, birds mortality related to WNV infection is rare (unlike in North America). European birds usually do not show any symptoms when infected, which is taken to indicate that the virus has been circulating amongst both migrant and resident birds for many years, producing herd immunity or selecting the more resistant individuals. WNV infection in symptomatic birds was confirmed, in Hungary, in domestic goose showing ataxia and other neurological signs, and in goshawks and sparrow hawks in a rehabilitation centre[62].

Table WNV1 presents the countries reporting data for 2012.

Table WNV1. Overview of countries reporting data for West Nile virus, 2012

Data	Total number of reporting MSs	Countries
Human	24	**All MSs** except DE, DK, PT **Non-MSs:** CH, NO
Animal	12	**MSs:** BE, CZ, DE, FR, GR, HU, IT, PL, RO, SK, ES, UK **Non-MS:** CH

Note: The overview table contains all data reported by MSs and non-MSs.

3.11.1. West Nile fever in humans

In 2012, 24 MSs provided information on West Nile fever in humans. Belgium and France have a sentinel surveillance system, which covers only part of the population, so no rates could be calculated for these countries. Eight MSs (Belgium, Bulgaria, France, Greece, Hungary, Italy, Romania and Sweden) reported human cases. A total of 232 cases of West Nile fever in humans were reported in the EU, 119 being confirmed, acquired either locally or during travel in or outside Europe (Table WNV2).

The EU notification rate was 0.07 per 100,000 population. There was an overall 75.8 % increase in the number of reported cases compared with 2011 (132 cases), but a 33.5 % decrease compared with 2010 (349 cases). These variations are influenced by the incidence in Greece, where 70 % of all cases are

[59] Calistri P, Giovannini A, Hubalek Z, Ionescu A, Monaco F, Savini G and Lelli R, 2010. Epidemiology of West Nile in Europe and in the Mediterranean basin. Virology Journal, 4, 29–37.

[60] Tsai TF, Popovici F, Cernescu C, Campbell GL and Nedelcu NI, 1998. West Nile encephalitis epidemic in southeastern Romania. Lancet, 352(9130), 767–771.

[61] Barzon L, Papa A, Pacenti M, Franchin E, Lavezzo E, Squarzon L, Masi G, Martello T, Testa T, Cusinato R and Palù G, 2013. Genome Sequencing of West Nile Virus from Human Cases in Greece. Viruses, 5, 2311–2319.

[62] Mannelli A, Martello E, Tomassone L, Calzolari M, Casalone C, De Meneghi D, Dottori M, Estrada-Peña A, Fabbi M, Ferreri L, Ferroglio E, Luini M, Nicolau Solano S, Ortega C, Pautasso A, Prati P and Vesco U, 2012. Inventory of available data and data sources and proposal for data collection on vector-borne zoonoses in animals. EFSA supporting publication 2012:EN-234,189 pp.

reported. In 2012, Greece had the highest notification rate (1.44 cases per 100,000 population). Greece also reported the highest number of cases in both 2011 and 2012. In 2011 and 2012, transmission was no longer limited to a specific region (Central Macedonia) but occurred in a large part of the continental territory including the capital, Athens. In 2012, the infection also spread to some islands (Samos, Lefkada and Kerkyra).

In 2012 the largest increase in reported cases (325 %) was observed in Hungary, but case numbers were still relatively small. Small outbreaks were reported across the country.

Cases doubled in Italy. The island of Sardinia was affected for the first time in 2011. Transmission continued in 2012 and the province of Matera, in the south of the mainland, was affected.

In Romania case numbers were stable compared with 2011 and much lower than in 2010. Outbreaks were reported from counties located in the south-eastern part of the country and in the capital, Bucharest, in both 2011 and 2012.

The vast majority of cases reported in Greece, Italy, Hungary and Romania were domestically acquired (Figure WNV1). Belgium, France, Sweden and Switzerland reported travel-associated cases, representing all their cases. Greece reported both locally acquired cases and travel-associated cases. Of the eight travel-associated cases reported in Europe in total, only three were acquired within Europe and three cases contracted the infection from the North American continent.

West Nile fever has been reportable at the EU level since 2008. Since then, the number of cases has varied from year to year but there was no overall increasing trend (Figure WN2). As stated above, the epidemiological curve is largely dominated by the situation in Greece, where the highest peak was observed in 2010, followed by fewer cases in 2011 and then an increase again in 2012. In Hungary, variations in case numbers seem to show a two-year cycle, with peaks observed in 2008, 2010 and 2012 (Table WNV2). In Italy, an increasing incidence has been observed since 2008, with a larger number of cases reported in 2009. Special surveillance for West Nile fever was implemented in 2010 in the Veneto Region. The systematic nucleic acid screening of tissue and organ donations also implemented there in 2012 and carried out between 15 July and 30 November, in accordance with the National Blood Directive and the National Transplant Coordination, enabled detection of the first 2012 West Nile case (blood donor) in Italy[63]. In Greece enhanced surveillance was implemented for WNV infection in human and animals. During the West Nile fever transmission periods, measures of blood safety to prevent WNV infection were implemented in the affected areas, including blood donor deferral, blood screening for WNV-RNA and haemovigilance procedures (Theano Georgakopoulou, Hellenic Centre for Disease Control and Prevention, personal communication, 15/01/2014).

Two MSs (Hungary and Romania) provided data on hospitalisation for all of their cases. On average, 84.4 % of the West Nile cases were hospitalised, but hospitalisation status was provided for only 13.8 % of the cases reported in the EU.

Five MSs provided information on the outcome of the disease, but Italy reported information only on fatal cases. The overall EU case-fatality rate was 11.1 % among the 198 cases for which this information was reported (85.3 % of all cases). This figure could be an overestimate.

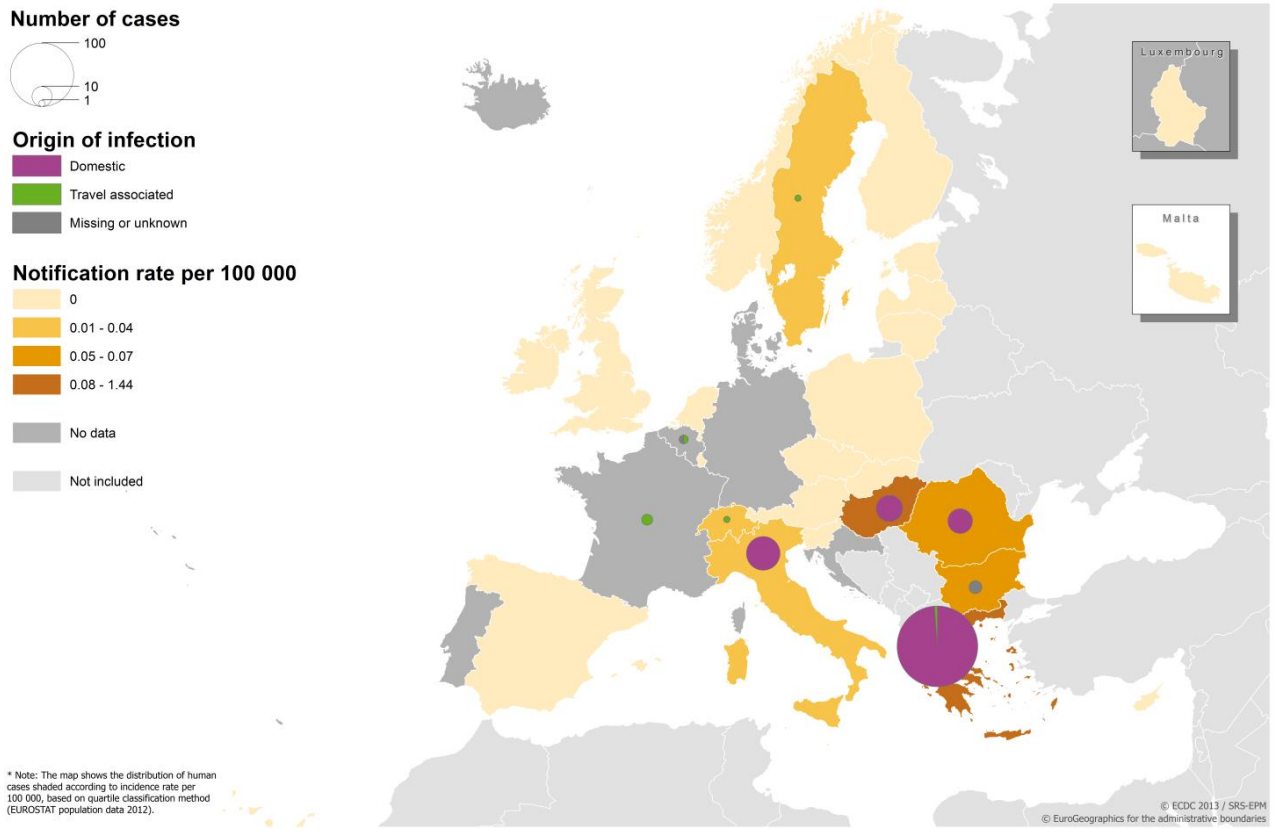
[63] Barzon L, Pacenti M, Franchin E, Martello T, Lavezzo E, Squarzon L, Toppo S, Fiorin F, Marchiori G, Scotton GP, Russo F, Cattai M, Cusinato R and Palu G, 2012. Clinical and virological findings in the ongoing outbreak of West Nile virus Livenza strain in northern Italy, July to September 2012. Eurosurveillance, 17, 20260. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19883

Table WNV2. Reported cases of human West Nile fever in 2008–2012, and notification rates for confirmed cases in 2012

Country	2012				2011	2010	2009	2008
	Report Type[1]	Cases	Confirmed cases	Total cases/ 100,000	Total cases			
Austria	U	0	0	0.00	0	0	0	0
Belgium[3]	C	2	2	–	0	0	0	0
Bulgaria	A	4	4	0.05	–	–	–	0
Croatia	–	–	–	–	–	–	–	–
Cyprus	U	0	0	0	0	0	0	0
Czech Republic	U	0	0	0	0	0	0	0
Denmark[2]	–	–	–	–	–	–	–	–
Estonia	U	0	0	0	0	0	0	0
Finland	U	0	0	0	0	0	0	0
France[3]	C	3	3	-	1	3	1	0
Germany[2]	–	–	–	–	–	–	–	–
Greece	C	162	50	1.44	100	262	0	0
Hungary	C	17	17	0.17	4	19	7	19
Ireland	C	0	0	0	1	0	0	0
Italy	C	28	28	0.05	14	5	18	3
Latvia	U	0	0	0	0	0	0	0
Lithuania	U	0	0	0	0	0	0	0
Luxembourg	U	0	0	0	0	0	0	0
Malta	U	0	0	0	0	0	0	0
Netherlands	U	0	0	0	1	1	0	0
Poland	A	0	0	0	1	0	0	0
Portugal[2]	–	–	–	–	–	–	–	–
Romania	C	15	14	0.07	11	57	2	2
Slovakia	U	0	0	0	0	0	0	0
Slovenia	U	0	0	0	0	0	0	0
Spain	C	0	0	0	0	2	0	0
Sweden	C	1	1	0.01	0	0	0	0
United Kingdom	U	0	0	0	0	0	0	0
EU Total		**232**	**119**	**0.07**	**132**	**349**	**28**	**24**
Iceland	–	–	–	–	–	–	–	–
Liechtenstein	–	–	–	–	–	–	–	–
Norway	U	0	0	0	0	0	0	0
Switzerland[4]	C	1	1	0.01		1		

1. A: aggregated data report; C: case-based report; –: no report; U: unspecified.
2. Not notifiable, no surveillance system exists.
3. Sentinel surveillance; coverage unknown and notification rate cannot be estimated.
4. Switzerland provided data directly to EFSA.

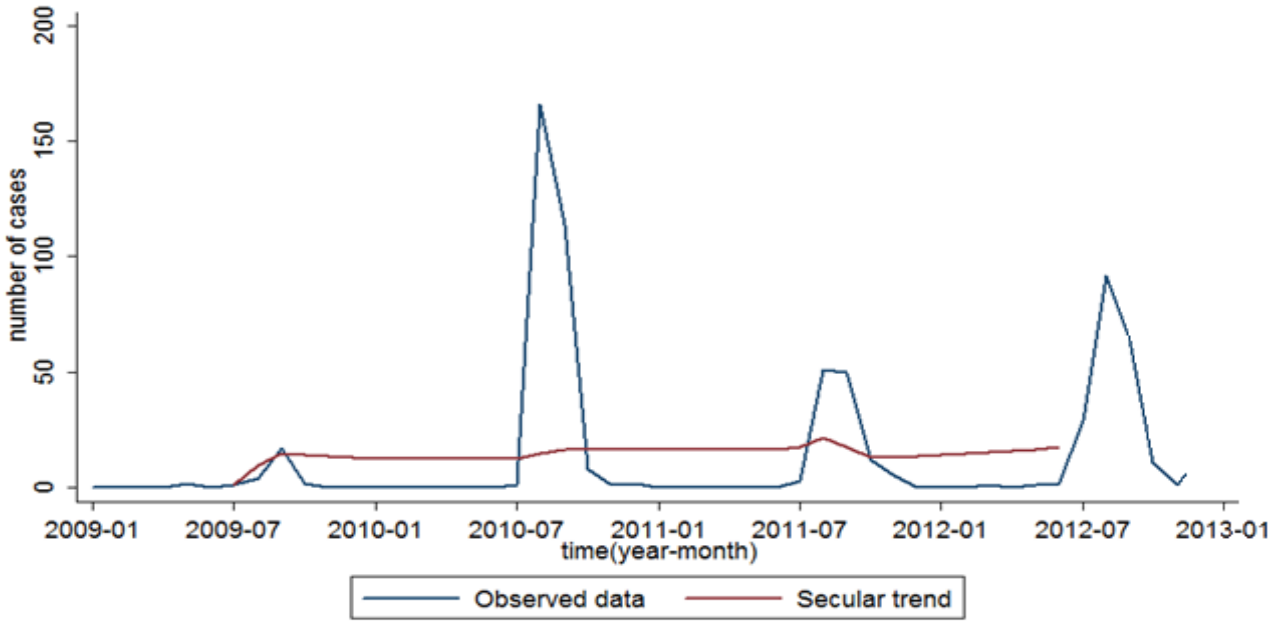
Figure WNV1. Notification rates and origin of infection in human West Nile fever in the EU/EEA, 2012



Note Belgium, the Czech Republic, Sweden and France have only imported cases; Belgium and France appear in dark grey as surveillance of WN is based on a sentinel system.

The map shows the distribution of human cases shaded according to incidence rate per 100,000 based on quartile classification method (EUROSTAT population data 2012).

Figure WNV2. Trend in reported cases of human West Nile fever in the EU, 2009–2012



Source: TESSy data from 22 MSs (Belgium, France, Greece, Hungary, Italy, the Netherlands and Sweden. Austria, Cyprus, Czech Republic, Estonia, Finland, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Slovakia, Slovenia, Spain and United Kingdom reported zero cases throughout the period). Bulgaria, Denmark, Germany, Portugal and Romania were excluded since they either did not report over the whole period, or cases had an unknown month of occurrence.

3.11.2. West Nile virus in animals

2012 was the first year when MSs were specifically invited to report data on WNV in animals. Twelve MSs and one non-MSs submitted data, which is a substantial achievement, particularly as not all MSs yet have a monitoring system in place. Reporting of WNV in animals is not mandatory, but is to be carried out based on the epidemiological situation. Most of the reported data were from domestic solipeds and birds, but some other animal species were also included.

Of the 11 MSs reporting data on horses and donkeys, all except Germany and Poland found animals that tested positive for WNV (Table WNV3). In the United Kingdom, both positive horses were imported. France and Italy reported a proportion of test-positive horses of above 10 %. Spain found four test-positive horses in the region of Andalusia. Switzerland tested two horses which were found to be negative. Some of the reported data derived from clinical investigations whereas some data were collected from active or passive monitoring.

Most of the test-positive findings in solipeds were made in the Southern European countries, particularly in Italy (Figure WNV3). However, Belgium, the Czech Republic and Slovakia also reported test-positive animals.

Four MSs and one non-MS provided data on WNV in domestic and wild birds (Table WNV3 and Figure WNV4). Belgium did not find any positive samples in the substantial numbers of wild birds and poultry tested, as did Germany. Italy reported positive findings from *Gallus gallus* and other farmed birds, but not from ducks. Spain found one positive wild bird in the region of Catalonia.

In addition, Belgium tested cattle without any positive test results. Hungary reported one positive finding of the virus in wild animals and Slovakia three positive samples from farmed deer.

Since 2010, Greece has had a surveillance programme in place for West Nile fever involving regular testing of sentinel horses, dispersed throughout the country, testing of all clinically suspect equidae, and examination of samples from wild birds.

In 2012, the programme involved the examination of 750 sentinel (non-vaccinated) horses placed in 36 different regional units throughout Greece, each animal being subject to three samplings within the period 15 May to 30 September. During July–September a total of 14 outbreaks were reported in solipeds (except for one single case in a donkey, all other affected animals were horses). Clinical signs were reported in only three of these outbreaks (all in horses). In 2012 testing of serum/blood samples was carried out using ELISA for initial screening and then positives were tested with IgM (capture) ELISA to detect recent (IgM) antibodies and eventually confirm a recent infection (outbreak). The majority of the IgM-positive samples were also tested for virus detection using Real-time RT PCR, with negative results.

The first animal outbreak of West Nile disease (WND) in Italy took place in the late summer of 1998, when some clinical cases of WND occurred in horses stabled in the area surrounding the Fucecchio Marshes in Tuscany.

In August 2008, WND re-appeared in Italy in the Po river delta. Further outbreaks occurred in 2009, 2010, 2011 and 2012, involving new areas in central and southern Italy. The infection caused clinical symptoms, not only in equines, but also in humans and in some birds. In the Veneto Region (northern Italy) WNV has been recently detected every year in either humans or animals. Clinical cases were generally observed from July to October. In 1998–2012, the case-fatality rate in horses was 23.9 % (95 % CI 17.6–31.6 %). Clinical signs were also reported in 2011 for the first time in birds. Moreover, 46 mosquito pools tested RT-PCR positive, and a few positive serological samples were detected in poultry. Both lineage 1 and 2 viruses were detected in birds and mosquito pools.

The recurrence of WND, involving humans and equines, is likely to be linked to the endemisation of the infection in some territories, as well as the new introduction of the virus by migratory birds. The co-circulation of WNV strains belonging to lineage 1 and lineage 2 enhances the possible occurrence of homologous or heterologous recombination which may affect the diagnosis, virulence and transmission of these strains. The most common vectors are mosquitoes of the *Culex* genus, feeding mostly on birds and mammals.

The Italian West Nile Disease Summary Report 2012 is available at http://sorveglianza.izs.it/emergenze/west_nile/pdf/Bollettino_riassuntivo_2012ENG_DEF.pdf. In this report the number of cases in equines and the number of outbreaks reported are presented.

Table WNV3. *Findings of West Nile virus infection in animals, 2012*

Country	Description	Sample unit	Analytical method	2012		
				N	N pos	% pos
Solipeds						
Belgium	Horses, domestic, objective or suspect sampling	Animal, blood	IgG ELISA and seroneutralisation as confirmation test	746	24	3.2
	Horses, domestic, clinical investigation	Animal, brain	Real Time PCR	5	0	0
Czech Republic	Horses, active monitoring, selective sampling	Animal	ELISA	783	4	0.5
France	Horses, at farm, clinical investigations or passive monitoring	Animal, blood	IgG ELISA	94	15	16.0
Germany	Horses, at farm, domestic production	Animal	Microbiological standard tests	2,145	0	0
Greece	Horses, at farm, active monitoring	Animal, blood	ELISA for initial screening, and IgM-capture ELISA as confirmation test[1]	1,640	16	1.0
Italy	Horses, at farm, domestic production, monitoring, objective sampling	Animal	Several methods	1,659	322	19.4
	Horses, at farm, domestic production, monitoring, suspect sampling	Animal	Several methods	332	167	50.3
	Donkeys, at farm, domestic production, monitoring, objective sampling	Animal	Several methods	95	7	7.4
	Donkeys, at farm, domestic production, monitoring, suspect sampling	Animal	Several methods	4	3	75.0
Poland	Horses, at slaughterhouse, active monitoring, census	Animal, blood	ELISA	287	0	0
Romania	Horses, at farm, active monitoring, objective sampling	Animal, blood	IgM-capture ELISA (MAC-ELISA)	328	1	0.3
Slovakia	Horses, at farm, clinical investigations or monitoring, suspect and objective sampling	Animal, blood		504	24	4.8
Spain	Horses, at farm, clinical investigations or active or passive monitoring, suspect and selective sampling	Animal, blood	IgG ELISA; and MAC-ELISA and RT-PCR as confirmation tests[2]	557	4	0.7
United Kingdom	Horses, at farm, clinical investigations, suspect sampling	Animal, blood	IgG ELISA	11	0	0
	Horses, at farm, imported, expert testing, surveillance, selective sampling	Animal, blood	IgG ELISA	2	2	100
Switzerland	Horses, at farm, clinical investigations	Animal	Real-Time PCR, ELISA	2	0	0

Table continued overleaf.

Table WNV3 (continued). Findings of West Nile virus in animals, 2012

Country	Description	Sample unit	Analytical method	2012		
				N	N pos	% pos
Birds						
Belgium	Wild birds, surveillance or monitoring, objective, selective or suspect sampling	Animal, blood, brains, organs/ tissues	Real Time PCR, IgG ELISA	2,283	0	0
	Poultry, at farm, surveillance objective sampling	Animal, blood	IgG ELISA	1,600	0	0
Germany	Parrots, at farm, domestic production	Animal	Microbiological standard tests	22	0	0
Italy	*Gallus gallus*, at farm, domestic production, monitoring, objective sampling	Flock	Several methods	321	62	19.3
	Ducks, at farm, domestic production, monitoring, objective sampling	Flock	Several methods	13	0	0
	Birds, at farm, domestic production, monitoring, objective sampling	Animal	Several methods	1,200	8	0.7
Spain	Birds, at farm, active or passive monitoring, selective sampling	Animal, blood	IgG ELISA and seroneutralisation or RT-PCR as confirmation test[3]	70	0	0
	Wild birds, active or passive monitoring, selective or convenience sampling	Animal, blood	IgG ELISA and seroneutralisation or RT-PCR as confirmation test[4]	2,059	1	<0.1
Switzerland	Wild birds, passive monitoring	Animal	Real-Time PCR	1	0	0
Other animals						
Belgium	Cattle (bovine animals) - adult cattle over 2 years, at farm, surveillance objective sampling	Animal, blood	IgG ELISA	1,670	0	0
Hungary	Wild animals	Animal	Immuno Histo Chemistry (IHC)	15	1	6.7
Slovakia	Deer, farmed, at farm, monitoring, objective sampling	Animal, blood		12	3	25.0

1. Testing of serum / blood samples is carried out using ELISA for initial screening and then testing of positives with IgM (capture) ELISA to detect recent antibodies and eventually confirm a recent infection (= outbreak). The majority of the IgM-positive samples were also tested for virus detection using Real-time RT PCR, with negative results.
2. Of the 14 IgG ELISA-positive samples, four tested positive with MAC-ELISA.
3. The one IgG ELISA-positive sample tested negative with the seroneutralisation test.
4. Of the 11 IgG ELISA-positive samples, one tested positive with the seroneutralisation test.

Figure WNV3. Findings of West Nile virus in solipeds in the EU, 2012

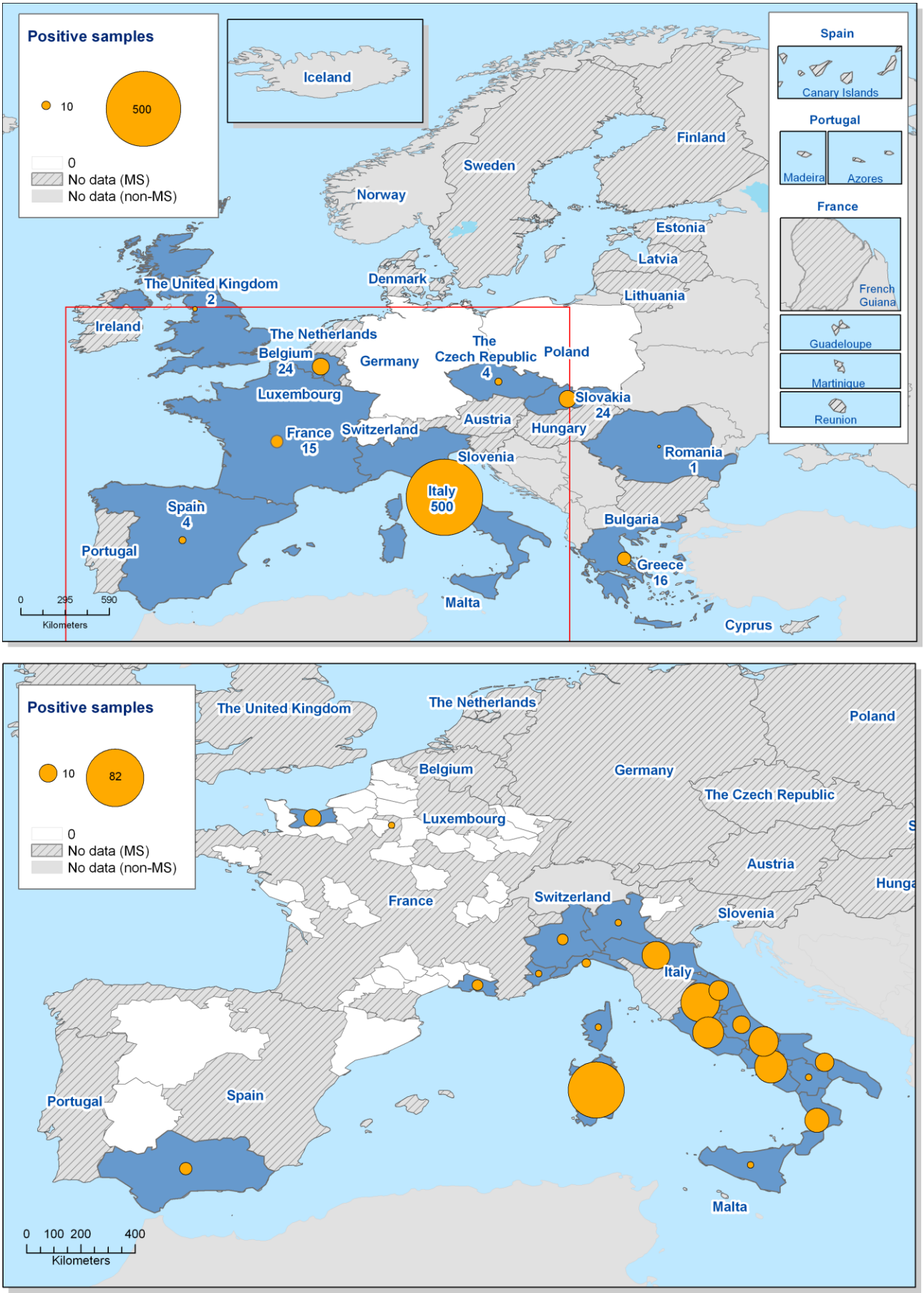
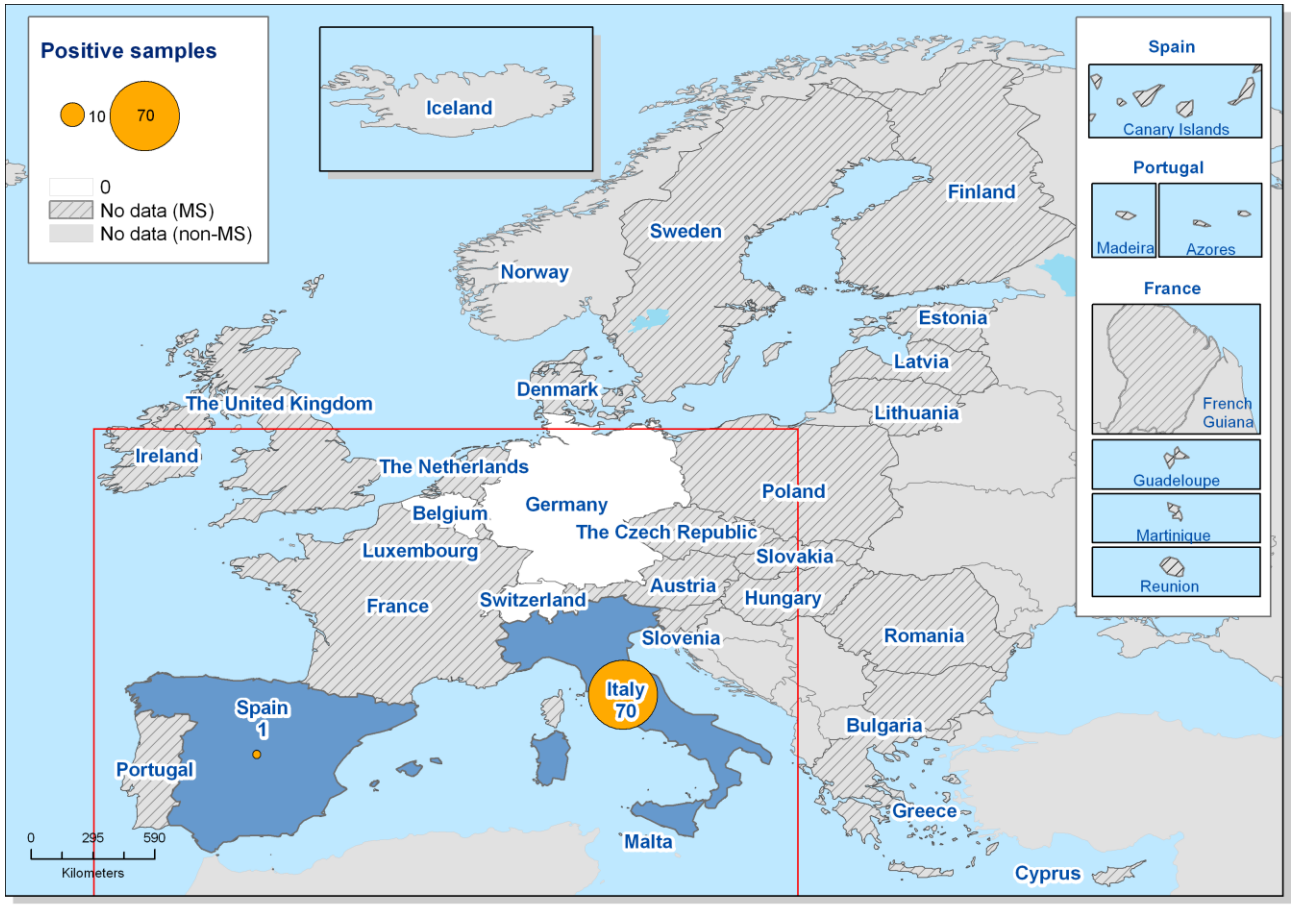
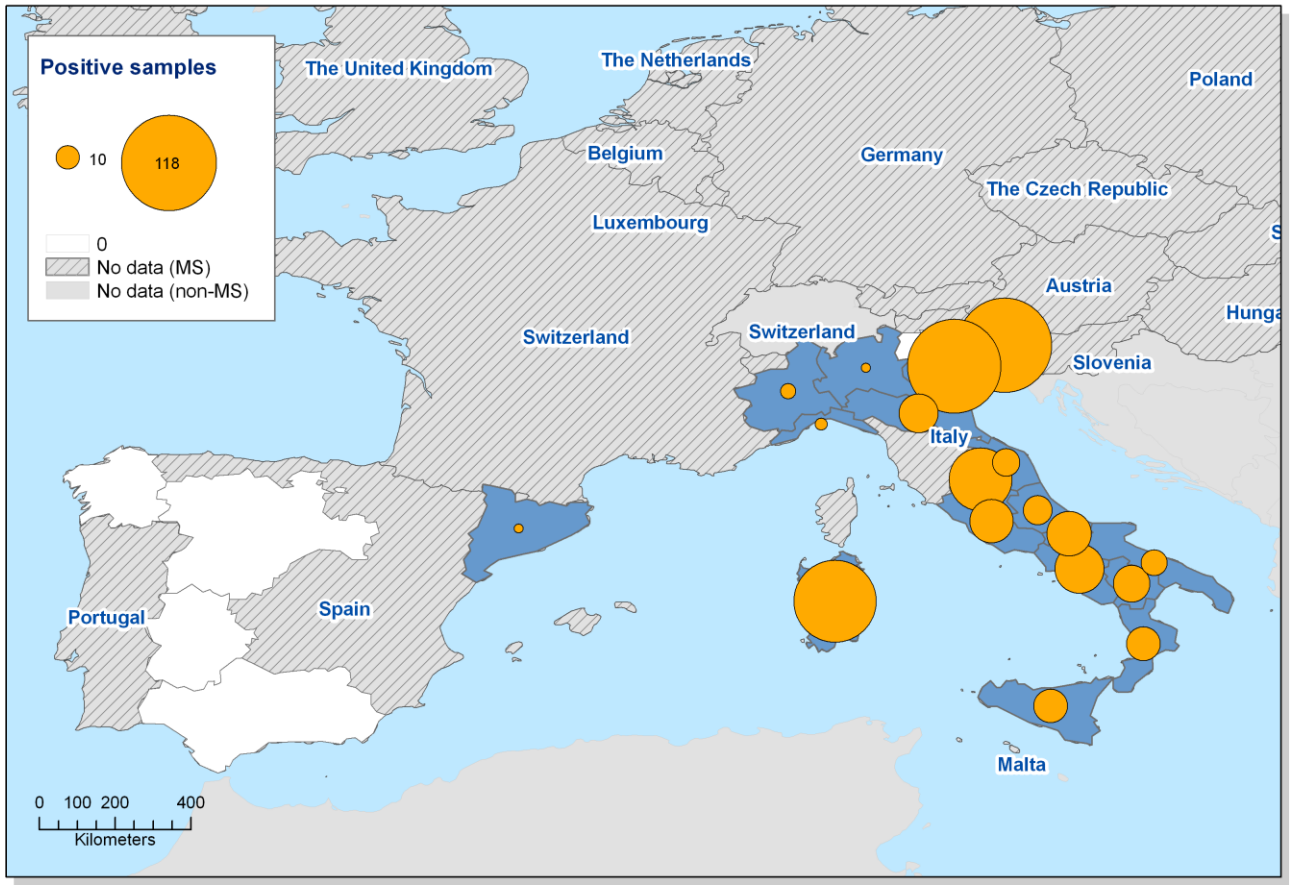


Figure WNV4. Findings of West Nile virus in birds in the EU, 2012





3.11.3. Discussion

In 2011, the number of human cases of West Nile fever was lower than in 2010, but it increased again in 2012. Four countries in the EU have been affected for three consecutive years and the figures have steadily increased in Italy. Moreover, the geographic distribution in each country has expanded to affect new areas.

The increase in case reports can be partly explained by the substantial efforts made to strengthen the level of detection in the affected countries or in newly affected countries, as soon as the first cases are identified. Health professionals (including blood safety authorities) are alerted at the beginning of the season, as are the stakeholders involved in animal and entomological surveillance. It is important to point out that variations and differences in case numbers are partly due to variations and differences in surveillance systems. A detailed overview for both the EU and neighbouring countries, including at the regional level, is published on the ECDC website[64] with an epidemiological update summarising the West Nile fever season and the last weekly update of the ECDC West Nile risk map.

2012 was the first year when MSs were specifically invited to report data on WNV in animals. Eleven MSs and one non-MS have already submitted data, which is an achievement, particularly as not all MSs yet have a monitoring system in place. Most data were reported from surveillance and monitoring in horses and other solipeds and less information was reported from surveillance and monitoring in birds and other animal species. WNV test-positive solipeds were reported by Southern European MSs but few test-positive horses were reported by Central and Western European MSs. Seropositivity in animals, for example, horses, can indicate exposure to infection, whether domestically acquired or related to travel (movement) to WNV endemic areas. Alternatively, seropositivity in horses can also result from vaccination against WNV. In this context, it is worthwhile to mention that horses can be employed in leisure or sport activities, utilised in the agricultural industry or reared specifically for meat production[65]. Two Southern MSs reported positive WNV findings in birds.

In light of the reported findings in solipeds, WNV may present in Central Europe and, therefore, Central and Northern European countries may consider a need to establish a monitoring system in their animal populations in order to prepare for the emergence of the disease and subsequent increased potential for human exposure.

[64] European Centre for Disease Prevention and Control, 2012. West Nile fever maps. Historical data (2010–2012). Available online: http://ecdc.europa.eu/en/healthtopics/west_nile_fever/West-Nile-fever-maps/Pages/historical-data.aspx

[65] European Food Safety Authority, 2013. Technical specifications on harmonised epidemiological indicators for biological hazards to be covered by meat inspection of domestic solipeds. EFSA Journal 2013;11(6):3268, 33 pp. doi:10.2903/j.efsa.2013.3268

3. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

3.12. Other zoonoses

Anisakis

Slovakia provided information on *Anisakis* parasites in food (fish) from the year 2011. In total, 23 fish batches were sampled at retail and *Anisakis* was not found in any of the samples. The fish samples derived from monitoring of fish of non-EU origin using objective sampling.

Cysticercus

Belgium and Sweden reported information on *Cysticercus* in slaughter animals for both 2011 and 2012.

In the case of findings of *Taenia saginata* cysts in cattle at the slaughterhouse, in Belgium, 859,390 animals were inspected and 1,347 (0.16 %) carcases were found positive in 2011, of which 11 were heavily contaminated. In 2012, the number of inspected animals was 824,511, of which 1,214 (0.15 %) were positive and nine heavily contaminated.

Sweden inspected 456,120 bovine carcases for *Cysticercus* cysts (*T. saginata)* with one (0.0002 %) positive finding. In 2012, a total of 419,939 carcases were tested, and once again one (0.0002 %) was found positive.

Sweden also reported data on *Taenia solium* cysts in pigs at slaughter. In 2011, out of 2,845,390 pig carcases, none was found to be positive. Nor were any positive carcases detected in 2012, out of the 2,585,665 animals inspected.

Francisella tularensis

Two MSs, Spain and Sweden, reported on the occurrence of *Francisella tularensis* in animals during the years 2011–2012. In 2011, Spain investigated wild hares from hunting and did not find any positive samples from the 51 animals tested. Spain also tested 306 wild rodents without positive findings. All these samples derived from surveillance and convenience sampling.

Sweden reported data on *F. tularensis* in wild hares for both years. In 2011, 11 animals (18.0 %) were found positive out of the 61 tested, whereas in 2012 Sweden detected 12 positive hares (29.3 %) from the 41 animals tested. The hare samples were derived from passive monitoring and suspect sampling.

Sarcocystis

Belgium reported data on *Sarcocystis* in bovine carcases from meat production animals at the slaughterhouse in 2012. Of the 824,511 carcases inspected, 61 (0.007 %) were found to be positive.

4. FOOD-BORNE OUTBREAKS

4.1. General overview

The reporting of investigated food-borne outbreaks has been mandatory for EU MSs since 2005. Starting in 2007, harmonised specifications on the reporting of food-borne outbreaks at EU level have been applied. In 2012, as in 2010 and 2011, revised reporting specifications for food-borne outbreaks were implemented and the distinction between 'verified' and 'possible' food-borne outbreaks was abandoned; instead, outbreaks were categorised as having 'strong evidence' or 'weak evidence' based on the strength of evidence implicating a suspected food vehicle. In the former case, i.e. where the evidence implicating a particular food vehicle was strong, based on an assessment of all available evidence, a detailed dataset was reported for outbreaks. In the latter case, i.e. where no particular food vehicle was suspected or for food-borne outbreaks where the evidence implicating a particular food vehicle was weak, only a limited dataset was reported. This minimal dataset included the number of outbreaks per causative agent and the number of human cases, hospitalisations and deaths. In this chapter the term 'weak-evidence outbreak' also covers outbreaks for which no particular food vehicle was suspected. It is important to note that the food-borne outbreak investigation systems at national level are not harmonised among MSs. Therefore, the differences in the number and type of reported outbreaks, as well as in the causative agents, may not necessarily reflect the level of food safety among MSs; rather they may indicate differences in the sensitivity of the national systems in identifying and investigating food-borne outbreaks.

Data from 2012 provide information on the total number of reported food-borne outbreaks attributed to different causative agents, including food-borne outbreaks for which the causative agent was unknown.

In this general overview, all reported food-borne outbreaks, including waterborne outbreaks, are included in the tables and figures. In subsequent sections, outbreaks are presented in more detail and categorised by the causative agent, but excluding waterborne outbreaks where the evidence was strong. All waterborne outbreaks with strong evidence are addressed separately in section 4.13.

In 2012, 25 MSs and 2 non-MSs provided data on food-borne outbreaks; this is the same as in 2011. No outbreak data were reported by Luxembourg and Cyprus for 2012. An overview of countries reporting data on food-borne outbreaks is provided in Table OUT1.

Table OUT1. Overview of countries reporting data on food-borne outbreaks, 2012

Causative agent	Total number of reporting MSs	Countries
Salmonella	24	**All MSs except** CY, LU, PT **Non-MSs:** CH, IS, NO
Campylobacter	19	**MSs:** AT, BE, CZ, DE, DK, EE, ES, FI, FR, HU, IE, IT, LT, MT, NL, PL, SE, SK, UK **Non-MSs:** CH, NO
Pathogenic *E. coli*	10	**MSs:** AT, BE, DE, DK, FI, FR, IE, PT, SE, UK
Other bacterial agents[1]	12	**MSs:** AT, CZ, DE, ES, FI, FR, GR, HU, LV, PL, SK, UK **Non-MS:** NO
Bacterial toxins[2]	17	**MSs:** BE, DE, DK, ES, FI, FR, HU, IT, LV, NL, PL, PT, RO, SE, SI, SK, UK **Non-MSs:** CH, IS, NO
Viruses	20	**MSs:** AT, BE, CZ, DE, DK, ES, FI, FR, GR, HU, IE, IT, LV, MT, NL, PL, SE, SI, SK, UK **Non-MSs:** IS, NO
Parasites	11	**MSs:** AT, BG, DE, ES, FI, IE, LT, LV, RO, SK, UK
Other causative agents[3]	12	**MSs:** BE, DE, DK, ES, FI, FR, LV, MT, PL, SE, SI, UK **Non MS:** NO
Unknown	19	**MSs:** BE, DE, DK, EE, ES, FI, FR, GR, HU, IE, IT, LT, LV, MT, NL, PL, SE, SI, UK **Non MSs:** CH, NO

Note: The overview table contains all data reported by MSs.

1. Includes *Listeria, Shigella, Yersinia, Brucella, Francisella, Vibrio parahaemolyticus* and other bacterial agents.
2. Includes *Bacillus*, *Clostridium* and staphylococcal enterotoxins.
3. Includes atropine, histamine, mushroom toxins, marine biotoxins, mycotoxins, escolar fish (wax esters) and other agents.

Number of outbreaks

In 2012, a total of 5,363 food-borne outbreaks, including both weak- and strong-evidence outbreaks, were reported by the 25 reporting MSs. This represents a decrease of 5.0 % compared with 2011, when 5,648 outbreaks (including the 11 strong-evidence waterborne outbreaks) were reported in total by 25 MSs.

The overall reporting rate in 2012 at EU level was 1.07 outbreaks per 100,000 population (Table OUT2), similar to that observed in 2011 (1.12). Latvia had the highest reporting rate (23.36 outbreaks per 100,000 population), followed by Slovakia (13.53 outbreaks per 100,000 population) and Malta (11.26 outbreaks per 100,000). It is important to note that the food-borne outbreak investigation systems at national level are not harmonised among MSs. Therefore, the differences in the number and type of reported outbreaks, as well as in the reporting rates, may not necessarily reflect the level of food safety among MSs; rather they may indicate differences in the sensitivity of the national systems in identifying and investigating food-borne outbreaks. In addition, some MSs implemented changes in reporting between different years; in 2012 Latvia reported viral outbreaks with two or more cases, as compared to only outbreaks with at least five human cases in 2011.

In 2012, France accounted for 23.8 % (1,279) of all reported outbreaks (Table OUT2) and was also the MS reporting the largest number of outbreaks in the previous years (1,153 in 2011). The MS reporting the second highest number of outbreaks was Slovakia, with 731 outbreaks reported (13.6 % of the total). Poland, Latvia and Spain reported 490, 477 and 447 outbreaks, respectively, and these countries, together with France and Slovakia, accounted for 63.8 % of all outbreaks reported within the EU. However, the reporting rate per 100,000 population in Spain, Poland and France was quite low (between 0.97 and 1.96), whereas the reporting rate in Latvia and Slovakia was relatively high (23.36 and 13.53 respectively) (Table OUT2 and Figure OUT1).

A total of 763 strong-evidence outbreaks were reported by 21 MSs, representing 14.2 % of the total number of food-borne outbreaks recorded in 2012 (Table OUT2). This was higher than the number of strong-evidence outbreaks reported in 2011 (701).

France, Spain and Poland accounted for 60.6 % of the total number of reported strong-evidence outbreaks (Table OUT2). These were the same countries reporting the highest number of strong-evidence outbreaks in 2011.

In the non-MSs, Norway, Iceland and Switzerland, 53 outbreaks were reported in total, of which eight were reported with strong evidence.

Strong- and weak-evidence outbreaks

The classification of outbreaks as either strong- or weak-evidence outbreaks was based on an assessment of all available evidence, and more than one type of evidence is often reported in one outbreak.

MSs varied in the proportion of strong- and weak-evidence outbreaks reported in 2012 (Figure OUT2). For example, Portugal, Romania and Slovenia reported only outbreaks supported by strong evidence, whereas the majority of outbreaks reported by the other MSs were supported by weak evidence. This variation may be due to differences between the MSs' specific outbreak investigation and reporting systems, and consequently the type of information available for each outbreak.

The MSs reporting the highest proportions of strong-evidence outbreaks out of the total outbreaks reported in the country were Denmark, Portugal, Romania, Slovenia and the United Kingdom, where the proportions of these outbreaks were 75.3 %, 100 %, 100 %, 100 % and 66.7 %, respectively (Table OUT2 and Figure OUT2).

Human cases

For the 5,363 outbreaks at EU level, 55,453 human cases were reported, as well as 5,118 hospitalisations and 41 deaths (case fatalities) (0.07 % out of the reported cases). The 53 outbreaks reported in total by the non-MSs (Iceland, Switzerland and Norway) comprised 1,181 human cases with 25 hospitalisations and one fatality (Table OUT2). It is important to note that the number of human cases may be unknown for some outbreaks.

With regard to the 763 strong-evidence outbreaks reported by MSs, a total of 26,247 human cases were involved; of these cases, 1,515 people (5.8 %) were admitted to hospital and 24 people died (0.09 %) (Table OUT2). However, these high numbers of cases were dominated by a large norovirus outbreak associated with frozen strawberries in Germany that affected 10,950 people.

In the non-MSs, Norway, Iceland and Switzerland, eight strong-evidence outbreaks were reported involving 500 human cases with 18 hospitalisations and one fatality (Table OUT2).

Of the 24 fatalities related to strong-evidence outbreaks, 10 were associated with *Salmonella*, two with *Clostridium perfringens* toxins, two with norovirus, one with mycotoxins and nine with 'Other bacterial agents' (*Listeria monocytogenes*) (Table OUT4).

Of the 17 fatalities reported in weak-evidence outbreaks, 10 were associated with *Clostridium* toxins, three with *Bacillus cereus* toxins and one each with staphylococcal enterotoxins, norovirus and unspecified other agents. For one fatality the causative agent was unknown.

The case fatality reported by Switzerland was caused by *Campylobacter*.

Table OUT2. Number of all food-borne outbreak and human cases in the EU, 2012

Country	Total outbreaks	Reporting rate per 100,000	Strong-evidence outbreaks				Weak-evidence outbreaks			
			N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Austria	122	1.44	3	217	22	0	119	344	75	0
Belgium	327	2.95	31	386	25	0	296	1,000	30	1
Bulgaria	2	0.03	-	-	-	-	2	82	-	-
Czech Republic	23	0.22	-	-	-	-	23	520	117	0
Denmark	85	1.52	64	1,710	23	0	21	474	12	0
Estonia	17	1.27	1	87	20	0	16	94	29	0
Finland	45	0.83	22	1,103	36	3	23	308	8	0
France	1,279	1.96	208	2,329	176	1	1,071	7,889	527	5
Germany	393	0.48	56	11,988	245	3	337	1,143	207	0
Greece	32	0.28	3	650	2	0	29	166	85	0
Hungary	115	1.18	10	544	133	0	105	897	73	0
Ireland	38	0.83	13	89	6	0	25	152	11	0
Italy	20	0.03	-	-	-	-	20	111	-	-
Latvia	477	23.36	1	16	-	0	476	1,629	203	0
Lithuania	93	3.09	5	69	22	0	88	285	187	0
Malta	35	11.26	-	-	-	-	35	203	20	0
Netherlands	273	1.63	12	1,449	32	4	261	1,146	6	0
Poland	490	1.27	78	876	354	0	412	4,868	1,215	10
Portugal	7	0.07	7	135	42	0	-	-	-	-
Romania	10	0.05	10	119	59	0	-	-	-	-
Slovakia	731	13.53	5	162	42	0	726	2,284	546	0
Slovenia	10	0.49	10	490	15	0	-	-	-	-
Spain	447	0.97	176	2,442	212	3	271	3,902	197	1
Sweden	232	2.45	8	351	-	1	224	1,240	8	-
United Kingdom	60	0.10	40	1,035	49	9	20	469	47	0
EU Total	**5,363**	**1.07**	**763**	**26,247**	**1,515**	**24**	**4,600**	**29,206**	**3,603**	**17**
Iceland	4	1.25	1	25	0	0	3	31	-	-
Norway	44	0.88	3	419	6	0	41	623	7	0
Switzerland	5	0.06	4	56	12	1	1	27	0	0

Figure OUT1. Reporting rate per 100,000 population in Member States and non-Member States, 2012

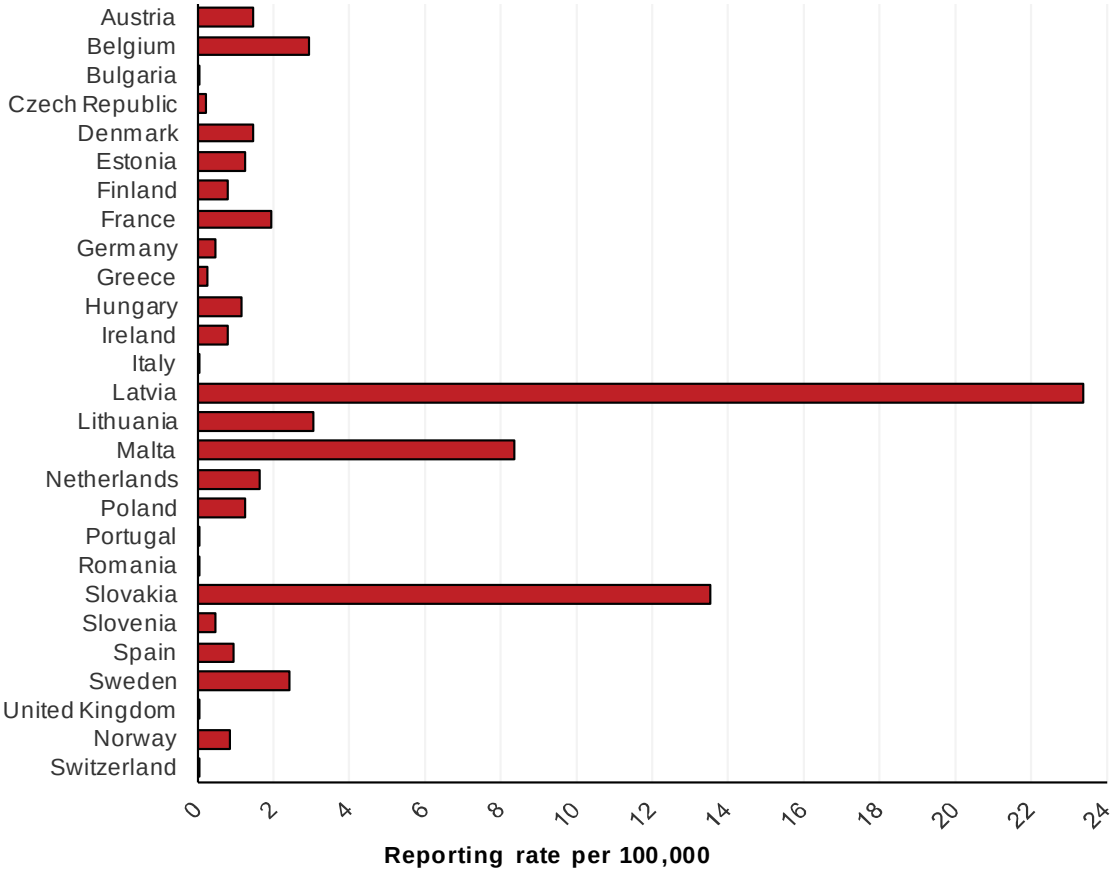
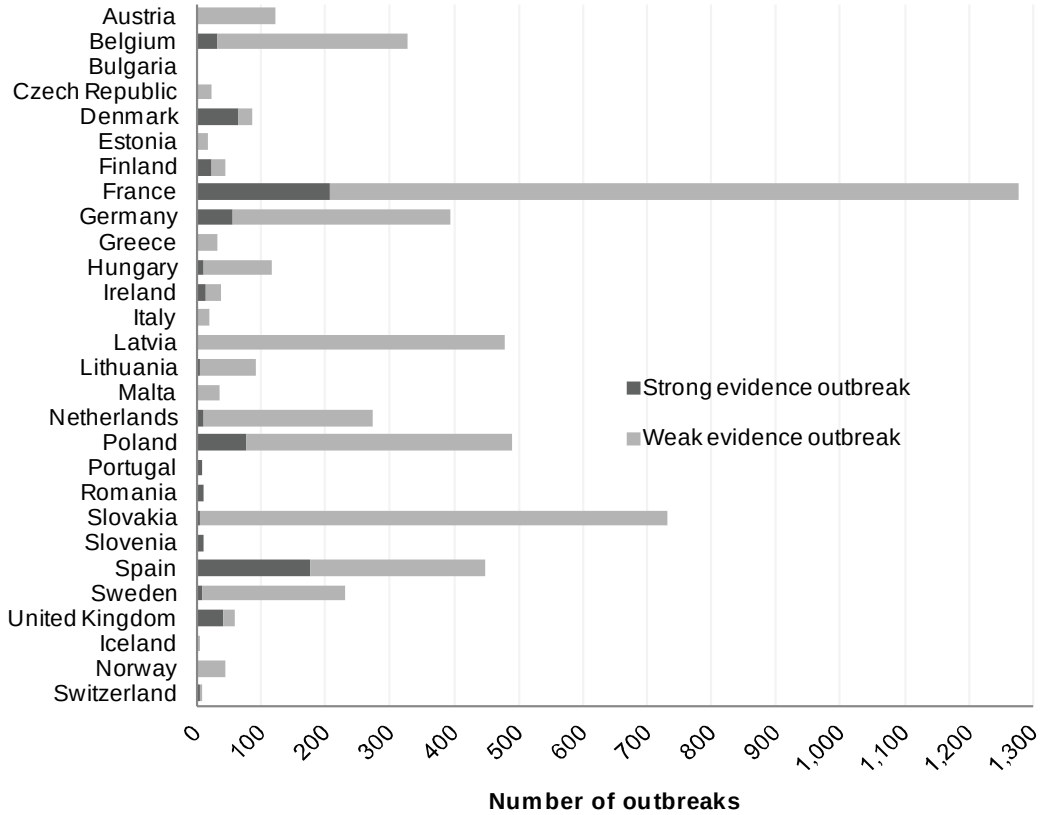


Figure OUT2. Distribution of food-borne outbreaks in Member States and non-Member States, 2012



Causative agents

Within the EU, the causative agent was known in 72.4 % of the total number of outbreaks reported (Table OUT3 and Figure OUT3). *Salmonella* remained the most frequently detected causative agent in the food-borne outbreaks reported (28.6 % of outbreaks), followed by bacterial toxins, viruses and *Campylobacter*, which accounted for 14.5 %, 14.1 % and 9.3 % of the outbreaks, respectively. Other agents each accounted for 2.6 % or less of the number of food-borne outbreaks.

Salmonella outbreaks increased slightly, from 1,501 outbreaks in 2011 to 1,533 outbreaks in 2012. An increase was observed in the numbers of outbreaks caused by viruses, from 525 outbreaks in 2011 to 756 in 2012. A slight increase was observed in the number of outbreaks caused by bacterial toxins (from 730 in 2011 to 777 in 2012) and a decrease in the number of outbreaks caused by *Campylobacter* (598 in 2011 to 501 in 2012). The number of outbreaks in which the causative agent was unknown decreased from 2,023 in 2011 to 1,478 in 2012, representing a decrease of 26.9 % (Figure OUT4).

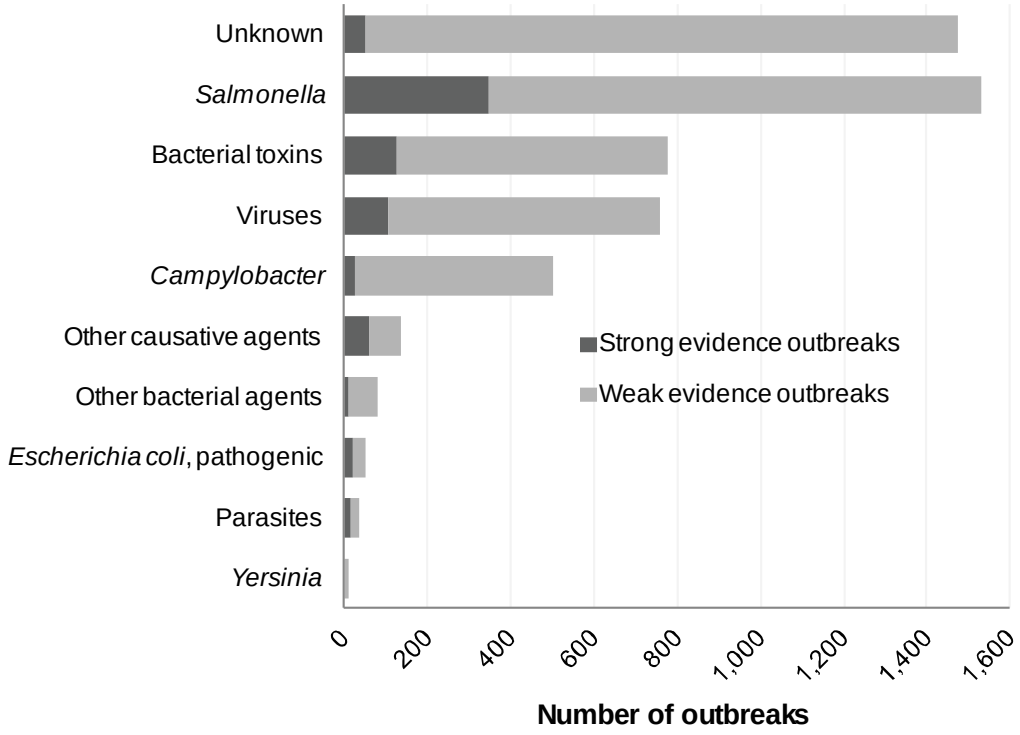
Considering the outbreaks reported for each causative agent, the highest proportion of strong-evidence outbreaks was reported for the group of other causative agents (45.3 %), followed by *E. coli* (43.1 %) and parasites (36.8 %) (Table OUT3 and Figure OUT3).

Table OUT3. Causative agents in all food-borne outbreaks in the EU, 2012

Causative agent	Totale outbreaks		Strong-evidence outbreaks		Weak-evidence outbreaks	
	N	%	N	%	N	%
Salmonella	1,533	28.6	347	45.5	1,186	25.8
Bacterial toxins	777	14.5	127	16.6	650	14.1
Viruses	756	14.1	105	13.8	651	14.2
Campylobacter	501	9.3	25	3.3	476	10.3
Other causative agents	137	2.6	62	8.1	75	1.6
Other bacterial agents	80	1.5	10	1.3	70	1.5
Escherichia coli, pathogenic	51	1.0	22	2.9	29	0.6
Parasites	38	0.7	14	1.8	24	0.5
Yersinia	12	0.2	0	0.0	12	0.3
Unknown	1,478	27.6	51	6.7	1,427	31.0
EU Total	**5,363**	**100**	**763**		**4,600**	

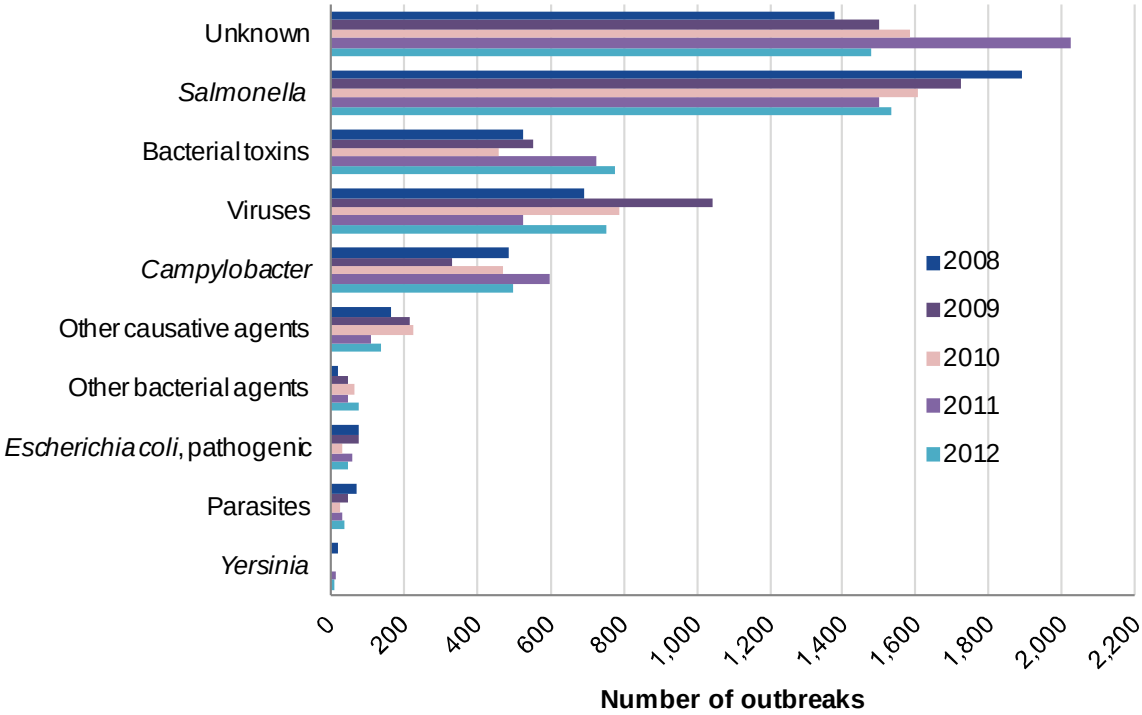
Note: Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus*. Food-borne viruses include calicivirus, hepatitis A virus, flavivirus, rotavirus and other unspecified viruses. Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins, atropine and other unspecified agents. Parasites include primarily *Trichinella*, but also *Cryptosporidium*, *Giardia*, *Anisakis* and other unspecified parasites. Other bacterial agents include *Listeria*, *Brucella*, *Shigella*, *Vibrio* and *Francisella*. Pathogenic *Escherichia coli* includes also verotoxigenic *Escherichia coli*.

Figure OUT3. Distribution of all food-borne outbreaks per causative agent in the EU, 2012



Note: Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus*. Food-borne viruses include calicivirus, hepatitis A virus, flavivirus, rotavirus and other unspecified viruses. Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins, atropine and other unspecified agents. Parasites include primarily *Trichinella*, but also *Cryptosporidium*, *Giardia*, *Anisakis* and other unspecified parasites. Other bacterial agents include *Listeria*, *Brucella*, *Shigella*, *Vibrio* and *Francisella*. Pathogenic *Escherichia coli* includes also verotoxigenic *Escherichia coli*.

Figure OUT4. Total number of food-borne outbreaks in the EU, 2008-2012



Note: Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus*. Food-borne viruses include calicivirus, hepatitis A virus, flavivirus, rotavirus and other unspecified viruses. Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins, atropine and other unspecified agents. Parasites include primarily *Trichinella*, but also *Cryptosporidium*, *Giardia*, *Anisakis* and other unspecified parasites. Other bacterial agents include *Listeria*, *Brucella*, *Shigella*, *Vibrio* and *Francisella*. Pathogenic *Escherichia coli* includes also verotoxigenic *Escherichia coli*.

Strong-evidence outbreaks

Within the EU, the causative agent of the strong-evidence outbreaks was known in 93.3 % of the reported outbreaks (Table OUT4).

Salmonella was the most frequent causative agent (45.5 % of outbreaks), followed by bacterial toxins, viruses and other causative agents, responsible for 16.6 %, 13.8 % and 8.1 % of outbreaks, respectively. Other agents were each reported in less than 4.0 % of food-borne outbreaks. However, outbreaks caused by viruses were responsible for the highest number of human cases, accounting for 56.7 % of the reported cases in all strong-evidence outbreaks. However, it should be noted that a large outbreak in Germany, due to norovirus, affected 10,950 people.

In addition, *Salmonella* outbreaks accounted for the majority of hospitalisations (65.0 % of all hospitalised cases) and deaths (41.7 % of all deaths) related to strong-evidence outbreaks (Table OUT4). Five outbreaks caused by *Listeria monocytogenes* resulted in 55 cases, 47 hospitalisations and 9 deaths (i.e. 37.5 % of all deaths).

The proportion of hospitalisations out of the reported cases for each causative agent was low for outbreaks due to viruses (Table OUT4).

Table OUT4. Number of outbreaks and human cases per causative agent in strong-evidence food-borne outbreaks (including strong-evidence waterborne outbreaks) in the EU, 2012

Causative agent	Strong-evidence outbreaks				
	N	%	Human cases		
			Cases	Hospitalised	Deaths
Salmonella	347	45.5	5,787	985	10
Bacterial toxins	127	16.6	2,938	121	2
Viruses	105	13.8	14,892	124	2
Other causative agents	62	8.1	478	39	1
Campylobacter	25	3.3	198	17	0
Escherichia coli, pathogenic	22	2.9	160	81	0
Parasites	14	1.8	639	40	0
Other bacterial agents	10	1.3	156	52	9
Unknown	51	6.7	999	56	0
EU total	**763**	**100**	**26,247**	**1,515**	**24**

Note: Data from 763 outbreaks are included: Austria (3), Belgium (31), Denmark (64), Estonia (1), Finland (22), France (208), Germany (56), Greece (3), Hungary (10), Ireland (13), Latvia (1), Lithuania (5), Netherlands (12), Poland (78), Portugal (7), Romania (10), Slovakia (5), Slovenia (10), Spain (176), Sweden (8) and United Kingdom (40).

Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus.* Food-borne viruses include calicivirus, hepatitis A virus, flavivirus and rotavirus. Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins and atropine. Parasites include primarily *Trichinella,* but also *Cryptosporidium, Giardia* and *Anisakis.* Other bacterial agents include *Listeria, Brucella, Shigella, Vibrio* and *Francisella*.

Types of evidence supporting the outbreaks

Types of evidence supporting the strong-evidence outbreaks are summarised here below.

Epidemiological evidence

- Descriptive epidemiological evidence
- Analytical epidemiological evidence

Microbiological evidence

- Detection in food vehicle or its component and Detection of indistinguishable causative agent in humans
- Detection in food chain or its environment and Detection of indistinguishable causative agent in humans
- Detection in food vehicle or its component and Symptoms and onset of illness pathognomonic of the causative agent found in food vehicle or its component or in food chain or its environment
- Detection in food chain or its environment and Symptoms and onset of illness pathognomonic of the causative agent found in food vehicle or its component or in food chain or its environment

The types of evidence reported for the strong-evidence outbreaks, including strong-evidence waterborne outbreaks, are presented in Table OUT5.

Analytical epidemiological evidence supported the link between human cases and food vehicles in 30.0 % of strong-evidence outbreaks, and convincing descriptive epidemiological evidence was reported in 33.9 % of strong-evidence outbreaks.

Seventy-four strong-evidence outbreaks (9.7 %) were supported by detection of the causative agent in the food chain or its environment in combination with detection in humans or the case had pathognomonic symptoms. In 339 strong-evidence outbreaks (44.4 %) the pathogen was detected in the food vehicle or its component and either detected in cases or cases had symptoms and onset of illness pathognomonic of the causative agent (Table OUT5).

Table OUT5. Evidence in strong-evidence food-borne outbreaks (including strong-evidence waterborne outbreaks) in the EU, 2012

Country	N	Analytical epidemiological evidence	Descriptive epidemiological evidence (this evidence alone)	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans	Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans (this evidence alone)	Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent	Detection of causative agent in food chain or its environment - Symptoms and onset of illness pathognomonic to causative agent (this evidence alone)
Austria	3	1	-	3	-	-	-
Belgium	31	1	13 (13)	3	1 (1)	13	-
Denmark	64	19	57 (12)	13	3	10	36
Estonia	1	-	-	1	-	-	-
Finland	22	3	22 (9)	3	5	4	-
France	208	-	55 (55)	11	-	142	-
Germany	56	5	24 (17)	14	13 (5)	11	3 (2)
Greece	3	3	-	-	-	-	-
Hungary	10	5	-	1	-	3	1 (1)
Ireland	13	-	2 (2)	11	-	-	-
Latvia	1	-	-	1	-	-	-
Lithuania	5	5	5	-	-	-	-

Table continued overleaf.

Table OUT5 (continued). Evidence in strong-evidence food-borne outbreaks (including strong-evidence waterborne outbreaks) in the EU, 2012

Country	N	Analytical epidemiological evidence	Descriptive epidemiological evidence (this evidence alone)	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans	Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans (this evidence alone)	Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent	Detection of causative agent in food chain or its environment - Symptoms and onset of illness pathognomonic to causative agent (this evidence alone)
Netherlands	12	3	4 (4)	2	2 (2)	1	-
Poland	78	9	28 (28)	31	6 (6)	4	-
Portugal	7	2	-	-	-	5	-
Romania	10	-	-	2	-	8	-
Slovakia	5	1	4 (1)	4	-	-	-
Slovenia	10	1	8 (8)	-	-	1	-
Spain	176	164	0	0	0	35	0
Sweden	8	1	5 (3)	-	1	1	2 (1)
United Kingdom	40	6	32 (32)	1	1 (1)	-	-
EU Total	**763**	**229**	**259 (184)**	**101**	**32 (15)**	**238**	**42 (4)**
Norway	3	1	-	-	-	2	-
Switzerland	4	-	4 (4)	-	-	-	-

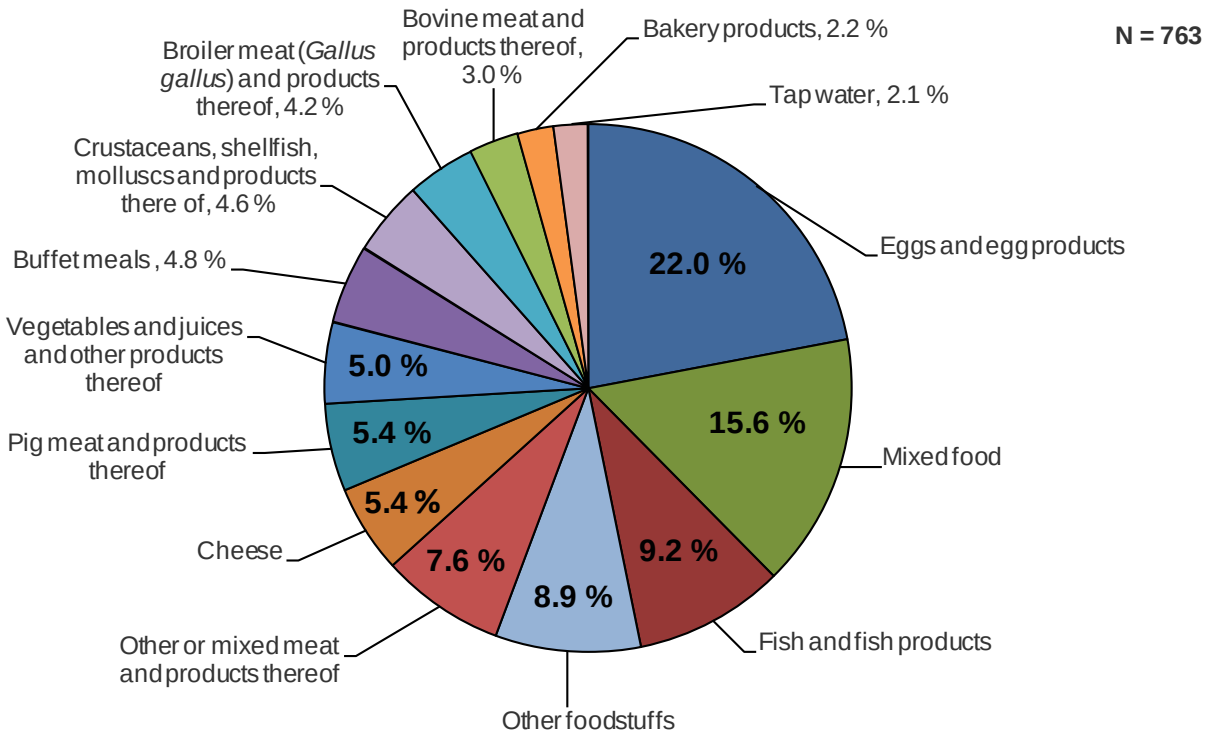
Note: Data from waterborne outbreaks included.
The evidence types 'Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans'/'Detection of causative agent in food chain or its environment - Symptoms and onset of illness pathognomonic of causative agent' in combination with 'Descriptive epidemiological evidence' were the only types of evidence reported in 24 outbreaks.
More than one type of evidence can be reported per outbreak.

Food vehicle

The food vehicle was reported in all 763 strong-evidence outbreaks, even though in 38 outbreaks (5.0 %) it was reported as 'Other food'.

In 2012, the majority of the strong-evidence outbreaks were associated with foodstuffs of animal origin (Figure OUT5). As in previous years, the most common single foodstuff category reported as food vehicle was eggs and egg products, responsible for 168 outbreaks (22.0 %). Mixed foods were the next most common single category (15.6 %), followed by fish and fish products (9.2 %) (Figure OUT5).

Figure OUT5. Distribution of strong-evidence outbreaks by food vehicle in the EU, 2012



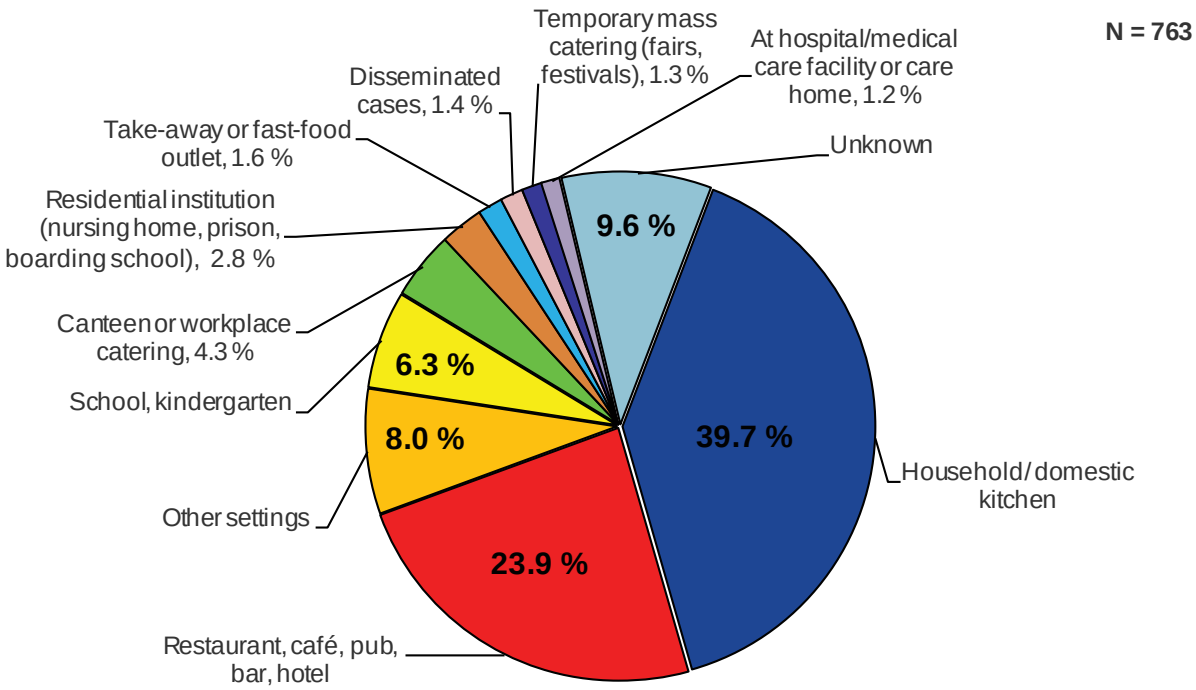
Note: Data from 763 outbreaks are included: Austria (3), Belgium (31), Denmark (64), Estonia (1), Finland (22), France (208), Germany (56), Greece (3), Hungary (10), Ireland (13), Latvia (1), Lithuania (5), Netherlands (12), Poland (78), Portugal (7), Romania (10), Slovakia (5), Slovenia (10), Spain (176), Sweden (8) and United Kingdom (40).

Other foodstuffs (N = 68) include: canned food products (1), cereal products including rice and seeds/pulses (nuts, almonds) (4), dairy products (other than cheeses) (4), drinks (1), fruit, berries and juices and other products thereof (6), herbs and spices (2), milk (7), sweets and chocolate (5) and other foods (38).

Setting

The setting of the outbreak was provided in 690 of strong-evidence outbreaks (Figure OUT6), whereas for 73 outbreaks the setting was unknown. The setting 'restaurant, café, pub, bar, hotel' decreased from 34.4 % in 2011 to 23.9 % in 2012. The category 'household/domestic kitchen' (39.7 %) was the most commonly reported setting. Apart from restaurants and households, the next most common settings in strong-evidence outbreaks were other settings (8.0 %) and school, kindergarten (6.3 %).

Figure OUT6. Distribution of strong-evidence outbreaks by settings in the EU, 2012

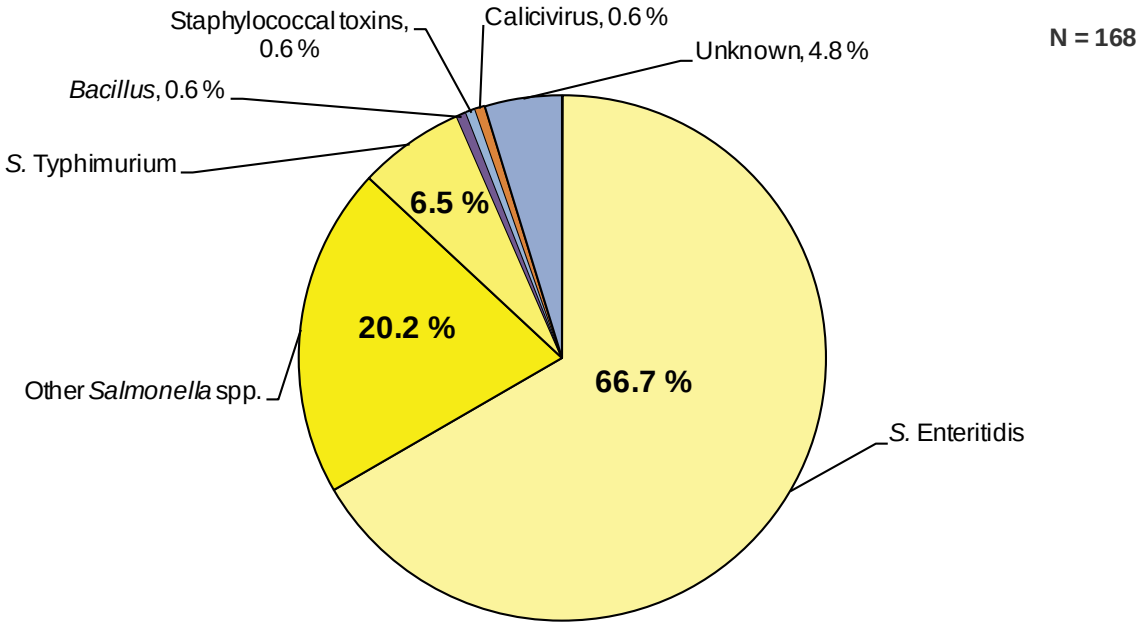


Note: Data from 763 outbreaks are included: Austria (3), Belgium (31), Denmark (64), Estonia (1), Finland (22), France (208), Germany (56), Greece (3), Hungary (10), Ireland (13), Latvia (1), Lithuania (5), Netherlands (12), Poland (78), Portugal (7), Romania (10), Slovakia (5), Slovenia (10), Spain (176), Sweden (8) and United Kingdom (40).
Other settings (N = 61) include: camp, picnic (3), mobile retailer, market/street vendor (4), farm (primary production) (2) and other settings (52).

Detailed information on causative agents in selected food vehicles

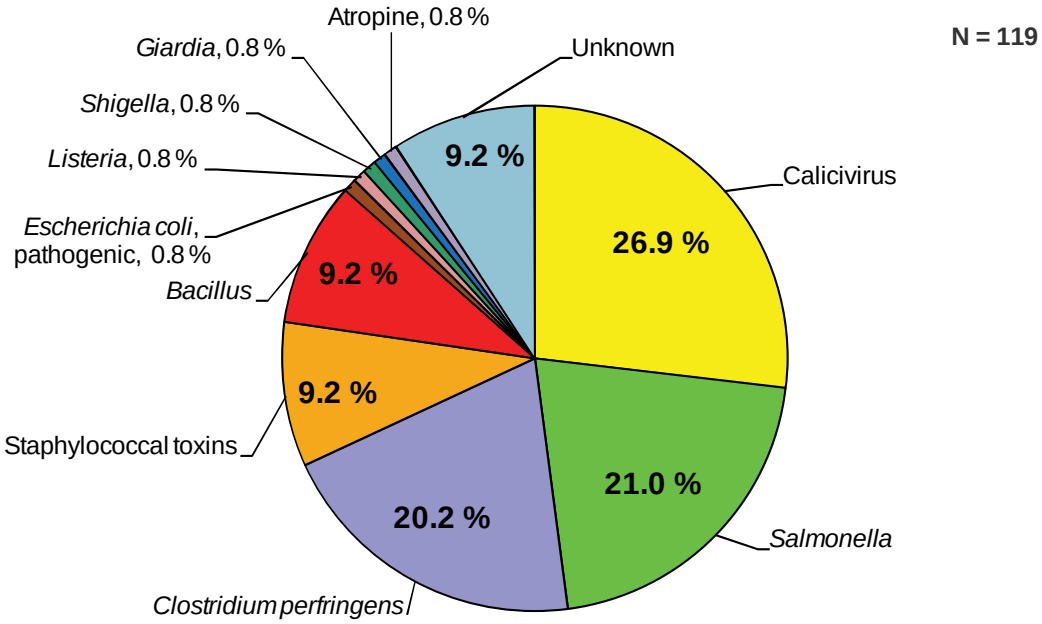
The following section provides a more detailed view of different food vehicles identified in the outbreaks and shows the distribution of the causative agents related to strong-evidence outbreaks implicating eggs and egg products (Figure OUT7); mixed foods (Figure OUT8); fish and fish products (Figure OUT9); crustaceans, shellfish, molluscs and products thereof (Figure OUT10); food of non-animal origin (Figure OUT11); and vegetables (Figure OUT12).

Figure OUT7. Distribution of strong-evidence outbreaks, implicating eggs and egg products, by causative agent in the EU, 2012



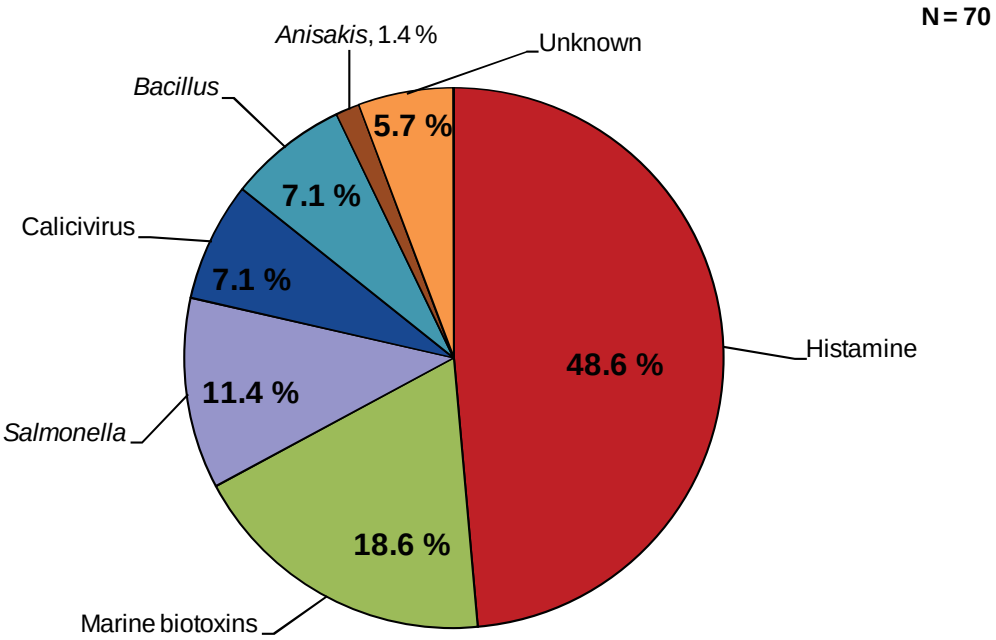
Note: Data from 168 outbreaks are included: France (33), Germany (3), Netherlands (1), Poland (51), Slovakia (3), Spain (74) and United Kingdom (3).

Figure OUT8. Distribution of strong-evidence outbreaks, implicating mixed food, by causative agent in the EU, 2012



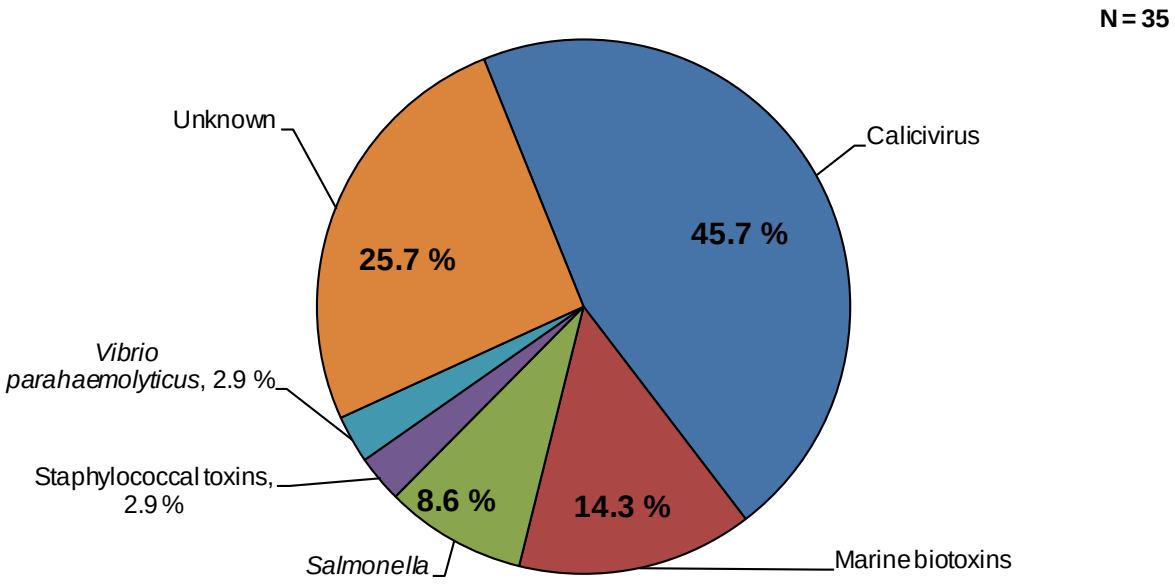
Note: Data from 119 outbreaks are included: Belgium (6), Denmark (25), Estonia (1), France (26), Germany (17), Netherlands (3), Poland (14), Portugal (3), Slovenia (6), Spain (10), Sweden (2) and United Kingdom (6).

Figure OUT9. Distribution of strong-evidence outbreaks, implicating fish and fish products, by causative agent in the EU, 2012



Note: Data from 70 outbreaks are included: Belgium (5), Denmark (3), Finland (1), France (36), Germany (2), Latvia (1), Netherlands (1), Slovenia (1), Spain (16), Sweden (2) and United Kingdom (2).

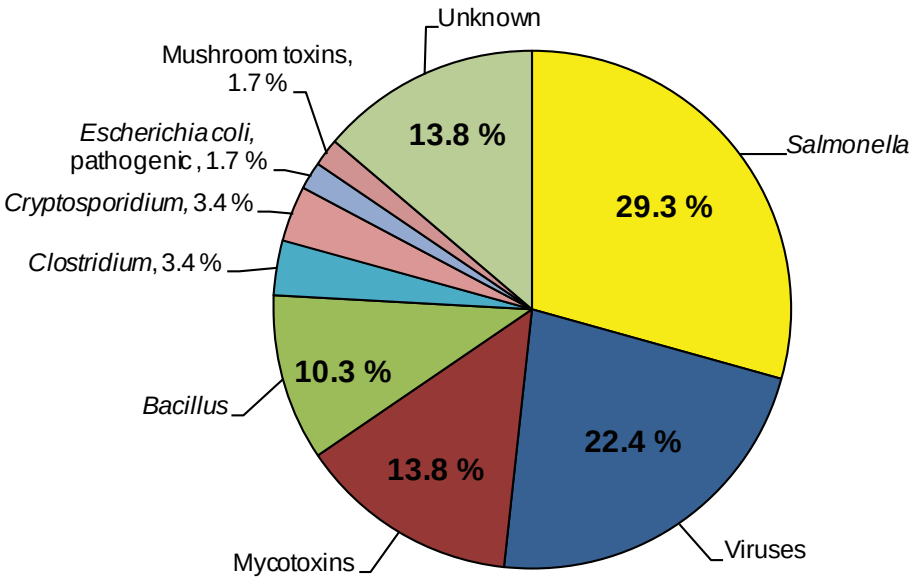
Figure OUT10. Distribution of strong-evidence outbreaks, implicating crustaceans, shellfish, molluscs and products thereof, by causative agent in the EU, 2012



Note: Data from 35 outbreaks are included: Belgium (5), Denmark (3), France (7), Ireland (1), Netherlands (1), Spain (15) and United Kingdom (3).

Figure OUT11. Distribution of strong-evidence outbreaks, implicating food of non-animal origin, by causative agent in the EU, 2012

N = 58

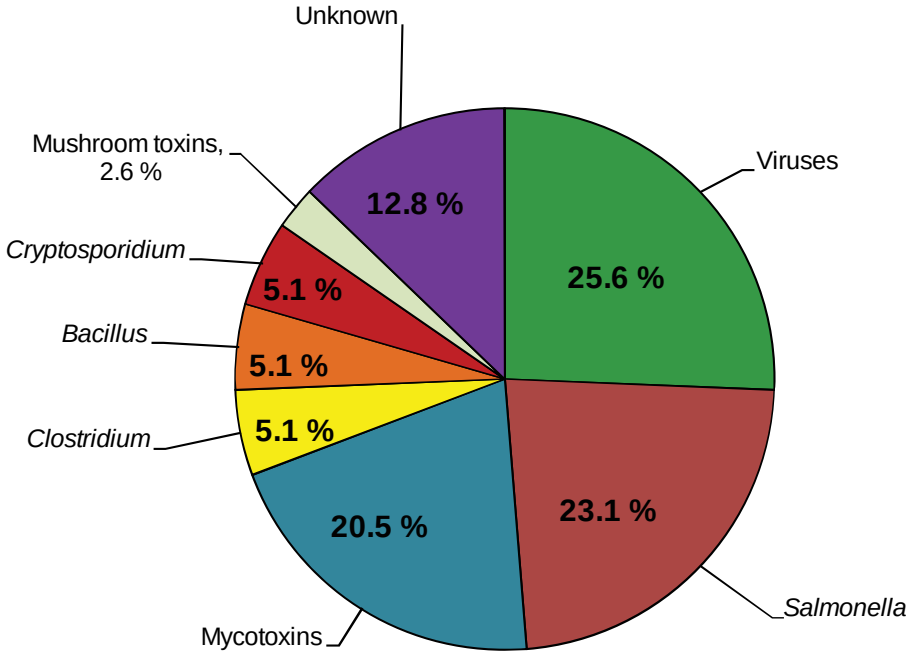


Note: Data from 58 outbreaks are included: Belgium (2), Denmark (8), Finland (3), France (4), Germany (5), Hungary (1), Ireland (1), Netherlands (1), Poland (7), Slovenia (1), Spain (17), Sweden (3) and United Kingdom (5).

Food of non-animal origin includes: cereal products including rice and seeds/pulses (nuts, almonds) (4), drinks (1), fruit, berries and juices and other products thereof (6), herbs and spices (2), sweets and chocolate (5), vegetables and juices and other products thereof (38), mixed food (1) and other foods (1). For the last two categories, the outbreaks were included only when it was clearly stated that the food vehicle was of non-animal origin.

Figure OUT12. Distribution of strong-evidence outbreaks, implicating vegetables, by causative agent in the EU, 2012

N = 39



Note: Data from 39 outbreaks are included: Belgium (1), Denmark (6), Finland (2), France (2), Germany (3), Netherlands (1), Poland (2), Spain (17), Sweden (3) and United Kingdom (2).

Vegetables includes: vegetables and juices and other products thereof (38) and other foods (1). For the last category, the outbreaks were included only when it was clearly stated that the food vehicle was of vegetable origin.

Egg and egg products were implicated in 168 outbreaks (22 %), of which 93.5 % were caused by *Salmonella* spp. (Figure OUT7). The majority of these outbreaks were associated with *S*. Enteritidis (66.7 %), as in previous years. Two outbreaks were caused by bacterial toxins (one by *Bacillus* and one by staphylococcal toxins). In addition, one calicivirus outbreak was attributed to eggs and egg products.

Mixed foods were implicated in 119 outbreaks. Calicivirus, *Salmonella* and *Clostridium perfringens* were the most frequently detected causative agents in these outbreaks (26.9 %, 21.0 % and 20.2 %, respectively), followed by staphylococcal enterotoxins (9.2 %) and *Bacillus* (9.2 %) (Figure OUT8). In 9.2 % of cases the causative agent was unknown.

In 2012, fish and fish products were implicated in 70 outbreaks (Figure OUT9). The majority of these outbreaks were caused by histamine (34 outbreaks, 48.6 %). Other reported causative agents were marine biotoxins and *Salmonella* (18.6 % and 11.4 %, respectively) and in 5.7 % of outbreaks the agent was not identified.

In 2012, there were 35 outbreaks attributed to crustaceans, shellfish, molluscs and products thereof (Figure OUT10). The majority were caused by calicivirus (45.7 %), followed by marine biotoxins (14.3 %). A relevant percentage of outbreaks was reported with unknown causative agent (25.7 %).

Food of non-animal origin was reported as the food vehicle in 58 strong-evidence outbreaks (Figure OUT11). This category includes: cereal products including rice and seeds/pulses; drinks; fruit, berries and juices and other products thereof; herbs and spices; sweets and chocolate; and vegetables and juices and other products thereof. In addition, some outbreaks related to mixed food or other foods were included when it was clearly indicated that the food vehicle was of non-animal origin.

Salmonella and viruses were the most frequently detected causative agents (29.3 % and 22.4 %, respectively) in the food of non-animal origin outbreaks, followed by mycotoxins (13.8 %) and *Bacillus* (10.3 %).

In 2012, vegetables were implicated in 39 outbreaks (Figure OUT12). The causative agents were primarily viruses (25.6 %), *Salmonella* (23.1 %) and mycotoxins (20.5 %).

4.2. *Salmonella*

In 2012, 24 MSs reported a total of 1,533 food-borne outbreaks of human salmonellosis, which constituted 28.6 % of the total number of reported outbreaks of food-borne illness in the EU (Table OUT3). This is a small increase compared with 2011 (1,501 outbreaks). Within the EU, the majority of *Salmonella* outbreaks (78.0 %) were reported by Slovakia, Spain, France, Germany and Poland. The overall reported incidence was 0.31 outbreaks per 100,000 population, ranging from <0.01 per 100,000 population in Italy and Romania to 7.51 per 100,000 population in Slovakia. Norway reported four outbreaks and Switzerland reported one outbreak (Table OUT6).

The annual total number of *Salmonella* outbreaks within the EU has decreased markedly during recent years. From 2008 to 2012, the total number of *Salmonella* outbreaks decreased by 19 %, from 1,888 to 1,533 outbreaks. This reduction parallels the general decline in notified human salmonellosis cases observed within the EU over the same period.

In total, 18 MSs reported 347 *Salmonella* outbreaks supported by strong evidence. These were mainly reported by France, Spain and Poland, which accounted for 76.7 % of strong-evidence *Salmonella* outbreaks (29.4 %, 27.4 % and 19.9 %, respectively). One strong-evidence *Salmonella* outbreak was reported by Switzerland.

As in previous years, *S.* Enteritidis was the predominant serovar associated with the S*almonella* outbreaks, accounting for 179 outbreaks (51.6 % of all strong-evidence *Salmonella* outbreaks) and 2,177 human cases (37.6 % of all cases in *Salmonella* outbreaks).

S. Typhimurium was associated with 49 outbreaks (14.1 % of the strong-evidence *Salmonella* outbreaks) and 792 human cases (13.7 % of human cases due to *Salmonella*). Of these outbreaks, seven were caused by monophasic *S.* Typhimurium.

For 97 strong-evidence outbreaks caused by *Salmonella* (28.0 %), the serovar was not reported or unknown.

Table OUT6. Strong- and weak-evidence food-borne outbreaks caused by* Salmonella *in the EU, 2012

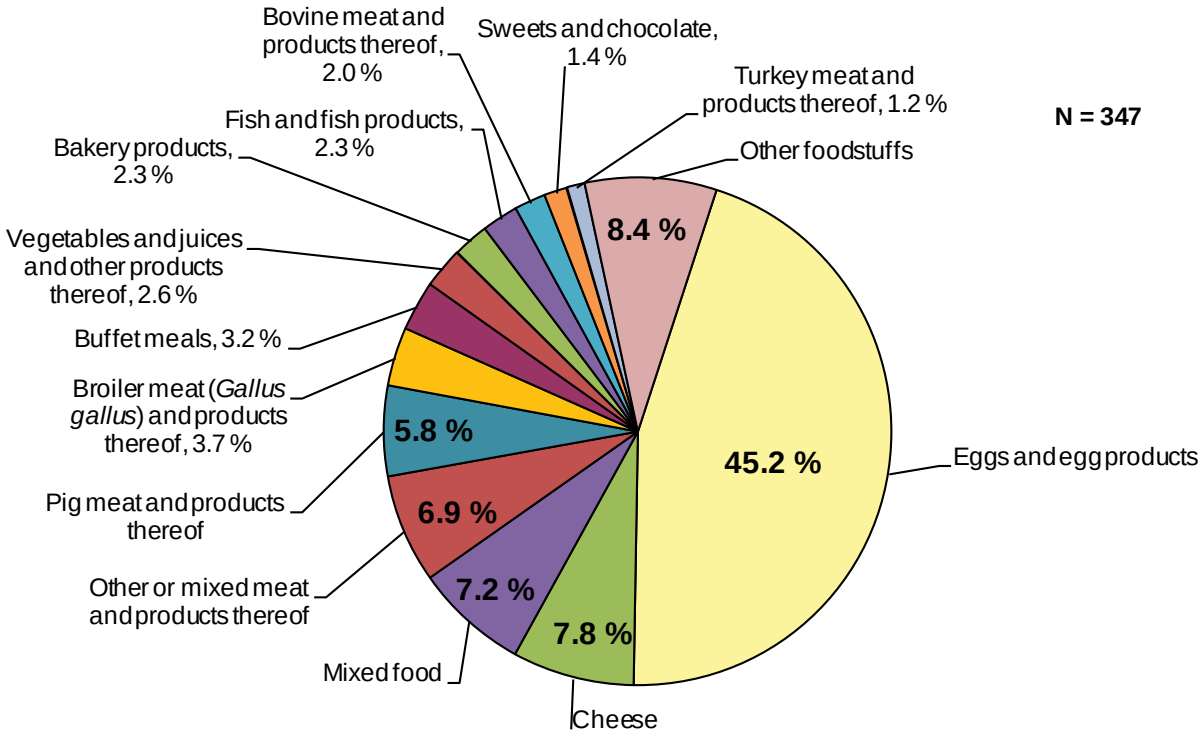
Country	Total outbreaks		Strong-evidence outbreaks				Weak-evidence outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Austria	53	0.63	2	214	22	0	51	148	39	0
Belgium	6	0.05	6	43	3	0	-	-	-	-
Bulgaria	1	0.01	-	-	-	-	1	47	-	-
Czech Republic	19	0.18	-	-	-	-	19	391	59	0
Denmark	11	0.20	5	117	10	0	6	24	1	0
Estonia	13	0.97	1	87	20	0	12	51	26	0
Finland	2	0.04	1	97	2	0	1	13	2	0
France	198	0.30	102	669	126	1	96	692	70	0
Germany	176	0.22	29	803	166	3	147	552	146	0
Greece	20	0.18	-	-	-	-	20	92	46	0
Hungary	80	0.80	9	517	133	0	71	373	43	0
Ireland	4	0.09	1	3	-	0	3	6	2	0
Italy	2	<0.01	-	-		-	2	7	-	-
Latvia	26	1.17	-	-	-	-	26	174	46	0
Lithuania	50	1.54	5	69	22	0	45	138	109	0
Malta	8	1.44	-	.	-	-	8	19	2	0
Netherlands	13	0.08	4	1,223	30	4	9	30	5	0
Poland	188	0.49	69	596	230	0	119	929	287	0
Romania	1	<0.01	1	7	0	0	-	-	-	-
Slovakia	408	7.51	4	150	30	0	404	1,277	224	0
Slovenia	4	0.20	4	78	14	0	-	-	-	-
Spain	225	0.49	95	940	162	0	130	1,062	158	0
Sweden	9	0.10	1	34	-	-	8	58	2	-
United Kingdom	16	0.03	8	140	15	2	8	25	31	0
EU Total	**1,533**	**0.31**	**347**	**5,787**	**985**	**10**	**1,186**	**6,108**	**1,298**	**0**
Norway	4	0.08					4	25	5	0
Switzerland	1	0.01	1	4	1	0	-	-	-	-

Detailed information from strong-evidence *Salmonella* outbreaks

Figure OUT13 shows the distribution of the most common food vehicles implicated in the strong-evidence *Salmonella* outbreaks in 2012. As in previous years, eggs and egg products were the most frequently identified food vehicles, associated with 45.2 % of these outbreaks. The proportion of strong-evidence *Salmonella* outbreaks, implicating contaminated eggs and egg products, was lower than in 2011 (50.5 %) but similar to 2010 (43.7 %) and previous years. Most of these outbreaks were reported by three MSs (France, Spain and Poland). The next most commonly implicated single food vehicle category, in the *Salmonella* outbreaks, was cheese (7.8 % of strong-evidence outbreaks), followed by mixed food (7.2 %). The outbreaks associated with consumption of cheese were reported by one MS, France. No additional information was provided on the type of cheese implicated and on the contributing factors.

A decrease was observed both in the proportion and in the numbers of outbreaks related to sweets and chocolate from 6.7 % in 2011 to 1.4 % in 2012. In 2011 most of the outbreaks in this category were reported by one country, Poland. The number of outbreaks implicating bakery products decreased to 2.3 % from 4.2 % in 2011. In addition, the proportion and number of outbreaks linked to bovine meat slightly decreased since 2011 (from 2.8 % to 2.0 %) but the proportion of outbreaks associated with broiler meat and pig meat increased. For broiler meat the proportion was 3.2 % in 2011 and 3.7 % in 2012 and for pig meat the proportion in 2011 was 4.6 % compared with 5.8 % in 2012.

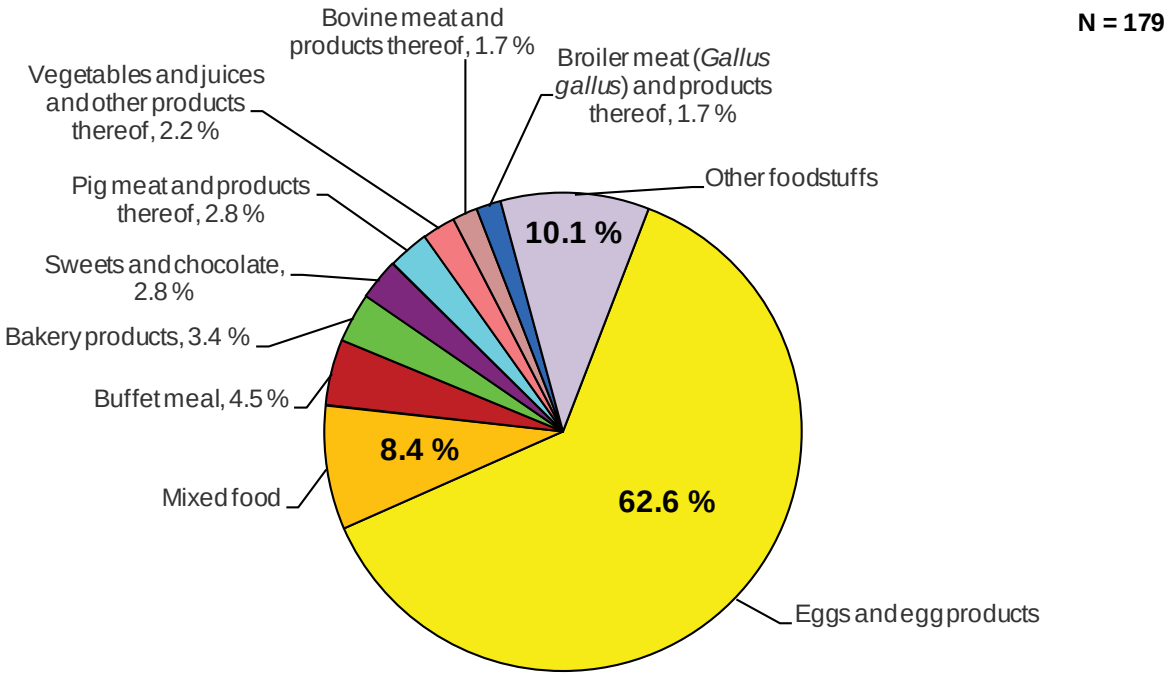
Figure OUT13. Distribution of food vehicles in strong-evidence outbreaks caused by* Salmonella *in the EU, 2012



Note: Data from 347 outbreaks are included: Austria (2), Belgium (6), Denmark (5), Estonia (1), Finland (1), France (102), Germany (29), Hungary (9), Ireland (1), Lithuania (5), Netherlands (4), Poland (69), Romania (1), Slovakia (4), Slovenia (4), Spain (95), Sweden (1) and United Kingdom (8).

Other foodstuffs (N = 29) include: crustaceans, shellfish, molluscs and products thereof (3), dairy products (2), fruits and juices and other products thereof (2), herbs and spices (1) and other foods (21).

Figure OUT14. Distribution of food vehicles in strong-evidence outbreaks caused by S. Enteritidis in the EU, 2012



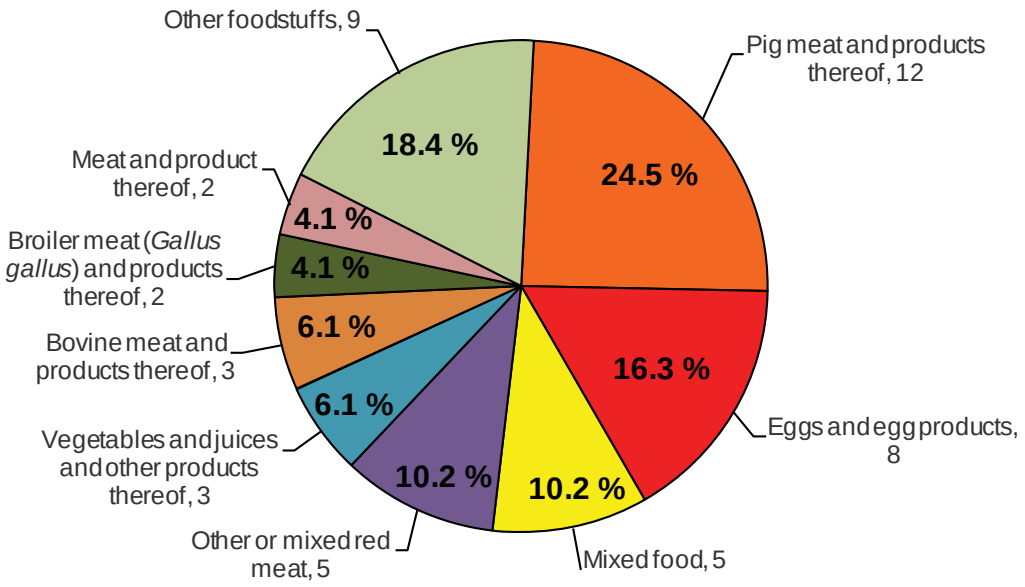
Note: Data from 179 outbreaks included: Austria (1), Belgium (2), Estonia (1), France (22), Germany (16), Hungary (5), Lithuania (5), Poland (67), Slovakia (4), Slovenia (2), Spain (50) and United Kingdom (4).

Other foodstuffs (N = 18) include: cheese (1), dairy products (other than cheeses) (2), fish and fish products (1), herbs and spices (1), meat and product thereof, unspecified (2), other, mixed or unspecified poultry meat (2), other or mixed red meat and products thereof (1) and other foods (8).

In 2012, 179 outbreaks, in total, with strong evidence were caused by *S*. Enteritidis. Most of these outbreaks were attributed to eggs and egg products (112 strong-evidence *S.* Enteritidis outbreaks, 62.6 %, compared with 108 outbreaks in 2011). Buffet meals and bakery products were implicated in 4.5 % and 3.4 % of outbreaks, respectively. Sweets and chocolate were implicated in 2.8 % of outbreaks, a decrease of 73.7 % compared with 2011, when sweets and chocolate were implicated in 10.0 % of *S.* Enteritidis outbreaks (Figure OUT14).

Figure OUT15. Distribution of food vehicles in strong-evidence outbreaks caused by S. Typhimurium in the EU, 2012

N = 49



Note: Data from 49 outbreaks are included: France (22), Denmark (3), Germany (8), Hungary (3), Netherlands (1), Poland (1), Spain (8), Sweden (1) and United Kingdom (2).

Other foodstuffs (N = 9) include: bakery products (1), fish and fish products (1), other, mixed or unspecified poultry meat (1), and other foods (6).

Number after the label refers to the number of outbreaks.

In total, 49 strong-evidence outbreaks were caused by *S.* Typhimurium (Figure OUT15), a substantial increase compared with 2011 when 29 strong-evidence outbreaks were caused by *S.* Typhimurium. The food vehicle most frequently reported was pig meat and products thereof (12 outbreaks, compared with 10 in 2011). Other important vehicles were eggs and egg products (eight outbreaks).

The seven outbreaks due to monophasic *S.* Typhimurium were associated with the consumption of pig meat (three outbreaks), bovine meat (two outbreaks), vegetables, juices and other products thereof (one outbreak) and mixed food-doner kebab (one outbreak).

The type of outbreak was reported in 340 (98.0 %) of *Salmonella* outbreaks: altogether 173 of these (50.9 %) were classified as household and 167 (49.1 %) as general. The setting was reported as household/domestic kitchen in 200 (57.6 %) of the 347 *Salmonella* outbreaks, followed by restaurant, café, bar, hotel in 65 outbreaks (18.7 %) and school/kindergarten in 18 (5.2 %).

Many contributory factors, either alone or in combination, were reported in 185 *Salmonella* outbreaks. The most common were unprocessed contaminated ingredient (in 63 outbreaks), inadequate heat treatment (in 53 outbreaks), inadequate chilling (in 35 outbreaks) storage time/temperature abuses (in 34 outbreaks) and infected food handlers (in 30 outbreaks).

Between 2011 and 2012, an outbreak of *Salmonella* Stanley infection occurred in Austria, Belgium, the Czech Republic, Germany, Hungary, Slovak Republic and the United Kingdom, involving 167 confirmed and 254 probable cases. The descriptive epidemiology of human cases indicated a transmission originating from a persistent common source or multiple sources, in the EU, which were contaminated with isolates indistinguishable by *XbaI*-PFGE. Food and veterinary investigations, conducted in Austria, Belgium, Germany, the Czech Republic, Poland and Hungary, identified an indistinguishable *XbaI*-PFGE fingerprint and a common resistance to nalidixic acid with concomitant decreased susceptibility to ciprofloxacin, among isolates originating from the turkey production chain (turkeys and turkey meat). Isolates with indistinguishable PFGE patterns were also detected in some cases from broiler flocks (breeding and fattening chicken flocks) and meat from other animal species (broiler meat, beef and pork) The epidemiological and microbiological information gathered through the public health, food and veterinary investigations strongly suggested that the turkey production chain was the source of the outbreak. However, the contribution of other food and animal sources, such as beef, pork and broiler meat, to the outbreak cannot be ruled out.
More information on this outbreak can be found at: http://www.efsa.europa.eu/en/efsajournal/pub/2893.htm

4.3. *Campylobacter*

Within the EU, 19 MSs reported a total of 501 food-borne *Campylobacter* outbreaks (Table OUT7), a decrease compared with 2011, when a total of 596 outbreaks were reported. This represents 9.3 % of the total reported food-borne outbreaks in the EU, a decrease compared with 2011, when *Campylobacter* outbreaks constituted 10.6 % of the total reported food-borne outbreaks in the EU. The overall reporting rate in the EU was 0.10 per 100,000 population, similar to that reported in 2011 (0.12) and in 2010 (0.10). As was the case in 2011, Austria, Germany and Slovakia reported the majority of outbreaks (78.2 %). In addition, Norway and Switzerland reported two outbreaks each.

Only 25 (5.0 %) *Campylobacter* outbreaks were classified as strong-evidence outbreaks. In addition, Switzerland reported two strong-evidence outbreaks, one of which involved a fatal case.

Table OUT7. Strong- and weak-evidence food-borne outbreaks caused by* Campylobacter *in the EU, 2012

Country	Total outbreaks		Strong-evidence outbreaks				Weak-evidence outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Austria	61	0.72	-	-	-	-	61	137	30	0
Belgium	2	0.02	1	2	0	0	1	2	0	0
Czech Republic	2	0.02	-	-	-	-	2	31	1	0
Denmark	3	0.05	3	31	1	0	-	-	-	-
Estonia	3	0.22	-	-	-	-	3	8	3	0
Finland	4	0.07	3	44	6	0	1	3	0	0
France	18	0.03	5	14	3	0	13	80	8	0
Germany	134	0.16	5	27	5	0	129	345	34	0
Hungary	16	0.16	-	-	-	-	16	40	2	0
Ireland	2	0.04	-	-	-	-	2	5	0	0
Italy	3	<0.01	-	-	-	-	3	8	-	-
Lithuania	8	0.27	-	-	-	-	8	16	13	0
Malta	16	3.35	-	-	-	-	16	39	14	0
Netherlands	14	0.08	1	15	2	0	13	55	0	0
Poland	5	0.01	-	-	-	-	5	10	4	0
Slovakia	197	3.65	-	-	-	-	197	500	66	0
Spain	3	<0.01	0	0	0	0	3	298	5	0
Sweden	3	0.03	-	-	-	-	3	26	-	-
United Kingdom	7	0.01	7	65	0	0	-	-	-	-
EU Total	**501**	**0.10**	**25**	**198**	**17**	**0**	**476**	**1,603**	**180**	**0**
Norway	2	0.04	-	-	-	-	2	5	1	0
Switzerland	2	0.03	2	44	3	1	-	-	-	-

Detailed information from strong-evidence *Campylobacter* outbreaks

Of the 25 strong-evidence *Campylobacter* outbreaks, 19 were categorised as general outbreaks, four as household outbreaks and two outbreaks were classified as unknown.

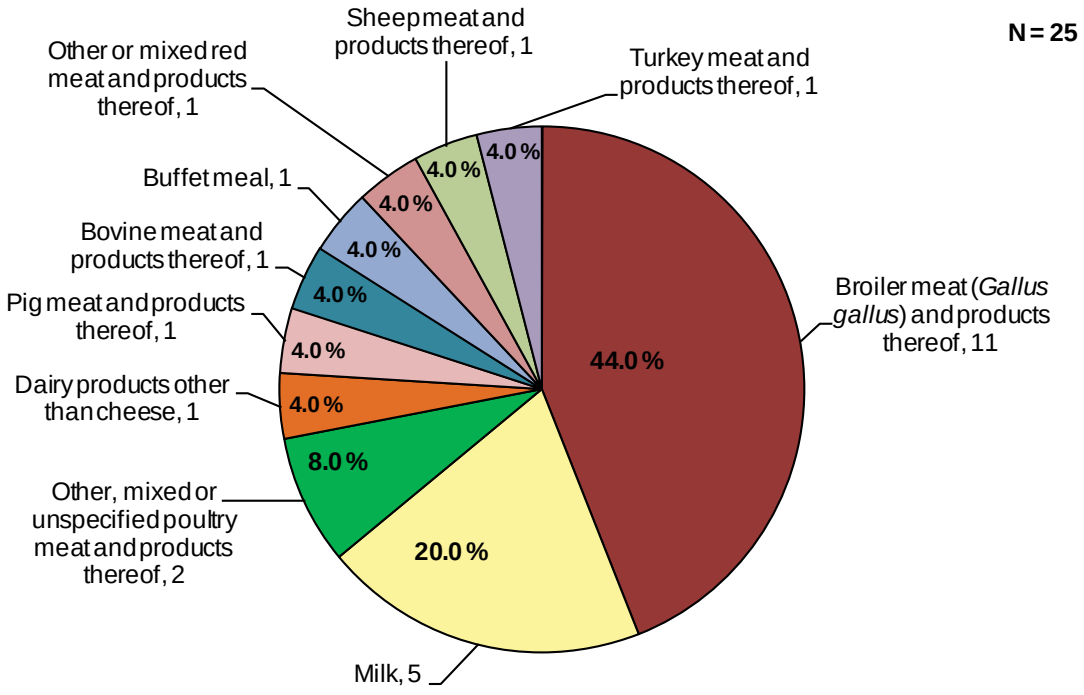
Figure OUT16 shows the distribution of the most common food vehicles implicated in the strong-evidence *Campylobacter* outbreaks in 2012. As in previous years, broiler meat was the most frequently identified food vehicle, associated with 44.0 % of these outbreaks. The proportion of strong-evidence *Campylobacter* outbreaks implicating broiler meat was similar to that in 2011 (45.9 %). The next most commonly implicated food vehicle was milk with 20.0 %, an increase compared with 2011, when 13.5 % of outbreaks implicated milk.

Seven outbreaks were reported by the United Kingdom, and six of these were associated with broiler meat. Five outbreaks were reported by France, and two of these were associated with broiler meat and the other three were associated with bovine meat, mixed red meat and turkey meat. The five outbreaks reported by Germany were associated with raw minced pig meat (one outbreak), carpaccio from raw duck meat (one outbreak) and raw milk (three outbreaks).

In 21 outbreaks the setting was identified: the most frequently reported was restaurant, café, pub, bar, hotel, catering service (10 outbreaks), followed by household/domestic kitchen (six outbreaks). Farm was the setting in two outbreaks and the place of origin of the problem reported in five outbreaks, and the food vehicle in these outbreaks was raw/unpasteurised milk. Many contributory factors, either alone or in combination, were reported in 14 outbreaks. The most common factor was inadequate heat treatment, reported in five outbreaks, followed by unprocessed contaminated ingredient, reported in four outbreaks.

Two outbreaks were reported by Switzerland. Both were general outbreaks and associated with broiler meat. The settings were a residential institution and a mass catering establishment and the contributory factors were storage time/temperature abuse and cross-contamination, respectively.

Figure OUT16. Distribution of food vehicles in strong-evidence outbreaks caused by* Campylobacter *in the EU, 2012



Note: Data from 25 outbreaks are included: Belgium (1), Denmark (3), Finland (3), France (5), Germany (5), Netherlands (1) and United Kingdom (7).
Number after the label refers to the number of outbreaks.

4.4. Verotoxigenic *Escherichia coli* and other pathogenic *Escherichia coli*

Nine MSs reported 41 outbreaks caused by human pathogenic *E. coli*, excluding 10 strong waterborne outbreaks (Table OUT16). This is a decrease since 2011 when 12 MSs reported a total of 60 food-borne outbreaks. This represents 0.8 % of the total number of reported food-borne outbreaks in the EU.

Detailed information from strong-evidence *E. coli* outbreaks

Twelve *E. coli* outbreaks were supported by strong evidence, and these outbreaks were reported by six MSs, by the United Kingdom (four outbreaks), Belgium (three), Denmark (two), Austria (one), Finland (one) and Portugal (one). Nine outbreaks were due to VTEC O157, one to VTEC O113:H4, one to other VTEC serotypes, and one to *E. coli* positive for LT genes.

Ten outbreaks were general and two household. These resulted in 117 cases, 78 hospitalisations and no fatalities.

The main food vehicle was bovine meat and products thereof, reported in six outbreaks; pig meat (roasted pork) was the food vehicle reported in two outbreaks linked to temporary mass catering. Each of the remaining four outbreaks was associated with raw milk, herbs and spices, mixed food, and other or mixed red meat.

The setting in five outbreaks was household. Two outbreaks were linked to temporary mass catering (fairs, festivals), one was associated with restaurant, café, pub, bar, hotel, catering service, and one with residential institutions. Information on setting was not provided in three outbreaks. Contributing factors were unprocessed contaminated ingredients in five outbreaks, inadequate heating in two outbreaks and cross-contamination in one outbreak. For three outbreaks the contributing factors were either not reported or were unknown.

Ten waterborne outbreaks attributable to pathogenic *E. coli* were also reported by Ireland (Table OUT16).

In Belgium, an outbreak of bloody diarrhoea and haemolytic-uraemic syndrome (HUS) caused by *Escherichia coli* O157 involved 24 cases, of which 17 were laboratory-confirmed. Four patients developed HUS, two children and two middle-aged women. The source of the outbreak could be traced back to the slaughterhouse by sampling and laboratory analyses, exploratory interviews and a case-control study. The patients were most frequently infected through the consumption of raw bovine meat products such as 'steak tartare'.

4.5. Other bacterial agents

Under the category 'other bacterial agents', outbreaks due to *Listeria*, *Shigella*, *Brucella*, *Francisella, Vibrio parahaemolyticus* and other bacterial agents are reported. In addition, a specific category was used for reporting outbreaks caused by *Yersinia*.

In 2012, 92 outbreaks caused by these bacteria were reported by 12 MSs, representing 1.7 % of all outbreaks reported in the EU. Ten of them (10.9 %), reported by four MSs, were supported by strong evidence. In addition, one non-MS reported one weak-evidence outbreak.

Five of the strong-evidence outbreaks were caused by ***Listeria monocytogenes*** (*L. monocytogenes*), four of which were general and the fifth was a household outbreak. Three general outbreaks were reported by the United Kingdom, resulting in 24 cases, 24 hospitalisations and five deaths. One of these outbreaks took place in a hospital/care home setting and mixed food (sandwiches) was implicated. In one outbreak the cases were disseminated, the implicated food was bakery products (pork pies) and cross-contamination was reported as a contributory factor. Mobile retailer/street vendor was the setting in the third outbreak; bovine meat and products thereof were implicated (pressed beef also called potted beef or beef stew) and cross-contamination was reported as a contributory factor.

In Spain a general household outbreak caused by *L. monocytogenes* resulted in 11 cases, three hospitalisations and one death. Cheese was the implicated food vehicle.

A *L. monocytogenes* outbreak in Finland was associated with other or mixed red meat and products thereof (meat jelly) and accounted for 20 cases and three deaths (see specific text box).

In July in Finland, a total of 10 cases with *L. monocytogenes* serotype IIa PFGE type 225 were identified in one ward of a municipal hospital. All cases presented with diarrhoea and two of them with septicaemia. One patient died 20 days after the onset of gastrointestinal listeriosis. Meat jelly was considered to be the probable source of the infection since the outbreak was limited to the wards where this product had been served. According to staff interviews, only a half of a meat jelly package was consumed after opening, and the other half was served within 24 hours or destroyed. However, the staff recalled that in July one opened package was stored in the refrigerator and was still used for serving one week later. No pathogens were found in any food or environmental samples taken at the hospital. From the middle of June to the middle of August, 10 cases with the same *L. monocytogenes* serotype were reported from various municipalities across Finland. Stool testing or diarrhoeal symptoms were not mentioned in the medical records of these cases. Two patients died within four to five days after the onset of illness. Among the 10 cases, seven had been in institutional care during June and July. Local health inspectors reported that all seven had had an opportunity to consume the suspected meat jelly product at the care facility. The sliced meat jelly was produced in 500kg batches on a biweekly basis and delivered to customers across the country through a distribution company. Internal quality control samples yielded negative results for *Listeria* at the production plant from March to May except for one finding of *L. monocytogenes* different from the outbreak strain. During an inspection carried out by the local food safety authority, at the beginning of August, a pooled sample taken from a floor drain and a wagon wheel in the food processing environment was found positive for the outbreak strain of *L. monocytogenes*.

Two strong-evidence outbreaks caused by ***Shigella*** were reported by France. Both were general outbreaks and resulted in 45 cases and five hospitalisations. There were no fatalities. Broiler meat was implicated in one outbreak which was linked to a restaurant, café, pub, bar, hotel setting and mixed food was implicated in the other outbreak. The setting for this latter outbreak was a residential institution. Contributory factors were reported as unknown.

One strong-evidence outbreak due to ***Brucella*** was reported by France. This was a household outbreak with a household/domestic kitchen setting and affected two people. Cheese was implicated and contributory factors were reported as unknown.

One outbreak of ***Francisella*** was reported by France. This was a household outbreak and was associated with other, mixed or unspecified poultry meat and products thereof. Three people were affected and there were no hospitalisations or deaths. The setting was household/domestic kitchen and an infected food handler was reported as a contributing factor.
One strong-evidence general outbreak due to ***Vibrio parahaemolyticus*** was reported by Spain. This resulted in 51 cases with no hospitalisations or deaths. It was a general outbreak and the setting was canteen/workplace catering and crustaceans, shellfish, molluscs and products thereof were implicated. Contributory factors were reported as unknown.

No strong-evidence food-borne outbreaks caused by *Yersinia* were reported.

4.6. *Bacillus*

This section details food-borne outbreaks in which the causative agent was reported as *Bacillus* toxins.

In 2012, 10 MSs reported 259 outbreaks (in 2011: 11 MSs reported 220 outbreaks) in which *Bacillus* toxins were the causative agent, representing 4.8 % of all outbreaks reported within the EU. The overall reporting rate in the EU was 0.05 per 100,000. France reported the majority (84.2 %) of these outbreaks, which involved 2,022 human cases, 126 hospitalisations and three deaths (Table OUT9). In addition, two non-MSs reported two outbreaks.

In total, 38 strong-evidence outbreaks caused by *Bacillus* toxins were reported in the EU, with the majority (20 outbreaks) reported by France. All these outbreaks were caused by *B. cereus* toxins, but two outbreaks, reported by Germany and Spain, were due to toxins of *Bacillus* spp. unspecified. These outbreaks affected 712 people, of whom 2.2 % were hospitalised. One strong-evidence outbreak due to *B. cereus* was reported by Switzerland and affected eight people, all hospitalised.

Detailed information from strong-evidence *Bacillus* outbreaks

In strong-evidence *Bacillus* outbreaks, mixed food was the most commonly implicated food vehicle (28.9 % of outbreaks). The second most frequently reported implicated single food vehicle was fish and fish products (13.2 % of outbreaks), followed by cereal products (10.5 %) (Figure OUT17).

Table OUT8. Strong- and weak-evidence food-borne outbreaks caused by Bacillus *toxins in the EU, 2012*

Country	Total outbreaks		Strong-evidence outbreaks				Weak-evidence outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Belgium	3	0.03	2	24	0	0	1	3	0	0
Denmark	3	0.05	3	43	0	0	-	-	-	-
Finland	5	0.09	3	13	0	0	2	50	0	0
France	218	0.33	20	349	11	0	198	1,673	115	3
Germany[1]	5	0.01	4	22	3	0	1	-	-	-
Hungary	1	0.01	-	-	-	-	1	13	0	0
Netherlands	12	0.07	-	-	-	-	12	43	0	0
Spain	8	0.02	4	56	2	0	4	15	0	0
Sweden	3	0.03	1	5	-	-	2	9	-	-
United Kingdom	1	<0.01	1	200	0	0	-	-	-	-
EU Total	**259**	**0.05**	**38**	**712**	**16**	**0**	**221**	**1,806**	**115**	**3**
Norway	1	0.02	-	-	-	-	1	6	0	0
Switzerland	1	0.01	1	8	8	0	-	-	-	-

1. The number of human cases was known only for two out of the four strong- evidence outbreaks reported. No information was reported for the other two outbreaks.

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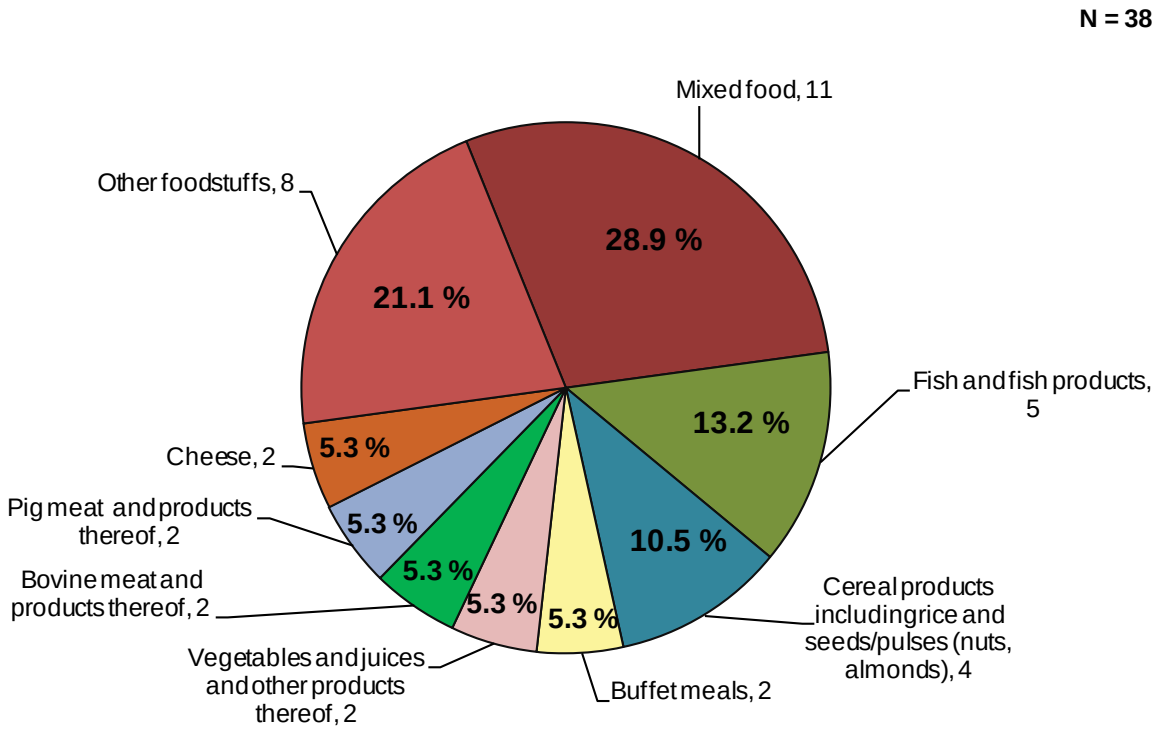
Figure OUT17. Distribution of food vehicles in strong-evidence outbreaks caused by* Bacillus *toxins in the EU, 2012



Note: Data from 38 outbreaks are included: Belgium (2), Denmark (3), Finland (3), France (20), Germany (4), Spain (4), Sweden (1) and United Kingdom (1).

Other foodstuffs (N = 8) include: bakery products (1), broiler meat (*Gallus gallus*) and products thereof (1), eggs and egg products (1), other or mixed red meat and products thereof (1), poultry meat (1), turkey meat and products thereof (1) and other foods (2).

Number after the label refers to the number of outbreaks.

Information on the type of outbreak was available for 36 outbreaks. Twenty-seven were classified as general and nine as household. For 35 outbreaks, information on the setting was provided: restaurant, café, pub, bar, hotel was the most frequently reported (11 outbreaks), followed by household/domestic kitchen (10 outbreaks). In five outbreaks the setting was a school/ kindergarten.

Many contributory factors, either alone or in combination, were reported in 18 outbreaks: inadequate chilling was reported as a contributing factor in seven outbreaks and storage time/temperature abuses in six outbreaks. Other factors included an infected food handler (in three outbreaks), inadequate heat treatment (in three outbreaks), cross-contamination (in one outbreak) and an unprocessed contaminated ingredient (in one outbreak).

In a kindergarten in Belgium, 20 out of 22 children started vomiting within 30 minutes after the consumption of rice containing cucumber and chicory. The rice was stored for 24 hours before preparation of the meal. High levels of *Bacillus cereus* (10^7 cfu/g) positive for the gene encoding the emetic toxin could be isolated from leftovers of the meal. Interestingly, the level of cereulide was quantified using liquid chromatography-mass spectroscopy (LC-MS) and was between 0.35 and 4.2 µg/g.

4.7. *Clostridium*

Thirteen MSs reported 172 food-borne outbreaks caused by *Clostridium perfringens*, *C. botulinum* or other *Clostridia* (Table OUT9). This represents 3.2 % of all outbreaks, compared with 2.9 % in 2011 (15 MSs, 165 outbreaks). However, it is an increase of almost 100 % compared with outbreaks reported in 2010 (88 outbreaks). As in 2011, the overall reported rate in EU was 0.03. France reported 53.5 % (92) of the outbreaks (Table OUT9). In addition, two non-MSs reported three outbreaks. Twelve fatalities were reported by three MSs, two in strong-evidence outbreaks and 10 in weak-evidence outbreaks (Table OUT9).

Fifty-four of these outbreaks (31.4 %) had strong evidence, and 25 of these (46.3 %) were reported by France. The rest were reported fairly evenly among the other seven reporting MSs. Two non-MSs each reported one strong-evidence outbreak (Table OUT9).

Detailed information from strong-evidence *Clostridium* outbreaks

Mixed food was the most frequently identified food vehicle, associated with 44.4 % of strong-evidence *Clostridium* outbreaks. The next most frequently reported food vehicles were bovine and pig meat and products thereof (9.3 %) (Figure OUT18).

Information on the type of outbreak was available for 53 out of 54 strong-evidence outbreaks: 45 were general outbreaks, and eight were household/domestic kitchen outbreaks. The settings most frequently reported were residential institution (nine outbreaks) and canteen or workplace catering (nine outbreaks), followed by restaurant, café, pub, bar, hotel (eight outbreaks), household/domestic kitchen (seven outbreaks) and school/ kindergarten (six outbreaks). The setting was unknown or not reported in 10 outbreaks.

Many contributory factors, either alone or in combination, were reported in 23 outbreaks. These included storage time/temperature abuses (10 outbreaks), inadequate heat treatment (eight outbreaks), inadequate chilling (eight outbreaks), cross-contamination (two outbreaks), and unprocessed contaminated ingredient (one outbreak). Contributory factors were reported as unknown in 31 outbreaks.

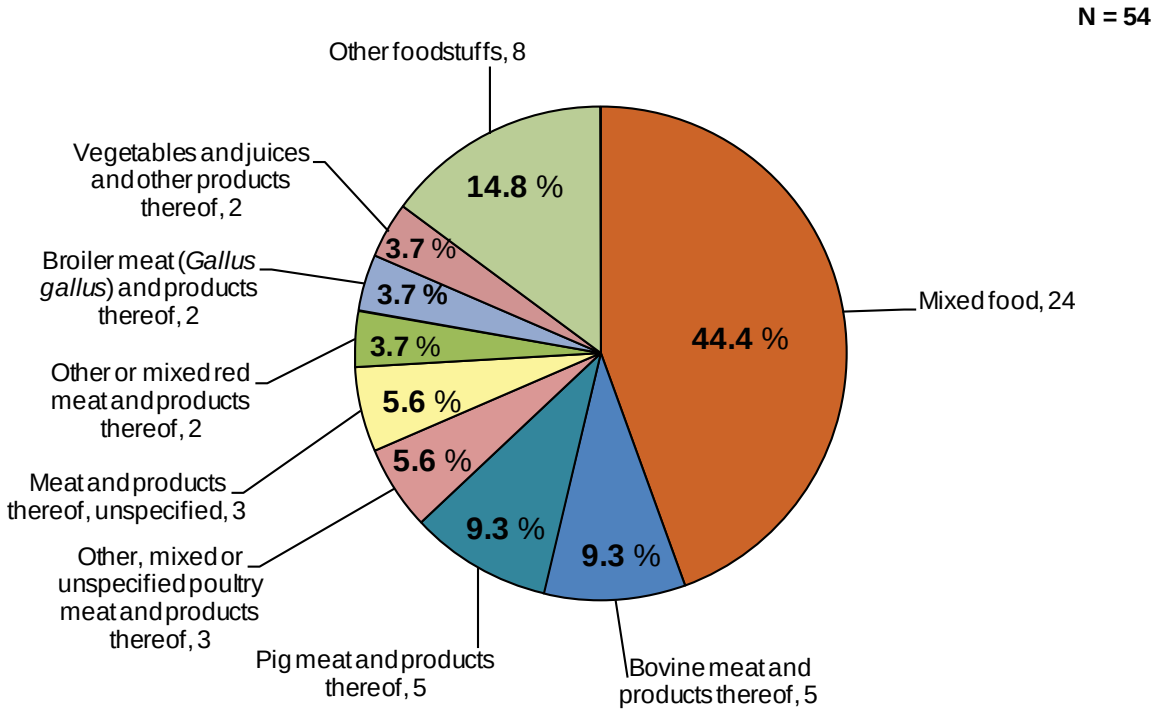
In the United Kingdom one death was reported from a *C. perfringens* outbreak that affected 22 people and was supported by analytical epidemiological evidence. The setting was a restaurant, the food vehicle was turkey meat and the contributory factors were unknown. In Spain one outbreak due to *C. perfringens,* associated with ‘Other food’, accounted for 57 human cases, two hospitalisations and one death.

Table OUT9. Strong- and weak-evidence food-borne outbreaks caused by* Clostridium *toxins in the EU, 2012

Country	Total outbreaks		Strong-evidence outbreaks				Weak-evidence outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Denmark	8	0.14	8	175	0	0	-	-	-	-
France	92	0.14	25	712	8	0	67	1,105	15	0
Germany	5	0.01	5	66	0	0	-	-	-	-
Hungary	1	0.01	-	-	-	-	1	13	0	0
Italy	2	<0.01	-	-	-	-	2	5	-	-
Latvia	1	0.05	-	-	-	-	1	2	2	0
Netherlands	4	0.02	-	-	-	-	4	11	1	0
Poland	31	0.08	-	-	-	-	31	244	147	9
Portugal	4	0.04	4	52	2	0	-	-	-	-
Slovenia	1	0.05	1	105	0	0	-	-	-	-
Spain	15	0.03	6	439	4	1	9	1,113	3	1
Sweden	3	0.03	1	118	-	-	2	17	-	-
United Kingdom	5	0.01	4	62	3	1	1	17	0	0
EU Total	**172**	**0.03**	**54**	**1,729**	**17**	**2**	**118**	**2,527**	**168**	**10**
Iceland	1	0.31	1	25	0	0	-	-	-	-
Norway	2	0.04	1	78	0	0	1	1	0	0

Note: Data include outbreaks caused by *Clostridium botulinum*, *Clostridium perfringens* and *Clostridium* spp., unspecified.

Figure OUT18. Distribution of food vehicles in strong-evidence outbreaks caused by* Clostridium *toxins (including* Clostridium botulinum *toxins) in the EU, 2012



Note: Data from 54 outbreaks are included: Denmark (8), France (25), Germany (5), Portugal (4), Slovenia (1), Spain (6), Sweden (1) and United Kingdom (4).

Other foodstuffs (N = 8) include: buffet meals (1), canned food products (1), turkey meat and products thereof (1) and other foods (5).

Number after the label refers to the number of outbreaks.

C. botulinum

In total, six outbreaks caused by *C. botulinum* were reported by three MSs; France, Portugal and Spain. Five of them, supported by strong evidence, were household outbreaks and accounted for eight human cases and seven hospitalisations (Table OUT10).

Portugal reported two outbreaks without detailed information on the food vehicle. The setting was also reported as unknown, as were the contributory factors. In France, one outbreak was associated with a canned food product and one with vegetables and juices. The setting in both outbreaks was household/domestic kitchen, and contributory factors were reported as unknown. Spain reported one outbreak, which was associated with 'Other foods'. Contributing factors were storage time/temperature abuses, inadequate heat treatment and inadequate chilling.

No outbreaks due to *C. botulinum*, with either strong or weak evidence, were reported by non-MSs (Table OUT10).

Table OUT10. Strong-evidence food-borne outbreaks caused by* Clostridium botulinum *toxins in the EU, 2012

Country	Strong-evidence outbreaks			
	N	Human cases		
		Cases	Hospitalised	Deaths
France	2	4	4	0
Portugal	2	2	2	0
Spain	1	2	1	0
EU Total	**5**	**8**	**7**	**0**

4.8. Staphylococcal enterotoxins

Fourteen MSs reported 346 outbreaks caused by staphylococcal toxins, representing 6.4 % of all outbreaks reported in the EU. This is similar to 2011, when 345 outbreaks were reported. As in 2011, the overall reporting rate was 0.07 per 100,000. The highest number of outbreaks was reported by France, 300 (86.7 %), even though, for most of these outbreaks (291), only weak evidence was provided. One case fatality was reported by France in one weak-evidence outbreak (Table OUT11). No non-MS reported an outbreak.

Thirty-five (10.1 %) of the outbreaks were strong-evidence outbreaks, reported by nine MSs. The majority of these, 57.1 %, were reported by Spain and France. All strong-evidence outbreaks accounted for 497 cases, of whom 88 (17.7 %) were hospitalised, but no case fatalities were reported (Table OUT11).

Table OUT11. Strong- and weak-evidence food-borne outbreaks caused by staphylococcal toxins in the EU, 2012

Country	Total outbreaks		Strong-evidence outbreaks				Weak-evidence outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Belgium	4	0.04	4	39	1	0	-	-	-	-
Denmark	1	0.02	1	68	0	0	-	-	-	-
Finland	2	0.04	1	2	0	0	1	4	0	0
France	300	0.46	9	92	6	0	291	1,842	175	1
Germany	3	<0.01	3	12	3	0	-	-	-	-
Italy	1	<0.01	-	-	-	-	1	22	-	-
Latvia	1	0.05	-	-	-	-	1	18	15	0
Netherlands	2	0.01	-	-	-	-	2	5	0	0
Poland	5	0.01	3	105	54	0	2	45	2	0
Portugal	2	0.02	2	43	0	0	-	-	-	-
Romania	1	<0.01	1	66	24	0	-	-	-	-
Slovakia	2	0.04	-	-	-	-	2	6	1	0
Spain	20	0.04	11	70	0	0	9	89	6	0
Sweden	2	0.02	-	-	-	-	2	4	1	-
EU Total	**346**	**0.07**	**35**	**497**	**88**	**0**	**311**	**2,035**	**200**	**1**

Detailed information from strong-evidence *Staphylococcus* enterotoxin outbreaks

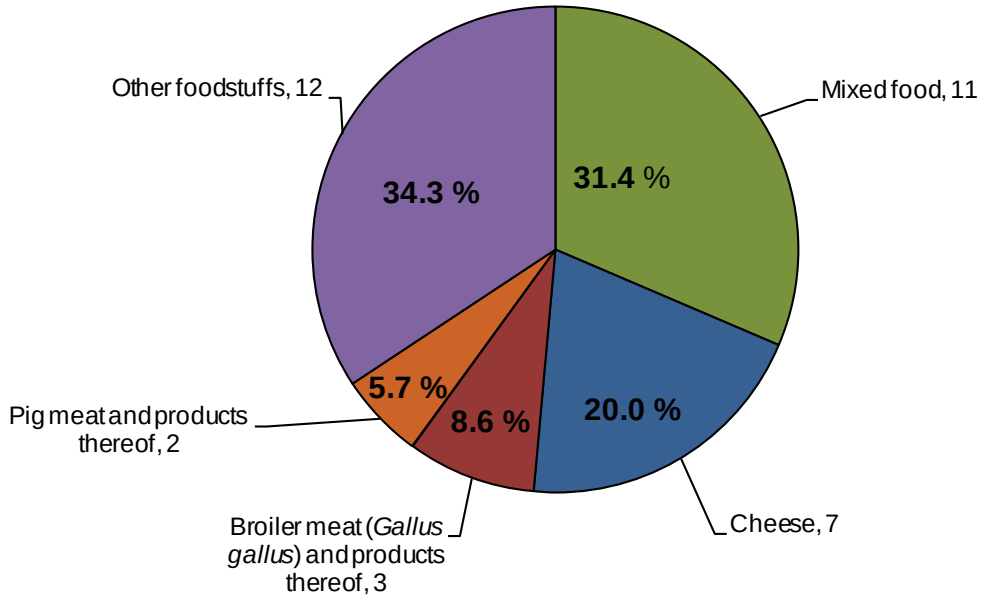
The first most frequently single food category reported was mixed foods (31.4 %) (Figure OUT19), followed by cheese (20.0 %).

The type of outbreak was provided for 34 outbreaks: 26 were general outbreaks and eight were household outbreaks. The most commonly reported settings were restaurant, café, pub, bar, hotel (11 outbreaks), followed by household/domestic kitchen in nine outbreaks.

Many contributory factors, either alone or in combination, were reported in these outbreaks. These include storage time/temperature abuses (in four outbreaks), inadequate chilling (in three outbreaks), inadequate heat treatment (in two outbreaks), an infected food handler (in two outbreaks) and unprocessed contaminated ingredient (in one outbreak). For 20 outbreaks, contributory factors were reported as unknown.

Figure OUT19. Distribution of food vehicles in strong-evidence outbreaks caused by staphylococcal toxins in the EU, 2012

N = 35



Note: Data from 35 outbreaks are included: Belgium (4), Denmark (1), Finland (1), France (9), Germany (3), Poland (3), Portugal (2), Romania (1) and Spain (11).

Other foodstuffs (N = 12) include: bovine meat and products thereof (1), buffet meals (1), crustaceans, shellfish, molluscs and products thereof (1), eggs and egg products (1), meat and product thereof, unspecified (1), milk (1), other or mixed red meat and products thereof (1), poultry meat and products thereof (1) and other foods (4).

Number after the label refers to the number of outbreaks.

4.9. Viruses

Twenty MSs reported a total of 752 food-borne outbreaks caused by viruses (Table OUT12), excluding four strong-evidence waterborne outbreaks (Table OUT16). This represents 14.0 % of all outbreaks reported in the EU and an increase of 44.3 % compared with 2011 (521 outbreaks). At the national level, a substantial increase in the number of outbreaks due to viruses was observed in Latvia (29 outbreaks in 2011, compared with 311 in 2012). The overall reporting rate in the EU was 0.15 outbreaks per 100,000 population. Latvia reported the majority of the outbreaks (41.4 %), followed by Poland (17.8 %). One case fatality was reported by France in one weak-evidence outbreak (Table OUT12). In addition, two non-MSs reported 15 outbreaks.

Only 13.4 % (101) of reported viral outbreaks had strong evidence, and these were reported by 12 MSs (Table OUT12). Denmark reported 32.7 % of all virus strong-evidence outbreaks in the EU. The proportion of total outbreaks with strong evidence within each country varied greatly amongst the MSs; the lowest rate was reported by Slovakia (1.1 %), whereas Belgium and Slovenia reported the highest proportion (100 %). One non-MS reported one viral strong-evidence outbreak (Table OUT12).

Of particular note was one strong-evidence norovirus outbreak, reported by Germany, in which 10,950 people were affected and 38 hospitalised. This outbreak was reported as having school/kindergarten as a setting and was associated with one batch of frozen strawberries from China mainly distributed through one big catering company.

Two deaths associated with calicivirus were reported, one in an outbreak in the United Kingdom and one in an outbreak in Sweden. In the United Kingdom, the outbreak was associated with raw oysters, was linked to a restaurant and affected six people. In Sweden, the outbreak was also linked to a restaurant and was associated with cabbage. This outbreak affected 27 people. A likely contributory factor to the latter outbreak was an infected food handler.

Table OUT12. Strong- and weak-evidence food-borne outbreaks caused by viruses (excluding strong-evidence waterborne outbreaks) in the EU, 2012

Country	Total outbreaks		Strong-evidence outbreaks				Weak-evidence outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Austria	3	0.04	-	-	-	-	3	49	1	0
Belgium	9	0.08	9	110	0	0	-	-	-	-
Czech Republic	1	0.01	-	-	-	-	1	36	2	0
Denmark	46	0.82	33	1,021	2	0	13	435	8	0
Finland	12	0.22	8	404	2	0	4	50	1	0
France	48	0.07	14	303	8	0	34	640	37	1
Germany	37	0.05	8	11,058	68	0	29	134	18	0
Greece	1	0.01	-	-	-	-	1	23	17	0
Hungary	8	0.08	-	-	-	-	8	336	21	0
Ireland	1	0.02	-	-	-	-	1	60	0	0
Italy	1	<0.01	-	-	-	-	1	12	-	-
Latvia	311	15.23	-	-	-	-	311	1,099	105	0
Malta	2	0.24	-	-	-	-	2	23	0	0
Netherlands	12	0.07	6	202	0	0	6	108	0	0
Poland	134	0.35	3	96	28	0	131	2,000	427	0
Slovakia	88	1.63	1	12	12	0	87	374	223	0
Slovenia	2	0.10	2	58	0	0	-	-	-	-
Spain	13	0.03	8	263	2	0	5	252	2	0
Sweden	11	0.12	2	149	-	1	9	510	1	-
United Kingdom	12	0.02	7	177	0	1	5	169	0	0
EU Total	**752**	**0.15**	**101**	**13,853**	**122**	**2**	**651**	**6,310**	**863**	**1**
Iceland	2	0.63	-	-	-	-	2	28	-	-
Norway	13	0.26	1	41	0	0	12	363	0	0

Table OUT13. Strong-evidence food-borne outbreaks caused by viruses (excluding strong-evidence waterborne outbreaks) in the EU, 2012

Agent	Country	Strong-evidence outbreaks			
		N	Human cases		
			Cases	Hospitalised	Deaths
Calicivirus - norovirus (Norwalk-like virus)	Belgium	9	110	0	0
	Denmark	33	1,021	2	0
	Finland	8	404	2	0
	France	12	269	1	0
	Germany	7	10,976	39	0
	Netherlands	6	202	0	0
	Poland	3	96	28	0
	Slovenia	2	58	0	0
	Spain	8	263	2	0
	Sweden	2	149	-	1
	United Kingdom	7	177	0	1
	EU Total	**97**	**13,725**	**74**	**2**
	Norway	1	41	0	0
Flavivirus	Slovakia	1	12	12	0
	EU Total	**1**	**12**	**12**	**0**
Hepatitis virus - Hepatitis A virus	France	2	34	7	0
	Germany	1	82	29	0
	EU Total	**3**	**116**	**36**	**0**

Detailed information from strong-evidence virus outbreaks

Of the 101 strong-evidence outbreaks due to viruses, four were caused by viruses other than calicivirus. One outbreak reported by Slovakia was caused by flavivirus and accounted for 12 human cases, all of whom were admitted to the hospital. This outbreak was classified as a household outbreak, in a household setting, and was associated with the consumption of cheese. Inadequate heat treatment contributed to this outbreak and the place of origin of the problem was a farm.

Three outbreaks of hepatitis A were reported. All were general outbreaks. In one outbreak, reported by Germany, food vehicles were various bakery products consumed in different households. The causative agent was detected on different surfaces in the bakery. Contributory factors were infected food handler and cross-contamination.

Two outbreaks of hepatitis A were reported by France. Both implicated ‘other foods’ and contributory factors were unknown. The setting in one outbreak was restaurant, café, pub, bar, hotel and eight people were affected and six hospitalised. The second outbreak accounted for 26 human cases and one hospitalisation; the setting was not specified.

Caliciviruses (including norovirus)

A total of 97 strong-evidence food-borne outbreaks, caused by calicivirus, were reported by 11 MSs (Table OUT13). Of these, 83 were reported as general outbreaks and 13 were characterised as household outbreaks. No information on type was provided for one outbreak.

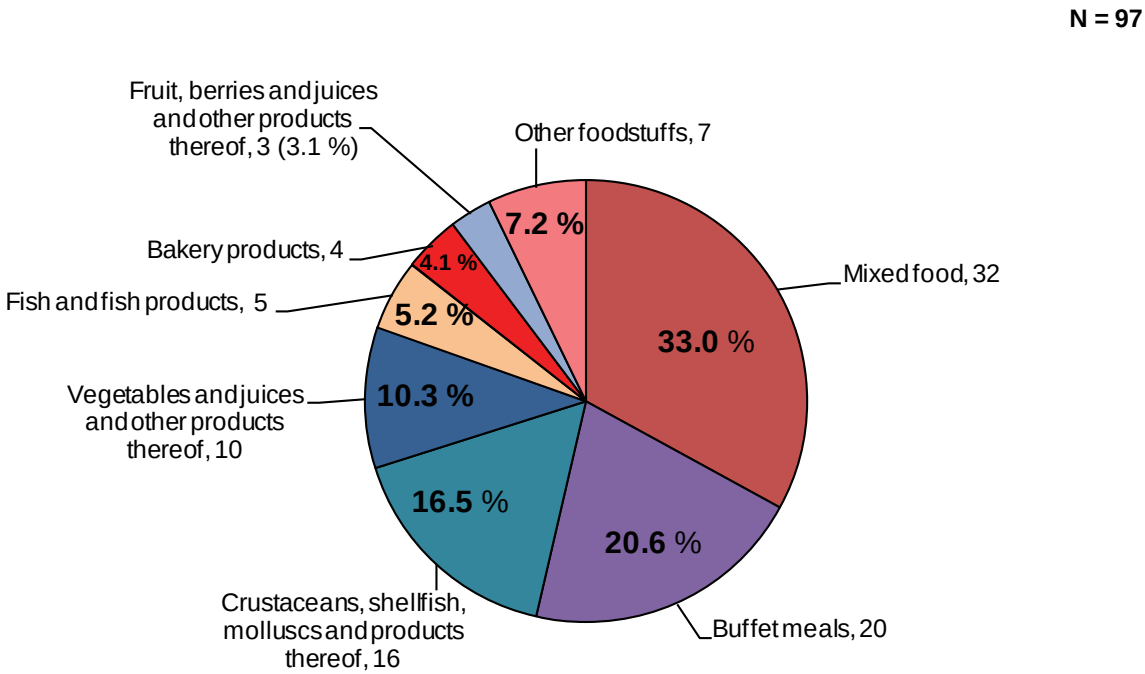
Information on the food vehicle was provided for all of the strong-evidence outbreaks caused by caliciviruses. The distribution of food vehicles for these outbreaks was split between mixed food (33.0 %), buffet meals (20.6 %), crustaceans, shellfish and molluscs (16.5 %), and vegetables, juices and products thereof (10.3 %) (Figure OUT20). The two fatal cases were associated with the consumption of raw oysters and cabbage.

The most commonly reported settings for the virus outbreaks were restaurant, café, pub, bar or hotel (33 outbreaks), but other settings were also identified, including household/domestic kitchen (nine) schools/kindergarten (six outbreaks), canteen or workplace (five outbreaks), hospital/care homes (two outbreaks) and temporary mass catering establishments (two outbreaks).

Many contributory factors, either alone or in combination, were reported in 66 outbreaks; among the most common was infected food handlers (42 outbreaks).

Four strong-evidence waterborne outbreaks were also reported: three attributable to calicivirus (including norovirus) and one to rotavirus (Table OUT16).

Figure OUT20. Distribution food vehicles in strong-evidence outbreaks caused by calicivirus, including norovirus (excluding strong-evidence waterborne outbreaks) in the EU, 2012



Note: Data from 97 outbreaks are included: Belgium (9), Denmark (33), Finland (8), France (12), Germany (7), Netherlands (6), Poland (3), Slovenia (2), Spain (8), Sweden (2) and United Kingdom (7).

Other foods (N = 7) include: broiler meat and products thereof (1), cheese (2), eggs and egg products (1), pig meat and products thereof (1) and other foods (2).

Number after the label refers to the number of outbreaks.

4.10. Parasites

A total of 37 food-borne outbreaks caused by parasites were reported by 11 MSs, excluding one strong-evidence waterborne outbreak, compared with 30 outbreaks by parasites in 2011. These outbreaks accounted for 0.7 % of food-borne outbreaks reported in 2012. The majority of the outbreaks (25) were caused by *Trichinella* (67.6 %). Only 13 of these outbreaks were supported by strong evidence, and the majority of these outbreaks (nine) were caused by *Trichinella* and reported by two MSs (eight by Romania and one by Spain). Identification of the agent species was provided in four outbreaks (*T. spiralis*).

For the nine strong-evidence *Trichinella* outbreaks reported, two were classified as general and the other seven as household. Seven were linked to consumption of pig meat, one with wild boar meat and one with unspecified meat and meat products thereof. The setting for all outbreaks was household, and 48 people were affected, of whom 37 were hospitalised. The contributory factor listed for eight outbreaks was inadequate heat treatment and for one outbreak the contributing factor was reported as unknown.

Two food-borne strong-evidence outbreaks, caused by *Cryptosporidium* spp., were reported by two MSs, Finland and the United Kingdom. In the Finnish outbreak, 264 people were affected and salad, served in five different restaurants in four towns, was suspected as having caused the outbreak. Some samples from affected cases were positive for *Cryptosporidium* spp. Trace-back investigations found that salad was the common food source served in all of the restaurants. An outbreak that occurred in the United Kingdom also implicated salad (loose leaf salad) and resulted in 305 cases. Contributing factors were unknown.

In addition, an outbreak of *Giardia intestinalis* (also known as *Giardia lamblia*) was reported by the United Kingdom and was associated with mixed food, probably salads. Five people were affected and the setting was workplace catering or canteen. An infected food handler was a contributing factor.

One *Anisakis* outbreak was reported by Spain. This was a general outbreak, linked to consumption of fish and fish products, and affected six people.

One strong-evidence waterborne outbreak attributable to *Cryptosporidium parvum* was also reported (Table OUT16).

4.11. Other causative agents

In this report the category 'other causative agents' includes histamine, marine biotoxins, mushroom toxins, mycotoxins and atropine as well as unspecified toxins.

Twelve MSs reported a total of 137 food-borne outbreaks due to other causative agents (Table OUT14). This represents 2.6 % of all outbreaks reported at EU level and an increase of 21.2 % compared with 2011 (113 outbreaks). This increase is mainly due to an increased number of outbreaks reported by France (43 in 2011 compared with 82 in 2012). The reporting rate was 0.03 per 100,000 population, with the highest rate reported by Malta (0.48). France and Spain together reported 78.8 % of these outbreaks. In addition, one non-MS reported one outbreak (Table OUT14).

In total, 62 strong-evidence outbreaks were reported by 10 MSs, and 69.4 % of these outbreaks were reported by France and Spain.

Detailed information from strong-evidence outbreaks

The majority (54.8 %) of strong-evidence outbreaks due to other causative agents were caused by histamine and accounted for 50.4 % of human cases and 35.9 % of hospitalisations reported in these outbreaks. Other agents included marine biotoxins (29.0 %), mushroom toxins (11.3 %), mycotoxins (3.2 %), and atropine (1.6 %) (Table OUT15). The majority (75.8 %) were associated with consumption of fish and fishery products (Figure OUT21).

Histamine

All 34 outbreaks were linked to fish and fish products. The majority of outbreaks, 30, were general and only four were household outbreaks. The main setting was reported as restaurant, café, pub, hotel (in 17 outbreaks) followed by canteen/workplace (four outbreaks) and school/kindergarten (three outbreaks). The main contributory factor, either alone or in combination, was storage time/temperature abuses (10 outbreaks).

Marine biotoxins

Of the 18 outbreaks reported, the main food vehicle implicated in the outbreaks was fish and fish products (72.2 %). Crustaceans, shellfish, molluscs and products thereof were implicated in the remaining outbreaks (five outbreaks). Nine outbreaks were household and nine were general. The main setting was household/domestic kitchen in 10 outbreaks, followed by restaurant, café, pub, bar, hotel, in five outbreaks. Contributory factors were reported as unknown in 15 outbreaks. An unprocessed contaminated ingredient was reported as a contributory factor in two outbreaks.

Mushroom toxins

One outbreak associated with mushroom toxins was reported by Poland. This was a household outbreak associated with the consumption of *Amanita phalloides* and the setting was household/domestic kitchen. Three persons were affected, all admitted to hospital. Spain reported six outbreaks: all were household outbreaks and all implicated vegetables, juices and products thereof. In one of them, a fatal case was reported.

Mycotoxins

Two general outbreaks, reported by Denmark, were associated with lectin through consumption of vegetables. The settings for these outbreaks were restaurant, café, pub, bar, hotel.

Atropine

France reported one outbreak due to atropine. This was a household outbreak and associated with consumption of mixed food. The setting was household/domestic kitchen.

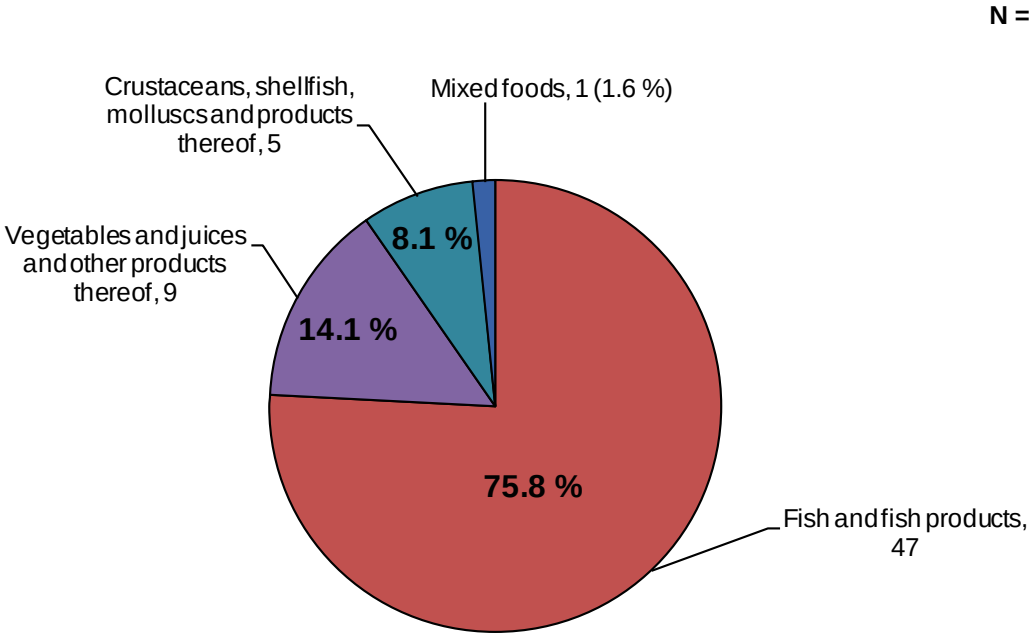
Table OUT14. Strong- and weak-evidence food-borne outbreaks caused by other causative agents in the EU, 2012

Country	Total outbreaks		Strong-evidence outbreaks				Weak-evidence outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Belgium	6	0.05	6	138	2	0	-	-	-	-
Denmark	5	0.09	5	35	1	0	-	-	-	-
Finland	1	0.02	-	-	-	-	1	28	0	0
France	82	0.13	26	111	9	0	56	198	22	0
Germany	1	<0.01	1	-	-	-	-	-	-	-
Latvia	1	0.05	1	16	-	0	-	-	-	-
Malta	2	0.48	-	-	-	-	2	8	0	0
Poland	2	0.01	1	3	3	0	1	2	2	1
Slovenia	1	0.05	1	3	1	0	-	-	-	-
Spain	26	0.06	17	150	20	1	9	58	3	0
Sweden	7	0.07	2	15	.	.	5	10	-	-
United Kingdom	3	<0.01	2	7	3		1	3	0	0
EU Total	**137**	**0.03**	**62**	**478**	**39**	**1**	**75**	**307**	**27**	**1**
Norway	1	0.02	-	-	-	-	1	2	0	0

Table OUT15. Strong-evidence food-borne outbreaks caused by other causative agents in the EU, 2012

Agent	Country	Strong-evidence outbreaks			
		N	Human cases		
			Cases	Hospitalised	Deaths
Histamine	Belgium	4	28	2	0
	Denmark	3	9	1	0
	France	13	62	6	0
	Latvia	1	16	-	0
	Slovenia	1	3	1	0
	Spain	8	101	1	0
	Sweden	2	15	-	-
	United Kingdom	2	7	3	0
	EU Total	**34**	**241**	**14**	**0**
Marine biotoxins	Belgium	2	110	0	0
	France	12	47	1	0
	Germany	1	-	-	-
	Spain	3	27	1	0
	EU Total	**18**	**184**	**2**	**0**
Mushroom toxins	Poland	1	3	3	0
	Spain	6	22	18	1
	EU Total	**7**	**25**	**21**	**1**
Mycotoxins	Denmark	2	26	0	0
	EU Total	**2**	**26**	**0**	**0**
Atropine	France	1	2	2	0
	EU Total	**1**	**2**	**2**	**0**

Figure OUT21. Distribution food vehicles in strong-evidence outbreaks caused by other causative agents in the EU, 2012



Note: Data from 62 outbreaks are included: Belgium (6), Denmark (5), France (26), Germany (1), Latvia (1), Poland (1), Slovenia (1), Spain (17), Sweden (2) and United Kingdom (2).

Number after the label refers to the number of outbreaks.

4.12. Unknown agents

Nineteen MSs reported 1,478 outbreaks in 2012 (27.6 % of all outbreaks) in which the causative agent was unknown (Table OUT3), excluding one strong-evidence waterborne outbreak. This represents a decrease of 26.9 % in the proportion of total outbreaks due to unknown agents compared with 2011 (N = 2,022). Of these, 51 were supported by strong evidence (6.7 % of all strong-evidence outbreaks).

One strong-evidence waterborne outbreak attributable to an unknown agent was also reported (Table OUT16).

4.13. Waterborne outbreaks

Waterborne outbreaks may potentially be large, especially if the public drinking water supply is contaminated.

In waterborne outbreaks, several zoonotic agents are often detected in the water as well as in human samples as a result of unspecific contamination, e.g. with sewage water.

In 2012, four MSs reported 16 strong-evidence waterborne outbreaks involving 1,113 human cases, of whom eight were hospitalised (Table OUT16). No deaths were reported. Four different pathogens were detected from these 16 outbreaks: calicivirus, verotoxigenic *E. coli, Cryptosporidium parvum* and rotavirus. There was one waterborne outbreak in which the causative agent was unknown.

All 10 VTEC outbreaks were reported by Ireland, and seven were reported to be linked to private water supplies or wells.

Water treatment failure was listed as a contributory factor in four general outbreaks. The largest outbreak occurred in Greece and affected 552 people, of whom two were hospitalised (see box below).

In March 2012, a gastroenteritis outbreak was notified in a district with 37,264 inhabitants in central Greece. Consumption of tap water was a risk factor for acquiring infection (odds ratio (OR) 2.18, 95% (CI) 1.11–4.28). Descriptive data on low gastroenteritis incidence in adjacent areas with different water supply systems, and water-quality data further supported the hypothesis of a waterborne outbreak. Thirty-eight stool samples were positive for rotavirus. Bacterial indicators of recent faecal contamination were detected in samples from the water source and ice cubes from a local production enterprise. Molecular epidemiology of rotavirus strains, apart from the common strain, G3[P8], identified the unusual G/P combination G2P[8].
A paper regarding this outbreak investigation can be found at:
http://www.ncbi.nlm.nih.gov/pubmed/23632123.

Table OUT16. List of reported strong-evidence waterborne outbreaks in the EU, 2012

Agents	Country	Setting	Strong-evidence outbreaks				Additional information
			N	Cases	Hospitalised	Deaths	
Calicivirus - norovirus (Norwalk-like virus)	Denmark		1	183	0	0	Contaminated drinking water after repairment work on a water pipe
	Greece	School, kindergarten	1	79	0	0	Tap water in a primary school
Calicivirus - sapovirus (Sapporo-like virus)	Finland	Household/domestic kitchen	1	225	0	0	Water distribution system
Cryptosporidium - C. parvum	Ireland	Disseminated cases	1	11	3	0	Treated public surface water supply
Escherichia coli, pathogenic - Verotoxigenic *E. coli* (VTEC) - VTEC O157	Ireland	Household/domestic kitchen	2	2	1	0	
		Household/domestic kitchen	1	2	-	-	Private water supply
		Disseminated cases	1	27	-	-	Treated well water
		Household/domestic kitchen	3	3	2	0	Well water
		Other setting	1	6	0	0	Well, untreated ground water
Escherichia coli, pathogenic - Verotoxigenic *E. coli* (VTEC) - VTEC O26	Ireland	Household/domestic kitchen	1	1	0	0	
		Household/domestic kitchen	1	2	-	0	Well, ground water
Rotavirus	Greece	Household/domestic kitchen	1	552	2	0	Treated tap water from a rural area's water supply system
Unknown	Finland	Household/domestic kitchen	1	20	0	0	
EU Total			**16**	**1,113**	**8**	**0**	

4.14. Discussion

In 2012, a total of 5,363 food-borne outbreaks were reported by 25 MSs, representing a decrease of 5.0 % compared with 2011 (5,648 outbreaks). The main causative agents in these outbreaks in 2012 were *Salmonella*, bacterial toxins, viruses and *Campylobacter*.

In 2012, a slight increase was observed in the number of outbreaks caused by *Salmonella*, after a decline from 2008 to 2011. Compared with the previous year, the number of outbreaks due to viruses increased, and these are now classified as the third most frequently reported causative agents (they were ranked fourth in 2011). However, the increase in numbers of virus outbreaks is mainly related to the reporting from one MS. On the other hand, the number of outbreaks due to *Campylobacter* decreased in 2012, even though only few countries reported fewer outbreaks than the previous year. Outbreaks caused by pathogenic *Escherichia coli* also decreased compared with 2011. It is noteworthy that in 2012 fewer outbreaks due to unknown causative agents were reported than in the previous year.

The food vehicle categories most frequently implicated in strong-evidence outbreaks were eggs and egg products, followed by mixed food, and fish and fish products, as in 2011. Interestingly, strong-evidence outbreaks associated with cheese increased significantly. The majority of these outbreaks were reported by one MS. Additional information on the type of cheese implicated and/or contributing factors was provided in three outbreaks. One outbreak, caused by staphylococcal enterotoxin, was associated with goat milk cheese. Storage time/temperature abuses were listed as contributing factors. Another MS reported an outbreak of flavivirus associated with inadequate heat treatment of cheese at a farm. In one outbreak of listeriosis implicating cheese, an infected food handler was reported as a contributory factor. Outbreaks associated with sweets and chocolate decreased compared with the previous year. However, in 2011 all sweets and chocolate-related outbreaks were reported by a single MS.

The majority of outbreaks implicating eggs and egg products and cheese were caused by *Salmonella* spp. Of note is the fact that the proportion of *Salmonella* outbreaks associated with cheese increased considerably. However, all these outbreaks were reported by one MS. Contributing factors in all of these outbreaks were reported as 'unknown' and the type of cheese was not reported

Broiler meat was the main food vehicle implicated in *Campylobacter* outbreaks. This is consistent with EFSA's BIOHAZ Panel Scientific Opinion that handling, preparation and consumption of broiler meat may account for 20-30 % of human cases. The majority of outbreaks associated with raw/unpasteurised milk were caused by *Campylobacter*. Of note is the fact that farm was the place of origin of the problem reported in most of these outbreaks, reinforcing the need to educate consumers about the risks of drinking unpasteurised milk.

The largest food-borne outbreak in terms of number of human cases in 2012 was a norovirus outbreak, in which 10,950 people were affected. This was associated with one batch of frozen strawberries imported from a non–EU country.

The number of reported strong-evidence waterborne outbreaks increased compared with 2011. Most of these outbreaks were associated with private water/well water supplies.

As in previous years, the data reported on food-borne outbreaks demonstrate that the reporting of single or a small number of MSs can have a strong influence on the distribution of causative agents and food vehicles at EU level. It also appears that, within the MSs, there may be large differences with regard to the reported causative agents and implicated food vehicles between years.

The revised food-borne outbreak reporting specifications were implemented for the third year in 2012. The two new evidence categories that could support the reporting of a detailed dataset (i.e. a strong-evidence outbreak) are descriptive epidemiological evidence and the detection of the causative agent in the food chain or its environment. Similar to 2010 and 2011 reporting, approximately one-third of the strong-evidence outbreaks in 2012 were supported only by these new evidence categories. Approximately one-third were supported by analytical evidence. This shows that the MSs had implemented the revised reporting specifications and that these specifications had an impact on the reported outbreaks. The number of outbreaks in which a detailed dataset was provided increased compared with 2011 (763 in 2012 compared with 701 in 2011). Also, these outbreaks as a proportion of the total number of outbreaks reported increased compared with the previous year (14.2 % in 2012 compared with 12.4 % in 2011).

5. MATERIALS AND METHODS

5.1. Data received in 2012

Human data

The human data analyses in the EU Summary Report for 2012 were prepared by the Food- and Waterborne Diseases and Zoonoses programme at the ECDC and were based on the data submitted to the TESSy, hosted at ECDC. Please note that the numbers presented in the report may differ from national reports owing to differences in case definitions used at EU and national level or to different dates of data submission and extraction. The latter may also result in some divergence in case numbers presented in different ECDC reports.

TESSy is a software platform that has been operational since April 2008 and in which data on 52 diseases and special health issues are collected. Both aggregated and case-based data were reported to TESSy. Although aggregated data did not include individual case-based information, both reporting formats were included where possible to calculate country-specific notification rates, case-fatality rates, proportion of hospitalised cases and trends in diseases. Human data used in the report were extracted from TESSy on 3 September 2013 with the following exceptions: campylobacteriosis 10 September; West Nile fever and tuberculosis due to *M. bovis* 1 October. The denominators used for the calculation of the notification rates were the human population data from EUROSTAT as extracted on 28 June 2013.

Data on human zoonoses cases were received from all 27 MSs and also from 2 non-MSs: Iceland and Norway. Switzerland sent its data on human cases directly to EFSA.

Data on foodstuffs, animals and feedingstuffs

All MSs submitted national zoonoses reports for 2012. In addition, reports were submitted by the three non-MSs, Iceland, Norway and Switzerland. For the eighth consecutive year, countries submitted data on animals, food, feed and food-borne outbreaks using a web-based zoonoses reporting system maintained by EFSA. In addition, many countries submitted their data electronically, through the DCF.

In 2012, data were collected on a mandatory basis on the following eight zoonotic agents: *Salmonella*, thermotolerant *Campylobacter*, *L. monocytogenes*, VTEC, *M. bovis, Brucella*, *Trichinella* and *Echinococcus.* Mandatory reported data also included antimicrobial resistance in isolates of *Salmonella* and *Campylobacter*, food-borne outbreaks and susceptible animal populations. Furthermore, based on epidemiological situations in each MS, data were reported on the following agents and zoonoses: *Yersinia*, *Lyssavirus* (rabies), *Toxoplasma*, *Cysticercus*, *Sarcocystis*, *Coxiella burnetii* (Q fever), West Nile virus, *Francisella, Staphylococcus, Anisakis* and antimicrobial resistance in indicator *E. coli* and enterococci isolates. Finally, data concerning compliance with microbiological criteria were also reported on the staphylococcal enterotoxins, *Enterobacter sakazakii* (*Cronobacter* spp.) and histamine.

In this report, data are presented on the eight mandatory zoonotic agents, except *Echinococcus*, and also on rabies, *Toxoplasma*, Q fever, West Nile virus, *Francisella*, *Anisakis*, *Cysticercus* and *Sarcocystis*.

For each pathogen, an overview table presenting all MSs reporting data is included in the beginning of each chapter. However, for the detailed tables, data from industry own-control programmes and HACCP sampling and, unless stated otherwise, data from suspect sampling, selective sampling and outbreak or clinical investigations are excluded. The general rule is to exclude data from investigations with a sample size of fewer than 25 units. Exceptions to this rule are data from investigations presented in the following tables: compliance with the food safety criteria for *Salmonella* and *Listeria*; *Salmonella* in poultry species in countries implementing control programmes; number of tested animals and positive cases of rabies in domestic animals, wildlife species and bats; *Trichinella* in farmed and hunted wild boar and in wildlife other than wild boar; West Nile virus and all food-borne outbreak data.

5.2. Statistical analysis of trends over time

Human data

Routine surveillance data from TESSy were used to describe two components of the temporal pattern (secular trend and seasonality) of human zoonoses cases for the EU and by MS.

Only confirmed human cases (with the exception of West Nile Fever, for which total numbers of cases were used) reported consistently by MSs, throughout the study period 2008–2012, were included in the time series analysis. Diseases were analysed either by week or by month, depending on the number of data available. Consequently, campylobacteriosis, listeriosis and salmonellosis were analysed by week and brucellosis, Q fever and West Nile fever by month. Of the date variables available (date of onset, date of diagnosis, etc.), the date chosen by the MS as the official 'date used for statistics' was selected.

For assessing the temporal trends at EU level and by MS, moving averages were applied. Linear regression was applied where appropriate to test the significance of trends.

The level of statistical significance was set at 5 %. All analyses were performed using Stata® 12.

Data on animals

In the current report, temporal trends have been statistically analysed for *Salmonella* in fresh broiler meat (single samples). MS-group-weighted prevalence figures were estimated by weighting the MS-specific proportion of positive units with the reciprocal of the sampling fraction. The reciprocal is the ratio of 'the total number of units per MS per year' to the 'number of tested units in the MS per year'. For broiler meat, the 'total number of units per MS per year' was the number of slaughtered broilers reported by MSs in the framework of the 2008 baseline survey in broiler flocks and broiler carcases. These numbers were supplemented with EUROSTAT data from 2008 as appropriate.

In order to obtain yearly estimates of the weighted prevalence for groups of examined MSs, the SURVEYLOGISTIC procedure in the Statistical Analysis System (SAS) was used. The weight was applied in order to take into account disproportionate sampling at MS level. The statistical significance of trends was tested by a weighted logistic regression for binomial data using the GENMOD procedure in the SAS software, at a 5 % significance level. As non-independence of observations within each MS could not be excluded, for example because of the possibility of sampling animals belonging to the same holdings, the REPEATED statement was used. This yielded inflated standard errors for the effect of the year of sampling, reducing the probability of detecting significant time trends, and corresponding to a conservative approach to statistical analyses.

Changes in the proportions of positive units (trend watching) for zoonotic agents in food and animals during the time period from 2004 to 2012 were visually explored for each MS by *trellis* graphs using the *lattice* package in the R software (www.r-project.org). Specifically, trellis graphs have been presented for *Salmonella* in fresh broiler meat (single and batches samples); for the target *Salmonella* serovars in the different poultry species; for bovine tuberculosis; and for brucellosis in cattle and small ruminants in the MSs with a co-financed control and eradication programme.

5.3. Cartographic representation of data

Human data

ArcGIS from ESRI was used to map human data. Each map contains three different indicators: notification rate of the disease per 100,000 inhabitants, origin of infection and number of cases. Choropleth maps with graduated colours were used to map incidence rates across EU countries. Zero incidence, whenever reported, was reflected on the map as a category. Countries for which no data were available and countries not included within the area of interest were also represented. Pie charts were created to indicate the origin of infection of the disease. Each pie chart contains three categories: domestic, travel-associated and missing or unknown origin. An exception was made for tuberculosis due to *M. bovis* because of its often very long incubation time. In this case the categories considered have been native origin, foreign origin and missing or unknown. Their symbolisation, however, is identical to the other diseases to allow the comparability between maps, and to keep their homogeneity. Pie chart sizes are proportional to the number of cases they represent.

Animal data

ArcGIS from ESRI was used to map animal data. Choropleth maps with graduated colours over a continuous scale of values were used to map the proportion of positive samples across EU and other reporting countries.
For *Lyssavirus* and West Nile Virus the number of positive samples, rather than the proportion, was displayed using proportional circles, while for *Trichinella* in wild animals a simple absence/presence map was produced.

For disease status data a simple colour code was selected to represent the official status of each country as defined in the legislation (free or not free).

5.4. Data sources

In the following sections, the types of data submitted by the reporting countries are briefly described. Information on human surveillance systems is based on the countries reporting data to ECDC for 2012.

5.4.1. *Salmonella* data

Humans

The notification of non-typhoidal salmonellosis in humans is mandatory in most MSs, Iceland, Norway and Switzerland, except for six MSs, where reporting is based on a voluntary system (Belgium, France, Luxembourg, the Netherlands and Spain) or other system (the United Kingdom). In the United Kingdom, although the reporting of food poisoning is mandatory, isolation and specification of the organism is voluntary. The surveillance systems for salmonellosis have full national coverage in all MSs except three (Belgium, the Netherlands and Spain). The coverage in Spain is estimated to be 25 % and in the Netherlands 64 %. These proportions of populations were used in the calculation of notification rates for Spain and the Netherlands. Studies are being performed in Belgium to assess the coverage of the sentinel system. Diagnosis of human *Salmonella* infections is generally done by culture from human stool samples. The majority of countries perform serotyping of strains[66].

Foodstuffs

Salmonella in food is notifiable in 17 MSs (Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Romania, Slovakia, Slovenia, Spain and Sweden) and in 2 non-MSs, Norway and Iceland. Information was not provided from Cyprus, Greece, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal or Switzerland.

Commission Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs lays down food safety criteria for *Salmonella* in several specific food categories. This Regulation came into force in January 2006 and was modified by Regulation (EC) No 1441/2007, entering into force in December 2007. Sampling schemes for monitoring *Salmonella* in foodstuffs, e.g. place of sampling, sampling frequency and diagnostic

[66] European Centre for Disease Prevention and Control, 2012. Survey of National Reference Laboratory (NRL) capacity for six food- and waterborne diseases in EU/EEA countries. Stockholm: ECDC; 2012, 74 pp. Available online: http://www.ecdc.europa.eu/en/publications/publications/survey-nrl-capacity-for-food-waterborne-agents.pdf

methods, vary between MSs and according to food types. For a full description of monitoring schemes and diagnostic methods in individual MSs, refer to the national reports. The monitoring schemes are based on various types of samples, such as neck skin samples, carcase swabs and meat cuttings; these samples were collected at slaughter, at processing plants, at meat cutting plants and at retail. Several MSs reported data collected as part of HACCP programmes based on sampling at critical control points. These targeted samples could not be directly compared with those that were randomly collected for monitoring/surveillance purposes and were not included in data analysis and tables. Information on serotype distribution was not consistently provided by all MSs.

Animals

Salmonella in *Gallus gallus* (fowl) and/or other animal species is notifiable in all MSs, except for Hungary, and also in three non-MSs (Iceland, Norway and Switzerland). In Denmark, detection of *Salmonella* is notifiable in broiler and laying hen flocks of *Gallus gallus* and in other animals. In France, *Salmonella* detection is mandatory only for breeding flocks and laying hens of *Gallus gallus*, and in Malta for broilers and laying hen flocks of *Gallus gallus*. In Poland and in Romania, the notification of *Salmonella* is mandatory only in poultry (only for findings of *Salmonella* Enteritidis (*S*. Enteritidis), *S*. Typhimurium, *S*. Pullorum and *S*. Gallinarum in Poland and for findings of *S*. Enteritidis, *S*. Typhimurium in Romania).

The monitoring of *Salmonella* in animals is mainly conducted through passive, laboratory-based surveillance of clinical samples, active routine monitoring of flocks of breeding and production animals in different age groups, and tests on organs during meat inspection. Community Regulation (EC) No 2160/2003 prescribes a sampling plan for the control of *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and *S.* Hadar in breeding flocks of *Gallus gallus* and for the control of *S*. Enteritidis and *S.* Typhimurium in laying hen flocks and broiler flocks of *Gallus gallus* and for turkey flocks to ensure comparability of data among MSs. Non-MSs (European Free Trade Association members) must also apply the Regulation in accordance with the Decision of the European Economic Area Joint Committee No 101/2006[67]. No specific requirements for the monitoring and control of other commercial poultry production systems or in other animals were applicable in 2012.

Details of monitoring programmes and control strategies in breeding flocks of *Gallus gallus,* laying hen flocks, broiler flocks and breeding and production turkey flocks are available in the national reports.

Feedingstuffs

There is no common sampling scheme for feed materials in the EU. Results from compulsory and voluntary monitoring programmes, follow-up investigations and industry quality assurance programmes, as well as from surveys, are reported. The MS monitoring programmes often include both random and targeted sampling of feedstuffs that are considered at risk. Samples of raw material, materials used during processing and final products are collected from batches of feedstuffs of domestic and imported origin. The reported epidemiological units were either 'batch' (usually based on pooled samples) or 'single' (often several samples from the same batch). As in previous years, most MSs did not report separately data from the different types of monitoring programmes or data from domestic and imported feed. Therefore, it must be emphasised that the data related to *Salmonella* in feedstuffs cannot be considered national prevalence estimates. Moreover, owing to the lack of a harmonised surveillance approach, information is not comparable among countries. Nevertheless, data at country level are presented in the same tables. Information was requested on feed materials of animal and vegetable origin and on compound feedstuffs (mixture of feed materials intended for feeding specific animal groups). Data on the detection of *Salmonella* in fish meal, feed material of land animal origin (further categorised as meat and bone meal, dairy products or feed of other origin), cereals, oil seeds and products, and compound feed for cattle, pigs and poultry in 2012 are presented. Single-sample and batch-based data from the different monitoring systems are summarised.

[67] Decision of the EEA Joint Committee No 101/2006 of 22 September 2006 amending Annex I (Veterinary and phytosanitary matters) to the EEA Agreement. OJ L 333, 30.11.2006, p. 6–9.

5.4.2. *Campylobacter* data

Humans

The notification of campylobacteriosis is mandatory in most MSs, Iceland, Norway and Switzerland, except for seven MSs, where notification is based on a voluntary system (Belgium, France, Italy, Luxembourg, the Netherlands and Spain) or other system (the United Kingdom). No surveillance system exists in Greece and Portugal. The surveillance systems for campylobacteriosis have full national coverage in all MSs except three (Belgium, the Netherlands and Spain). The coverage of the surveillance system is estimated to be 25 % in Spain and 52 % in the Netherlands. These proportions of populations were used in the calculation of notification rates for these two MSs. Studies are being performed in Belgium to assess the coverage of the sentinel system. Diagnosis of human infection is generally based on culture from human stool samples and both culture and non-culture methods (PCR-based) are used for confirmation. The majority of MSs use biochemical tests for speciation of isolates submitted to the National Reference Level Laboratory.

Foodstuffs

In food, *Campylobacter* is notifiable in the following 12 MSs: Austria, Belgium, the Czech Republic, Estonia (only *C. jejuni*), Germany, Italy, Latvia, the Netherlands, Poland, Slovakia, Slovenia and Spain. *Campylobacter* is also notifiable in Iceland and Norway. Information on *Campylobacter* notification was not provided from Cyprus, France, Lithuania, Luxembourg, Malta, Portugal and Romania. Bulgaria did not test for *Campylobacter*. At processing, cutting and retail, sampling was predominantly carried out on fresh meat. Food samples were collected in several different contexts, i.e. continuous monitoring or control programmes, surveys and as part of HACCP programmes implemented within the food industry. Samples reported as HACCP or own controls were not included for analysis and, unless stated differently in the specific chapter, data from suspect and selective sampling and outbreak or clinical investigations were also excluded.

Animals

Campylobacter is notifiable in *Gallus gallus* in the Czech Republic, Finland, Slovenia, Iceland and Norway, in cattle in Germany and in all animals in Belgium, Estonia (only *C. jejuni*), Ireland, Latvia, the Netherlands, Spain and Switzerland. Information on *Campylobacter* notification was not provided from Cyprus, France, Lithuania, Malta and Poland. Bulgaria did not test for *Campylobacter*. The most frequently used methods for detecting *Campylobacter* in animals at farm, slaughter and in foodstuffs were bacteriological methods (ISO 10272[68] and NMKL 119[69]) as well as PCR methods. In some countries, isolation of the organism is followed by biochemical tests for speciation. For poultry sampled prior to slaughter, faecal material was collected either as cloacal swabs or as sock samples (faecal material collected from the floor of poultry houses by pulling gauze over footwear and walking through the poultry house). At slaughter, several types of samples were collected, including cloacal swabs, caecal contents and/or neck skin.

5.4.3. *Listeria* data

Humans

The notification of listeriosis in humans is mandatory in most MSs, Iceland, Norway and Switzerland, except for three MSs, where notification is based on a voluntary system (Belgium, Spain, and the United Kingdom). No surveillance system exists in Portugal. The surveillance systems for listeriosis have full national coverage in all MSs except Spain, where the estimated coverage is 25 %. This population proportion was used in the calculation of notification rates for Spain. Diagnosis of human infections is generally done by culture from blood, cerebro-spinal fluid and vaginal swabs.

Foodstuffs

Notification of *Listeria* in food is required in 12 MSs (Austria, Belgium, Estonia, France, Germany, Hungary, Italy, Latvia, the Netherlands, Slovakia, Slovenia and Spain); however, several other MSs reported data. Commission Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs lays down food safety criteria for *L. monocytogenes* in RTE foods. This Regulation came into force in January 2006. Surveillance in

[68] International Organization for Standardization, 2006. ISO 10272 Microbiology of food and animal feeding stuffs - Horizontal method for detection and enumeration of *Campylobacter* spp.

[69] Nordisk Metodikkomité for Næringsmidler- Nordic Committee on Food Analysis, 2007. NMKL 119. Thermotolerant *Campylobacter*. Detection, semi-quantitative and quantitative determination in foods and drinking water.

RTE foods was performed in most MSs. However, owing to differences in sampling and analytical methods, comparisons from year to year were difficult.

Animals

Listeriosis in animals was notifiable in 13 MSs (Belgium, the Czech Republic, Estonia, Finland, Germany, Greece, Latvia, Lithuania, the Netherlands, Slovakia, Slovenia, Spain and Sweden), Switzerland and Norway (information is missing from Bulgaria, Cyprus, Ireland, Malta and Poland). The monitoring of *Listeria* in animals is mainly conducted through passive, laboratory-based surveillance of clinical samples, active routine monitoring or random national surveys.

5.4.4. VTEC data

Humans

The notification of VTEC infections is mandatory in most MSs, Iceland, Norway and Switzerland, except for five MSs, where notification is based on a voluntary system (Belgium, France, Italy and Luxembourg) or other system (the United Kingdom). No data were reported from Liechtenstein and no surveillance system exists in Portugal. The surveillance systems for VTEC infections have full national coverage in all MSs except three (Belgium, France and Italy). In France, the VTEC surveillance is centred on paediatric HUS surveillance. Diagnosis of human VTEC infections is generally done by culture from stool samples although diagnosis by direct detection of the toxin or the toxin genes, without strain isolation, is increasing.

Foodstuffs and animals

VTEC is notifiable in food in 11 MSs (Austria, Belgium, Estonia, Germany, Italy, Latvia, the Netherlands, Romania, Slovakia, Slovenia and Spain) and in animals in eight MSs (Belgium, the Czech Republic, Estonia, Finland, Latvia, Lithuania, Spain and Sweden) (information is missing from Bulgaria, Cyprus, the Czech Republic, Denmark, Greece, Hungary, Lithuania, Malta, Poland, Portugal and Switzerland for food, and from Bulgaria, Cyprus, France, Germany, Greece, Ireland, Malta, Poland, Portugal and Romania for animals).

Samples were collected in a variety of settings, such as slaughterhouses, cutting plants, dairies, wholesalers and at retail level, and included different types of samples such as carcase surface swabs, cuts of meats, minced meat, milk, cheese, and other products. The majority of investigated products were raw but intended to undergo preparation before consumption. The samples were taken as part of official control and monitoring programmes as well as random national surveys. The number of samples collected and types of food sampled varied among individual MSs. Most of the animal samples were collected at the slaughterhouse or at the farm.

5.4.5. Tuberculosis data

Humans

The notification of tuberculosis in humans is mandatory in almost all MSs, Iceland, Norway and Switzerland. In France, the notification system for human tuberculosis does not distinguish between tuberculosis cases caused by different species of *Mycobacterium*, and in Greece only cases due to *Mycobacterium tuberculosis (M. tuberculosis*) are reported. Therefore, no reporting of cases due to *M. bovis* is available from these two countries.

Animals

Tuberculosis in animals is notifiable in 25 MSs, Norway and Switzerland (information was not provided from Bulgaria and Malta). In Cyprus, Greece, Hungary, Poland and Romania only bovine tuberculosis is notifiable, and in Ireland only tuberculosis in ruminant animals is notifiable. Rules for intra-EU bovine trade, including requirements for cattle herds and country qualification as officially free from tuberculosis, are laid down in Council Directive 64/432/EC, as last amended by Commission Decision 2007/729/EC[70]. By the end of 2012, 15 MSs (Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Latvia, Luxembourg, the Netherlands, Poland, Slovakia, Slovenia and Sweden), Switzerland and Norway were

[70] Commission Decision 2007/729/EC of 7 November 2007 amending Council Directives 64/432/EEC, 90/539/EEC, 92/35/EEC, 92/119/EEC, 93/53/EEC, 95/70/EC, 2000/75/EC, 2001/89/EC, 2002/60/EC, and Decisions 2001/618/EC and 2004/233/EC as regards lists of national reference laboratories and State institutes. OJ L 294, 13.11.2007, p. 26–35.

officially bovine tuberculosis free (OTF). Liechtenstein has the same status (OTF) as Switzerland. In Iceland, which has no special agreement concerning animal health (status) with the EU, the last outbreak of bovine tuberculosis was in 1959. In the United Kingdom, Scotland is OTF, and in Italy 15 provinces and 6 regions have now been declared OTF. In Portugal, all administrative regions within the superior administrative unit of Algarve were declared OTF in 2012. Moreover, in 2012, eradication programmes in cattle herds in Ireland, Italy, Portugal, Spain and the United Kingdom received co-financing (Decision 2011/807/EU).

5.4.6. *Brucella data*

Humans

The notification of brucellosis in humans is mandatory in almost all MSs, Iceland, Norway and Switzerland. Belgium has a voluntary reporting system and the United Kingdom has a different surveillance system. In Denmark, brucellosis is not notifiable and no surveillance is therefore in place. All of the existing surveillance systems for brucellosis have full national coverage.

Foodstuffs

The notification of *Brucella* in food is mandatory in 10 MSs (Austria, Belgium, Finland, Germany, Italy, Latvia, the Netherlands, Slovenia, Spain and the United Kingdom). Information was not provided from Bulgaria, Cyprus, the Czech Republic, Denmark, France, Greece, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia and Switzerland.

Animals

Brucellosis in animals is notifiable in 24 MSs, Norway and Switzerland (information was not provided from Bulgaria, Cyprus and Malta).

Cattle: Rules for intra-EU bovine trade, including requirements for cattle herds and country qualification as officially free from brucellosis, are laid down in Council Directive 64/432/EC, as last amended by Commission Decision 2007/729/EC. By the end of 2012, 16 MSs (Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, Poland, Slovakia, Slovenia and Sweden), Norway and Switzerland were officially free from brucellosis in cattle (OBF). Liechtenstein has the same status (OBF) as Switzerland. Moreover, in the non-MS Iceland, which has no special agreement concerning animal health (status) with the EU, brucellosis (*Brucella abortus* (*B. abortus*), *B. melitensis, B. suis*) has never been reported. OBF regions have been declared in Italy (11 regions and 9 provinces), Portugal (six Islands of the Azores and all administrative regions within the superior administrative unit of Algarve), Spain (two provinces of the Canary Islands) and in the United Kingdom (Great Britain, and Isle of Man). In 2012, eradication programmes in cattle herds in Italy, Portugal, Spain and the United Kingdom (Northern Ireland) received co-financing (Decision 2011/807/EU).

Sheep and goats: Rules for intra-EU trade of ovine and caprine animals and country qualification as officially free from ovine and caprine brucellosis, caused by *B. melitensis* (ObmF), are laid down in Council Directive 91/68/EEC[71], as last amended by Council Directive 2008/73/EC[72]. By the end of 2012, 19 MSs (Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden and the United Kingdom), Norway and Switzerland were officially free from ovine and caprine brucellosis caused by *B. melitensis* (ObmF). Liechtenstein has the same status (ObmF) as Switzerland. Moreover, in the non-MS Iceland, which has no special agreement concerning animal health (status) with the EU, brucellosis (*B. abortus, B. melitensis, B. suis*) has never been reported. ObmF regions have been declared in France (64 departments), Italy (12 regions and 9 provinces ObmF), Portugal (the Azores Islands) and Spain (two provinces of the Canary Islands and the Balearic Islands). In 2012, eradication programmes for ovine and caprine brucellosis in Cyprus, Greece, Italy, Portugal and Spain received co-financing (Decision 2011/807/EU).

[71] Council Directive 91/68/EEC of 28 January 1991 on animal health conditions governing intra-Community trade in ovine and caprine animals. OJ L 46, 19.2.1991, p. 19–36.

[72] Council Directive 2008/73/EC of 15 July 2008 simplifying procedures of listing and publishing information in the veterinary and zootechnical fields and amending Directives 64/432/EEC, 77/504/EEC, 88/407/EEC, 88/661/EEC, 89/361/EEC, 89/556/EEC, 90/426/EEC, 90/427/EEC, 90/428/EEC, 90/429/EEC, 90/539/EEC, 91/68/EEC, 91/496/EEC, 92/35/EEC, 92/65/EEC, 92/66/EEC, 92/119/EEC, 94/28/EC, 2000/75/EC, Decision 2000/258/EC Directives 2001/89/EC, 2002/60/EC and 2005/94/EC. OJ L 219, 14.8.2008, p. 40–54.

5.4.7. *Trichinella* data

Humans

The notification of *Trichinella* infections in humans is mandatory in most MSs, Norway and Switzerland, but not in Denmark. Three MSs (Belgium, France and the United Kingdom) have a voluntary surveillance system for trichinellosis. All surveillance systems have full national coverage except in Belgium. Studies are being performed in Belgium to assess the coverage of the sentinel system. No surveillance system for trichinellosis exists in Iceland. In humans, diagnosis of *Trichinella* infections is primarily based on clinical symptoms and serology (ELISA and Western blot). Histopathology on muscle biopsies is rarely performed.

Foodstuffs and animals

Trichinella in foodstuffs is notifiable in 17 MSs and Norway. Ireland and Switzerland report that *Trichinella* is not notifiable. Information was not provided from Bulgaria, Cyprus, the Czech Republic, Denmark, Latvia, Lithuania, Luxembourg, Malta and the Netherlands.

Trichinella infections in animals are notifiable in most countries except Hungary and Switzerland (information was not provided from Malta).

Rules for testing for *Trichinella* in slaughtered animals are laid down by Commission Regulation (EC) No 2075/2005. In accordance with this Regulation, all finisher pigs, sows, boar, horses, wild boar and some other wild species must be tested for *Trichinella* at slaughter. The Regulation allows MSs to apply for status as a region with negligible risk of *Trichinella* infestation in animals. Denmark is the only MS to have been assigned this status. Some MSs reported using digestion and compression methods as described in Council Directive 77/96/EEC[73].

5.4.8. *Toxoplasma* data

Humans

Data on congenital toxoplasmosis in the EU in 2012 are not included in this report but will be published in the ECDC Annual Epidemiological Report 2014 (in preparation).

Animals

Toxoplasmosis is a notifiable disease in Latvia, Poland and Switzerland in all animals and in Finland in all animals except hares, rabbits and rodents; no monitoring programmes are in place in these countries. In Germany, toxoplasmosis is notifiable in pigs, dogs and cats. In Austria, Denmark, and Sweden toxoplasmosis is not notifiable (information is missing from Belgium, Bulgaria, Cyprus, the Czech Republic, Estonia, France, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain and the United Kingdom).

5.4.9. Rabies data

Humans

The notification of rabies in humans is mandatory in most MSs, Iceland, Norway and Switzerland. Belgium has a voluntary notification system and the United Kingdom has another system. Most countries examine human cases based on blood samples or cerebrospinal fluid, and saliva. However, in the case of post-mortem examinations, the central nervous system is sampled. Identification is mostly based on antigen detection, viral genome detection by RT-PCR and/or isolation of virus.

Animals

Rabies is a notifiable disease in all MSs. In animals, most countries test samples from the central nervous system. Identification is mostly carried out using the fluorescent antibody test (FAT), which is recommended

[73] Council Directive 77/96/EEC of 21 December 1976 on the examination for trichinae (trichinella spiralis) upon importation from third countries of fresh meat derived from domestic swine. OJ L 26, 31.1.1977, p. 67–77.

by both WHO[74] and OIE[75], and the mouse inoculation test. However, ELISA, PCR, and histology are also used.

5.4.10. Q-fever data

Humans

The notification of Q fever in humans is mandatory in 22 MSs, Iceland, Norway and Switzerland. The disease is not notifiable in Austria, Denmark and Italy. Belgium, France, Spain and the United Kingdom have a voluntary system, which for Belgium and Spain is based on sentinel surveillance. The population covered by the sentinel surveillance system is estimated to be 25 % for Spain and unknown for Belgium, but both are reportedly constant over the study years. Cases are reported in an aggregated format by Bulgaria and Poland, and case based for the other countries.

Animals

C. burnetii in animals is notifiable in 15 MSs (Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Italy, Latvia, Lithuania, the Netherlands, Poland, Slovenia, Spain and Sweden) and Switzerland. In Austria, *C. burnetii* in animals is not notifiable (information is missing from the remaining 11 MSs and Norway).

Data reported are mostly based on suspect sampling due to an increase in abortions in the herd and identification is mostly carried out using serological testing methods as ELISA or immunofluorescence assay tests or direct identification methods such as real-time PCR.

5.4.11. West Nile Virus data

Humans

The notification of West Nile fever in humans is mandatory in 21 MSs, Norway and Switzerland. The disease is not notifiable in Denmark, Germany and Portugal. Austria, Belgium, France and the United Kingdom have a voluntary system, which in Belgium and France is based on sentinel surveillance, and in the United Kingdom on another, unspecified, surveillance system. The population covered by the sentinel surveillance systems is unknown, but in both cases is reportedly constant over the study years. Cases are reported in an aggregated format by Bulgaria and Poland, and case based for the other countries.

Total case numbers for West Nile were used because case confirmation according to the EU case definition is carried out only when cases occur in previously unaffected areas. Subsequent cases are diagnosed with laboratory methods for probable cases. Thus, both probable and confirmed cases reflect more accurately the epidemiological situation. This approach is also used for the seasonal real-time monitoring of West Nile cases in the EU carried out by ECDC.

Animals

Reporting of West Nile virus in animals is not mandatory. But where the epidemiological situation in a MS so warrants, West Nile virus in animals shall also be monitored. West Nile virus infection is notifiable in horses in Great Britain and in animals in Switzerland.

5.4.12. Other zoonoses and zoonotic agents data

Foodstuffs and animals

Cysticercus *in foodstuffs and animals*: Monitoring is carried out as a visual inspection (macroscopic examination) of carcases at the slaughterhouse by meat inspection according to Regulation (EC) No 854/2004[76], or by specific serological tests.

[74] WHO (World Health Organization), 1996. Laboratory Techniques in Rabies, 493 pp. Available online: http://libdoc.who.int/publications/1996/9241544791_eng.pdf

[75] OIE (World Organisation for Animal Health), 2009. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals. Available online: http://web.oie.int/eng/normes/MMANUAL/A_Index.htm

5.4.13. Food-borne outbreaks data

Food-borne outbreaks are incidents of two or more human cases of the same disease or infection in which the cases are linked or are probably linked to the same food vehicle. Situations in which the observed human cases exceed the expected number of cases and where the same food source is suspected are also indicative of a food-borne outbreak.

Information on the total number of food-borne outbreaks (including both 'weak-evidence' and 'strong-evidence' food-borne outbreaks) and the total number of strong-evidence food-borne outbreaks that occurred during the reporting year was provided by 25 MSs and 2 non-MSs. Cyprus and Luxembourg did not report any outbreaks. For 'weak-evidence' food-borne outbreaks, the causative agent, as well as the number of human cases, hospitalisations and deaths, should be reported. For the 'strong-evidence' food-borne outbreaks, more detailed information is collected, including food vehicle and its origin, nature of evidence linking the outbreak cases to the food vehicle, type of outbreak, setting, place of origin of the problem and contributory factors. All food-borne outbreaks are included in the general tables and figures. In subsequent sections, outbreaks are presented in more detail and categorised by the causative agent, but excluding strong-evidence waterborne outbreaks. All strong evidence waterborne outbreaks are addressed in a separate section (Section 4.13). The denominators used for the calculation of the reporting rates were the human populations from the EUROSTAT as extracted on 28 June 2013.

5.5. Terms used to describe prevalence or proportion-positive values

In the report a set of standardised terms are used to characterise the proportion of positive sample units or the prevalence of zoonotic agents in animals and foodstuffs:

- Rare: <0.1 %
- Very low: 0.1 % to 1 %
- Low: >1 % to 10 %
- Moderate: >10 % to 20 %
- High: >20 % to 50 %
- Very high: >50 % to 70 %
- Extremely high: >70 %

- Majority of MSs: 60 % (in 2012 this was 16 MSs)
- Most MSs: 75 % (in 2012 this was 20 MSs)

[76] Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption. OJ L 139, 30.4.2004, p. 206-320.

Abbreviations

List of abbreviations

Abbreviation	Definition
AHAW	Animal Health and Welfare
BIOHAZ	Biological Hazards
BBLV	Bokeloh Bat *Lyssavirus*
CFU	colony-forming unit
CI	confidence Interval
CONTAM	EFSA Panel on Contaminants in the Food Chain
DCF	Data Collection Framework
DT	definitive phage type
EAEC	enteroaggressive *Escherichia coli*
EBLV	European bat *Lyssavirus*
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EEC	European Economic Community
EFSA	European Food Safety Authority
EFTA	European Free Trade Association
EHEC	enterohaemorragic *Escherichia coli*
ELISA	enzyme-linked immunosorbent assay
EPEC	enteropathogenic *Escherichia coli*
EU	European Union
EURL	European Union Reference Laboratory
EUROSTAT	European Committee on Antimicrobial Susceptibility Testing
FAT	fluorescent antibody test
g	gram
HACCP	Hazard Analysis and Critical Control Point
HUS	Haemolytic–Uraemic Syndrome
I-ELISA	indirect enzyme-linked immunosorbent assay
IHC	ImmunoHistoChemistry
ISO	International Organization for Standardization
LC-MC	Liquid chromatography-mass spectroscopy
LHT	Low heat-treated
MAC-ELISA	IgM-capture ELISA
MS	Member State
NMKL	Nordic Committee on Food Analysis
NRL	National Reference Laboratory
NT	not typeable
OBF	officially brucellosis free specification, e.g. ‘as regards bovine herds’
ObmF	officially *Brucella melitensis* free specification, e.g. ‘as regards ovine and caprine’ herds
OIE	World Organisation for Animal Health
OR	odds ratio
OTF	officially tuberculosis free specification, e.g. ‘as regards bovine herd’
PCR	polymerase chain reaction
PFGE	Pulsed field gel electrophoresis
RABV	rabies virus
RNA	ribonucleic acid
RTE	ready-to-eat
RT-PCR	Real time polymerase chain reaction

Abbreviation	Definition
SAS	Statistical Analysis System
SLT-PCR	Shiga-like toxin polymerase chain reaction
spp.	subspecies
STEC	Shiga toxin-producing *Escherichia coli*
TESSy	The European Surveillance System
UHT	ultra-high temperature
VTEC	verotoxigenic *Escherichia coli*
WCB	West Caucasian Bat virus
WND	West Nile disease
WNV	West Nile Virus
WHO	World Health Organization

Member States of the European Union and other reporting countries in 2012

Member States of the European Union, 2012

Member State	ISO Country Abbreviations
Austria	AT
Belgium	BE
Bulgaria	BG
Cyprus	CY
Czech Republic	CZ[1]
Denmark	DK
Estonia	EE
Finland	FI
France	FR
Germany	DE
Greece	GR
Hungary	HU
Ireland	IE
Italy	IT
Latvia	LV
Lithuania	LT
Luxembourg	LU
Malta	MT
Netherlands	NL[1]
Poland	PL
Portugal	PT
Romania	RO
Slovakia	SK
Slovenia	SI
Spain	ES
Sweden	SE
United Kingdom	UK[1]

1. In text, referred to as the Czech Republic, the Netherlands and the United Kingdom.

Non Member States reporting in 2012

Country	ISO Country Abbreviations
Iceland	IS
Norway	NO
Switzerland	CH