SCIENTIFIC REPORT

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The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2014

European Food Safety Authority

European Centre for Disease Prevention and Control

Abstract

This report of the European Food Safety Authority and the European Centre for Disease Prevention and Control presents the results of the zoonoses monitoring activities carried out in 2014 in 32 European countries (28 Member States (MS) and four non-MS). Campylobacteriosis was the most commonly reported zoonosis with an increase in confirmed human cases in the European Union (EU) since 2008. In food the occurrence of *Campylobacter* remained high in broiler meat. The decreasing EU trend for confirmed human salmonellosis cases since 2008 continued. More human *Salmonella* Enteritidis cases were reported whereas the *S.* Stanley cases remained, as in 2013, at a higher level compared with 2011–2012. Most MS met their *Salmonella* reduction targets for poultry but isolates of *S.* Infantis increased at EU level. In foodstuffs, the EU-level *Salmonella* non-compliance in fresh and processed poultry meat was rare and low, respectively. The numbers of human listeriosis cases further increased, since 2008. In ready-to-eat foods *Listeria* seldom exceeded the EU food safety limit. The decreasing EU trend for confirmed yersiniosis cases since 2008 continued. Positive findings for *Yersinia* were mainly reported in pig meat and products thereof. The number of confirmed verocytotoxigenic *Escherichia coli* (VTEC) infections in humans slightly decreased compared with 2013. VTEC was reported from food and animals. A total of 5,251 food-borne outbreaks, including water-borne outbreaks, were reported. Most food-borne outbreaks were caused by viruses, followed by *Salmonella*, bacterial toxins and *Campylobacter* and with unknown causative agent in 29.1% of all outbreaks. Important food vehicles in strong-evidence food-borne outbreaks were 'eggs and egg products', followed by 'mixed food' and 'crustaceans, shellfish, molluscs and products thereof'. The report further summarises trends and sources along the food chain of tuberculosis due to *Mycobacterium bovis*, *Brucella*, *Trichinella*, *Echinococcus*, *Toxoplasma*, rabies, *Coxiella burnetii* (Q fever), West Nile virus and tularaemia.

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

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Amendment: This document has been amended three times (March 2016, September 2016 and this current amendment). The present amendment reflects updated datasets submitted by Italy, Latvia and Romania during October 2016. The updated data relate to *Trichinella* in pigs. The following sections on *Trichinella* were amended*:* Summary on *Trichinella* page 8; Section 3.8.2 – *Trichinella* in animals (related Tables TRICHPIGS, TICHPIGSNOT and related figure TRICHMAPSPIGSNOT) and Section 3.8.3 – *Trichinella* discussion. To avoid confusion, the original report has been removed from the EFSA Journal website but is available on request as is a version showing all the changes made.

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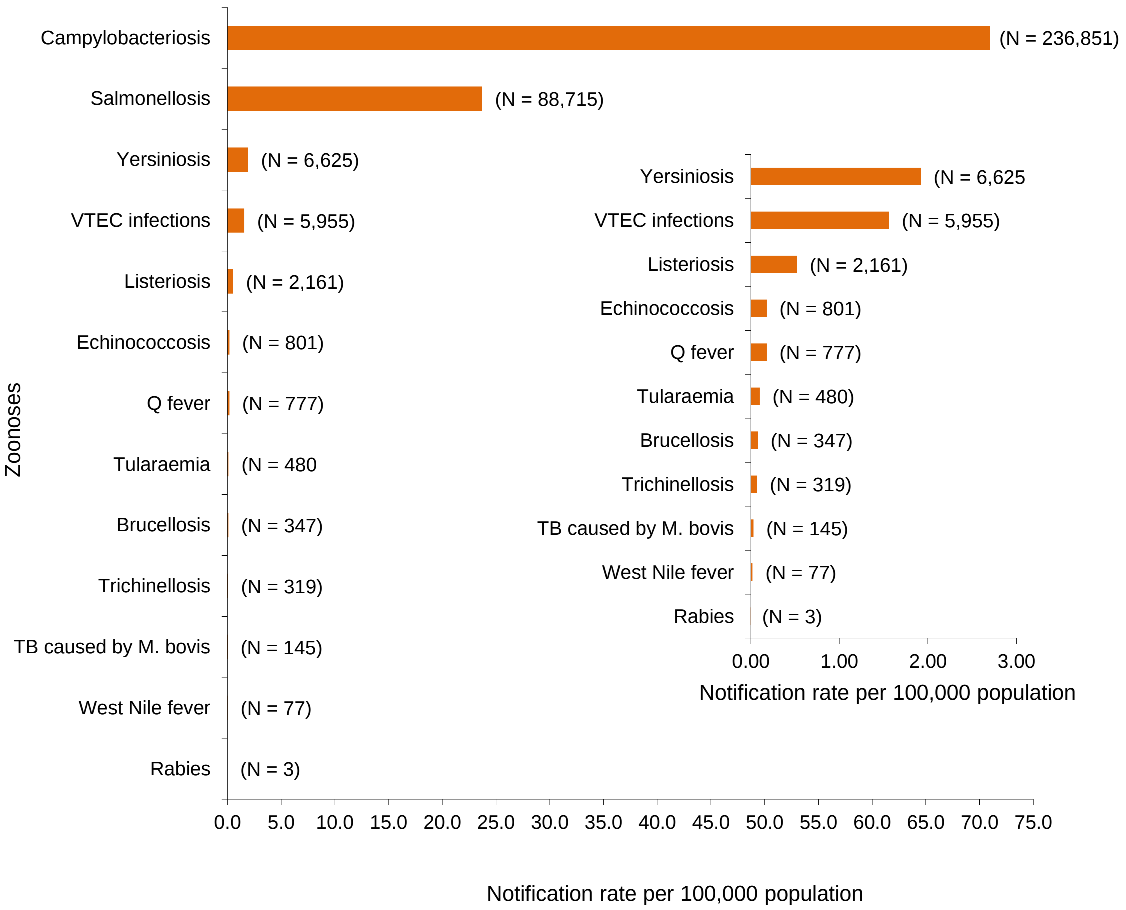
Summary

The report presents the results of the zoonoses monitoring activities carried out in 2014 in 32 European countries: 28 Member States (MS) and four non-Member States (non-MS) European Free Trade Association (EFTA) countries. The European Food Safety Authority (EFSA) and the European Centre for Disease Prevention and Control (ECDC) summarised all submitted data on the occurrence of zoonoses and food-borne outbreaks.

Campylobacter

Humans

In 2014, *Campylobacter* continued to be the most commonly reported gastrointestinal bacterial pathogen in humans in the European Union (EU) and has been so since 2005. The number of reported confirmed cases of human campylobacteriosis was 236,851 (Figure 1) with an EU notification rate of 71.0 per 100,000 population, a 9.6% increase compared with the rate in 2013. The 12-month moving average showed a statistically significant increasing trend over the 7-year period 2008–2014. The majority of the MS reported increasing notification rates in 2014 with almost half of the MS increasing significantly in 2008–2014. Considering the high number of human campylobacteriosis cases, their severity in terms of reported case fatality was low (0.01%) (Table 1).



Total number of confirmed cases is indicated in parenthesis at the end each bar. Exception is made for West Nile fever where total number of cases was used.

Figure 1: Reported numbers and notification rates of confirmed human zoonoses cases in the EU, 2014

Foodstuffs

Broiler meat is considered to be the most important single source of human campylobacteriosis. In 2014, 38.4% of the 6,703 samples of fresh broiler meat (single or batch, aggregated data from all sampling stages) were found to be *Campylobacter* positive, which is comparable to that observed in 2013. The variation between MS was high. In raw cow's milk intended for direct human consumption or manufacture of raw or low heat-treated products *Campylobacter* was detected in up to 16.7% of the tested units (single or batch).

Animals

In 2014, *Campylobacter* was found in 30.7% of the 13,603 units of broilers tested in MS. The variation in prevalence was high between MS. This prevalence is markedly higher than in 2013, though the number of reporting MS differed compared with 2013. The variation in reporting MS and in the number of units tested has greatly influenced the overall prevalence. Only few MS reported *Campylobacter* data for other animals.

Table 1: Reported hospitalisation and case-fatality rates due to zoonoses in confirmed human cases in the EU, 2014

Disease	Number of confirmed[(a)] human cases	Hospitalisation				Deaths			
		Status available (%)	Number of reporting MS[(b)]	Reported hospitalised cases	Proportion hospitalised (%)	Outcome available (%)	Number of reporting MS[(b)]	Reported deaths	Case-fatality (%)
Campylobacteriosis	236,851	25.4	16	18,303	30.4	73.6	15	25	0.01
Salmonellosis	88,715	32.2	14	9,830	34.4	49.6	15	65	0.15
Yersiniosis	6,625	15.2	12	442	44.0	58.3	14	5	0.13
VTEC infections	5,955	39.9	15	930	39.2	58.6	18	7	0.20
Listeriosis	2,161	38.0	16	812	98.9	64.8	20	210	15.0
Echinococcosis	801	24.0	14	122	63.5	24.6	12	1	0.51
Q- fever	777	NA[(c)]	NA	NA	NA	51.2	11	1	0.26
Brucellosis	347	62.0	9	142	66.1	41.5	10	0	0.00
Tularaemia	480	47.1	8	92	40.7	49.0	9	0	0.00
Trichinellosis	319	74.6	5	150	63.0	74.9	6	2	0.84
West Nile fever[(a)]	77	66.2	6	48	94.1	66.2	6	7	13.7
Rabies	3	NA	NA	NA	NA	66.6	3	2	100.0

(a): Exception made for West Nile fever where the total number of cases was included.
(b): Not all countries observed cases for all diseases
(c): NA-not applicable as the information is not collected for this disease.

Salmonella

Humans

In 2014, a total of 88,715 confirmed salmonellosis cases were reported by 28 EU MS, resulting in an EU notification rate of 23.4 cases per 100,000 population. This represented a 15.3% increase in the EU notification rate compared with 2013. There was a statistically significant decreasing trend of salmonellosis in the 7-year period of 2008-2014. Sixty-five fatal cases were reported by 11 MS among the 15 MS that provided data on the outcome of their cases. This gives an EU case-fatality of 0.15% among the 43,995 confirmed cases for which this information was available (Table 1).

As in previous years, the two most commonly reported *Salmonella* serovars in 2014 were *S.* Enteritidis and *S.* Typhimurium, representing 44.4% and 17.4%, respectively, of all reported serovars in confirmed human cases. The proportion of *S.* Enteritidis increased compared with 2013. This increase was mainly attributed to increase in cases in one MS. *S.* Typhimurium cases, including the variant monophasic *S.* Typhimurium 1,4,[5],12:i:-, decreased by 21.7% compared with 2013. Cases of *S.* Infantis, the fourth most common serovar, returned to the level of 2012 after the increase in 2013. *S.* Stanley continued to decrease also in 2014 but cases still remained, as in 2013, at a higher level than before the large outbreak reported in 2011-2012. The highest increase in 2014 was observed in *S.* Chester and could be explained by an outbreak related to travel to Morocco.

Foodstuffs

Generally there was no major change as regards *Salmonella*-contaminated foodstuffs compared with previous years. *Salmonella* was most frequently detected in poultry meat, and less often in pig or bovine meat. The highest proportions of *Salmonella*-positive single samples were reported for fresh turkey meat (3.5%) followed by fresh broiler (2.2%), pig (0.5%) and bovine meat (0.1%). *Salmonella* was rarely found in table eggs, at levels of 0.3% (single samples) or 1.0% (batch samples). The most important source of food-borne *Salmonella* outbreaks was, however, still eggs and egg products. *Salmonella* was also detected in other foods, including ready-to-eat (RTE) foods, at low to very low levels; however RTE foodstuffs pose a direct risk to the consumer, so assessing the proportion of *Salmonella*-positive samples should take this into account. In fresh poultry meat, subject to a *Salmonella* criterion for *S.* Enteritidis and *S.* Typhimurium (including monophasic *S.* Typhimurium strains with the antigenic formula 1,4,[5],12:i:-), the reported non-compliance decreased to 0.1% in single samples and remained at 0.2% in batches. This indicates that the continued investment of MS in *Salmonella* control is yielding noticeable results. Still, this is not reflected in minced meat and meat preparations from poultry to be cooked before consumption and also not in meat products from poultry intended to be eaten cooked. In these product categories the proportions of non-compliant units was low (< 10%), with no obvious trend during this period.

Animals

In 2014, the EU-level prevalence of *Salmonella* target serovar-positive poultry flocks was very low (< 1%), for breeding flocks of *Gallus gallus*, for laying hen flocks, broiler flocks, as well as for flocks of breeding and of fattening turkeys.

Since the implementation of National Control Programmes the declining trend in the EU prevalence of *Salmonella* target serovar-positive poultry flocks continued in 2014 for all groups of animals during their production period, except for breeding flocks of *G. gallus* for which the prevalence for the five target serovars (*S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Hadar and *S.* Virchow) stabilised at 0.6%, since 2010.

Twenty-one MS met the *Salmonella* reduction target of ≤ 1% set for fowl breeding flocks. In the case of flocks of laying hens, 23 MS met their relative *Salmonella* reduction targets and the EU prevalence for the two target serovars (*S.* Enteritidis and *S.* Typhimurium) was further reduced from 1.0% in 2013 to 0.9% in 2014. In broiler flocks, 21 MS met the reduction target set at ≤ 1% for the two serovars (*S.* Enteritidis and *S.* Typhimurium) and the EU prevalence for the target serovars was 0.2%, the same as in 2013. In turkeys, the same reduction target is in force as for broilers, and all 15 MS which reported data on turkey breeding flocks met the target, with an overall prevalence of 0.2% for the two target serovars (0.3% in 2013). A further 21 MS met the target for fattening turkey flocks before slaughter. At the EU level, 0.2% of the fattening turkey flocks were infected with the two target serovars, the same as in 2013.

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

Feedingstuffs

The overall level of *Salmonella* contamination in animal- and vegetable-derived feed material in 2014 was low (3.8%), but higher than in 2013 (1.4%). The highest proportion of positive samples in individual investigations was reported for the feed category 'Feed material of oil seed or fruit origin', mainly soya (bean)-derived and sunflower seed-derived feed.

In compound feedingstuffs (the finished feed for animals), the proportion of *Salmonella*-positive findings in 2014 was low to very low for all animal populations: 0.7% of 1,654 tested samples for cattle, 1.9% of 1,077 tested samples for pigs and 0.8% of 7,741 tested samples for poultry.

Serovars

The most commonly reported serovar in fowl (*G. gallus*) was *S.* Infantis, accounting for 38.3% of all 5,377 reported isolates, followed by *S.* Mbandaka (12.1%) and *S.* Enteritidis (11.9%). *S.* Livingstone and *S.* Typhimurium were reported as 6.7% and 4.8% of the total isolates, respectively. While the number of *S.* Enteritidis and *S.* Typhimurium reports has steadily declined over the past 5 years, the number of reported *S.* Infantis isolates has increased and was in 2014 more than the double reported in 2010.

S. Infantis was also the most commonly reported serovar from broiler meat, accounting for 35.8% of all 1,626 reported isolates. The number of reported *S.* Enteritidis isolates from broiler meat has been increasing over the past five years and in 2014 *S.* Enteritidis became the second most commonly reported serovar from broiler meat (33.9% of isolates).

In 2014, in turkeys *S.* Infantis was for the first time since years the most commonly reported serovar (22.2% of isolates). From turkey meat, *S.* Stanley and *S.* Infantis were most commonly reported, followed by *S.* Typhimurium.

In pigs, *S.* Typhimurium accounted for 54.7% of the 2,037 isolates reported in 2014, and *S.* Derby was the second most common serovar, accounting for 17.5% of isolates. The proportion of isolates that belong to the group of monophasic strains of *S.* Typhimurium has not changed substantially over the past 5 years and ranged between 8.4% of isolates in 2014 and 14% in 2013. In pig meat, across the EU, *S.* Typhimurium was the most commonly reported serovar (27.8%), followed by *S.* Derby (24.4%) and monophasic strains of *S.* Typhimurium (18%).

In cattle, the most common serovar was *S.* Typhimurium (46.8% of all 3,243 reported isolates). *S.* Dublin (31.3% of isolates) was the second most common serovar across the EU, and *S.* Enteritidis accounted for 4.6% of isolates only, the third one. In 2014, 24.7% of isolates from bovine meat were *S.* Derby, 20.6% were *S.* Typhimurium and 17.8% were *S.* Enteritidis.

Listeria

Humans

In 2014, 27 MS reported 2,161 confirmed human cases of listeriosis. The EU notification rate was 0.52 cases per 100,000 population which represented a 30% increase compared with 2013. There was a statistically significant increasing trend of listeriosis over 2008-2014. The majority of the countries reported increasing notification rates of listeriosis in 2014 and six MS had statistically increasing trend. Seventeen MS reported 210 deaths due to listeriosis in 2014, which was the highest annual number of deaths reported since 2009. The EU case fatality was 15.0% among the 1,401 confirmed cases with known outcome (Table 1). Listeriosis infections were most commonly reported in the elderly population with the case fatality peaking at 17.8% in the age group over 65 years old.

Foodstuffs

In 2014, the non-compliance for different RTE food categories was generally at a level comparable to previous years, with the level of non-compliance highest in fishery products at processing plant (mainly smoked fish). As in previous years and consistent with the results of the EU baseline survey on the prevalence of *L. monocytogenes* in certain RTE foods at retail, the proportion of positive samples at retail was highest in fish products (mainly smoked fish).

Animals

In 2014, several MS reported information on *Listeria* in various animal species. Findings of *Listeria* were most often reported in cattle, sheep, goats, pigs and solipeds but *Listeria* was also detected in broilers, cats, dogs, hunted wild boar, foxes, and other wild and zoo animals. *Listeria* is widespread in the environment; therefore, isolation from animals is to be expected and increased exposure may lead to clinical disease in animals.

Verocytotoxigenic *E. coli*

Humans

In 2014, 5,955 confirmed cases of verocytotoxigenic *Escherichia coli* (VTEC) infections were reported in the EU. The EU notification rate was 1.56 cases per 100,000 population, which was 1.9% lower than the notification rate in 2013. The EU notification rate in the 2 years following the large outbreak in 2011 was higher than before the outbreak and remained so in 2014. This is possibly an effect of increased awareness and of more laboratories testing also for other serogroups than O157. In 2014, seven deaths due to VTEC infection were reported in the EU which resulted in an EU case-fatality of 0.2% among the 3,491 confirmed cases for which this information was provided (Table 1).

As in previous years, the most commonly reported VTEC serogroup in 2014 was O157 (46.3% of cases with known serogroup) although its relative proportion compared to other serogroups declined. Serogroup O157 was followed by serogroups O26, O103, O145, O91, O146 and O111. The proportion of non-typable VTEC strains continued to increase in 2014 as did the proportion of O-rough which both doubled in the 3-year period from 2012 to 2014.

Foodstuffs and animals

No trends were observed in the presence of VTEC in food and animals. The highest proportion of VTEC-positive samples was reported for meat from ruminants (goat, sheep, bovine and deer). VTEC were reported in about 1% of cheese samples, in particular those made from sheep's and goats' milk, while contamination was rare in RTE food of vegetal origin. In particular, no VTEC-positive samples were reported for spices and herbs as well as for sprouted seeds, the sole food category for which microbiological criteria for VTEC have been established in the EU.

A wide range of VTEC serogroups was reported, with VTEC O157 being the most frequent in both food and animal samples. However, it should be considered that many of the MS's surveillance and monitoring programmes are traditionally focused on this serotype and this may have introduced a bias in the estimates of the frequency of VTEC serogroups. Similarly to the data referring to human infections, the VTEC serogroup O26 was the second most reported serogroup in both food and animal samples, with an increasing trend between 2011 and 2014. It is also interesting to note that the VTEC serogroups most frequently found in food samples (O157, O26, O103, O113, O146, O91, O145) are those most commonly reported in human infections in the EU/EEA in 2014 and also in the preceding years.

Yersinia

Humans

MS reported 6,625 confirmed cases of yersiniosis in 2014, making it the third most commonly reported zoonosis in the EU. The EU notification rate was 1.92 cases per 100,000 population which was comparable with 2013. There was a statistically significant decreasing 7-year trend in 2008–2014. The highest country-specific notification rates were observed in MS in north-eastern Europe. *Yersinia enterocolitica* was the most common species reported to be isolated from human cases.

Five fatal cases, all due to *Y. enterocolitica*, were reported among the 3,861 confirmed yersiniosis cases for which this information was reported in 2014. The EU case fatality was 0.13% (Table 1).

Food and animals

Only very few MS report data from surveillance of *Yersinia* in food and animals. In 2014, two MS reported positive findings for *Y. enterocolitica* in pig meat and products thereof, and two MS reported positive findings in pigs. Positive findings were also reported in other food (bovine meat, ovine meat and raw cow's milk) and in other animals (cattle, goats, sheep, foxes, hunted wild boar, dogs, deer, hares, cats).

Tuberculosis due to *Mycobacterium bovis*

Humans

Tuberculosis due to *M. bovis* is a rare infection in humans in the EU, with 145 confirmed human cases reported in 2014 and a notification rate of 0.03 cases per 100,000 population. The notification rates in the EU have been stable in 2011–2014. There was no clear association between a country's status as officially free of bovine tuberculosis (OTF) and notification rates in humans.

Animals

At the EU-level, the proportion of cattle herds infected with or positive for *M. bovis* remained very low (0.8% of the existing herds). The distribution of *M. bovis* across EU is, however, heterogeneous with a prevalence ranging from absence of infected/positive animals in many OTF regions to a prevalence of 11.6% in the non-OTF regions of the United Kingdom (England, Northern Ireland and Wales). In the non-OTF regions, the reported proportion of herds positive for *M. bovis* slowly increases during the last years.

Brucella

Humans

Brucellosis is a rare infection in humans in the EU with 347 confirmed cases reported in 2014. The highest notification rates and the majority of the domestic cases were reported from three countries (Greece, Portugal and Spain) that are not officially brucellosis-free in cattle, sheep or goats. Almost 70% of the human brucellosis cases had been hospitalised, but no deaths were reported in 2014.

Foodstuffs

There was a *Brucella*-positive investigation in nine samples of milk (processing plant sampling) collected in Italy. The other two MS (Portugal and Spain) that reported surveillance results in food did not have any positive sample.

Animals

In 2014, bovine, ovine and caprine brucellosis remained a rare event in the EU. Both bovine and small ruminant brucellosis cases of infected or positive herds have been reported by five Mediterranean MS: Croatia, Greece, Italy, Portugal and Spain. Most non-officially brucellosis-free MS and non-officially *Brucella melitensis* free MS reported fewer positive and/or infected herds than in 2013.

Trichinella

Humans

In 2014, 319 confirmed trichinellosis cases were reported in the EU. The EU notification was 0.07 cases per 100,000 population, an increase by 40% compared with 2013 and the highest notification rate reported since year 2010. The highest notification rates were reported in Romania, and Bulgaria. The time series of trichinellosis was greatly influenced by a number of smaller and larger outbreaks with peaks often occurring in January. Two deaths due to trichinellosis were reported in 2014.

Animals

Ten MS reported positive findings in animals (pigs and farmed wild boar).From more than 191 million tested pigs, 204 (0.0001%) were reported to be positive and all were reported from pigs not raised under controlled housing conditions of which most were found in Romania. From a total of 41,244 farmed wild boar tested, three MS reported positive finding at very low levels. No positive findings were reported from 198,665 domestic solipeds tested in EU.

In hunted wild boar 0.12% tested positive and originated mostly from eastern EU MS. Most of the *Trichinella*-positive reports from wildlife other than wild boar were from eastern and north eastern EU MS, in 27 different animal species. Throughout the past years, the highest proportions of positive samples were from raccoon dogs followed by bears. *Trichinella* is found in large parts of Europe as 15 MS reported positive findings.

Echinococcus

Humans

In 2014, a total of 806 echinococcosis cases, of which 801 were laboratory-confirmed, were reported in the EU. The EU notification rate was 0.18 cases per 100,000 population which was the same as in 2013. The number of cases reported to be infected with *E. granulosus* (cystic echinococcosis) increased in 2014 after a steady decrease since 2008. In contrast, the number of cases reported to be infected with *E. multilocularis* (alveolar echinococcosis) decreased for the first time in 2014 since 2008. One death due to *E. granulosus* was reported in 2014.

Animals

E. multilocularis was reported at low to moderate levels in foxes by eight MS. Further, three countries reported findings of *E. multilocularis* in pigs, raccoon dog and beaver. Two MS (Greece and Spain) reported almost all the positive findings of *Echinococcus* in domestic farm animals and were mainly obtained from meat inspection at slaughterhouse. *E. granulosus* findings were almost exclusively reported by one MS (Spain).

Toxoplasma

Humans

Data on congenital toxoplasmosis in the EU in 2014 are not included in this report but data will be available in the ECDC Surveillance Atlas (in preparation).

Animals

In 2014, 14 MS and two non-MS provided data on *Toxoplasma* in animals. Positive findings (indirect and direct analytical methods) were detected in pigs (four MS with overall 9.7% of the tested samples positive), cattle (nine MS, 3.9% positive), sheep and goats (12 MS and two non-MS, 26.2%), and dogs and cats (10 MS; 12.2% positive dogs and 17.2% positive cats). In addition, positive samples were detected from deer, donkeys, foxes, hares, horses, lynx, mouflons, rabbits, pet animals, water buffalo, wild rats and wolves.

Rabies

Humans

In 2014, three travel-associated cases of rabies were reported from France, the Netherlands and Spain. Two patients, 46 and 35 years old, were bitten by dogs in Morocco and India, respectively. The third patient, 57 years old, was infected by a canine strain of rabies virus in Mali.

Animals

In 2014, 319 rabies cases were reported in foxes by six MS (Romania, Poland, Hungary, Greece, Bulgaria and Croatia) which is a decrease of 41.4% compared to 2013. Overall, in 2014, 443 animals other than bats tested positive for either classical rabies virus or unspecified lyssavirus, in reporting countries. This number of cases reported was lower compared with 2013, when 778 cases were reported. Three MS reported rabies cases in pet animals (18 cases in cats and 27 cases in dogs). In addition, six MS (France, Germany, Poland, Spain, the Netherlands and the United Kingdom) reported positive cases from bats.

Q fever

Humans

In 2014, a total of 777 confirmed cases of Q fever in humans were reported in the EU. The EU notification rate was 0.18 per 100,000 population. The highest notification rate was observed in Hungary (0.60 cases per 100,000 population) for the second consecutive year.

Overall, there was a significantly decreasing trend of Q fever cases in 2008–2014. One death due to Q fever was reported by Hungary in 2014. This resulted in an EU case fatality of 0.26% among the 380 confirmed cases for which this information was reported.

Animals

The majority of the samples for Q fever in 2014 were reported from cattle (19 MS and two non-MS reported data), sheep and goat (19 MS and one non-MS reported) of mainly 3 MS. Different indirect and direct test methods were used and the proportion of positive animals varied largely between MS. Five and 10 MS did not detect any positive sample for *C. burnetii* in cattle and sheep and goat respectively. Six and two non-MS tested a range of other domesticated, captive as well as wild animals for Q fever, the majority in Italy. The latter detected 10.4% positive samples in a large survey of farmed water buffalo.

West Nile virus

Humans

In 2014, 77 cases of West Nile fever (WNF) in humans were reported in the EU. The EU notification rate of locally acquired and travel-related cases was 0.02 per 100,000 population. The overall notification rate decreased by 0.06 per 100,000 (71%) compared with 2013 (250 cases). The highest notification rate was observed in Greece (0.14 cases per 100,000 population), but was much lower than in previous years; however, surveillance systems vary between countries, making the comparison difficult. Case numbers peaked in September, not in August as during most previous years.

Seven deaths due to WNF were reported by Greece and Romania in 2014.

Animals

In 2014, a total of 23,629 animals (solipeds, birds and farmed red deer) were reported and tested for West Nile virus (WNV), which is more than in 2013 when 21,221 animals were tested. Only one MS (Spain) reported the WNV presence via a confirmatory test in birds. Eight MS detected seropositive animals in solipeds.

Tularaemia

Humans

In 2014, 480 confirmed cases of tularaemia in humans were reported in the EU. The EU notification rate was 0.10 cases per 100,000 population, a 43% increase compared with 2013. There was no significant increasing or decreasing trend in 2008–2014. The highest notification rate was observed in Sweden (1.56 confirmed cases per 100,000 population), slightly higher than in 2013. No deaths due tularaemia were reported at the EU.

Animals

Occurrence of *Francisella tularensis* was reported by one MS and one non-MS, in wild hares, and in a monkey.

Other zoonoses and zoonotic agents

Findings of *Taenia saginata* cysts in bovine carcases and of *Taenia solium* cysts in pig carcases and wild boar were reported by, respectively, three and two MS.

Food-borne outbreaks

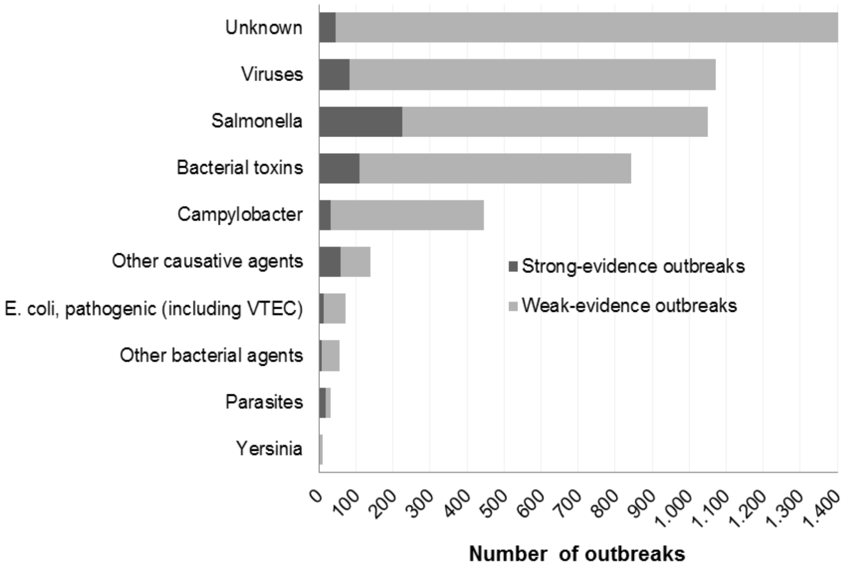
In 2014, a total of 5,251 food-borne outbreaks, including water-borne outbreaks, were reported in the EU. Overall, 45,665 human cases, 6,438 hospitalisations and 27 deaths were reported. The evidence supporting the link between human cases and food vehicles was strong in 592 outbreaks (Figure 2).

The largest number of reported food-borne outbreaks was caused by viruses (20.4% of all outbreaks), which overtook *Salmonella* (20.0% of all outbreaks) as the most common cause of outbreaks in the EU. Bacterial toxins accounted for 16.1% of the outbreaks and *Campylobacter* for 8.5% of the outbreaks. For 29.2% of the outbreaks the causative agent was unknown. From 2008 to 2014, there has been a markedly decreasing trend in the annual total number of *Salmonella* outbreaks within the EU by 44.4%, whereas the number of outbreaks caused by viruses has more than doubled since 2011

(525) and reached in 2014 the highest level yet reported (1,072). Reported *Campylobacter* food-borne outbreaks increased slightly compared to 2013.

As in previous years, the most important food vehicles in the strong-evidence outbreaks were 'eggs and egg products', followed by 'mixed food', 'crustaceans, shellfish, molluscs and products thereof' and 'vegetables and juices'.

In 2014, 12 strong-evidence water-borne outbreaks were reported in the EU. Five different pathogens were detected from these outbreaks: *Salmonella, Campylobacter*, VTEC, *Cryptosporidium parvum* and *Clostridium perfringens*. For four water-borne strong-evidence outbreaks the causative agent was unknown.



Food-borne viruses include adenovirus, calicivirus, hepatitis A virus (HAV), flavivirus, rotavirus and other unspecified viruses. Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus*. Other causative agents include chemical agents, histamine, lectin, marine biotoxins, mushroom toxins, and wax esters (from fish). Parasites include primarily *Trichinella*, but also *Cryptosporidium*, *Giardia* and *Anisakis*. Other bacterial agents include *Brucella*, *Listeria*, *Shigella*, *Vibrio parahaemolyticus* and other unspecified bacteria agents. In this figure, outbreaks due to pathogenic *E. coli* other than VTEC and VTEC outbreaks have been aggregated into the category '*E. coli* (including VTEC)'.

Figure 2: Distribution of all food-borne outbreaks per causative agent in the EU, 2014

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Legal basis

About EFSA

The European Food Safety Authority, located in Parma, Italy, and established and funded by the EU as an independent agency in 2002, provides objective scientific advice, 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 risk assessments provide risk managers (the European Commission (EC), 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 EC, particularly in the case of a food crisis, are also part of EFSA's mandate, as laid down in founding Regulation (EC) No 178/2002[1] 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 founding Regulation (EC) No 851/2004[2] 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 goal, 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 in health to develop authoritative scientific opinions about the risks posed by current and emerging infectious diseases.

Terms of reference

The EU system for the monitoring and collection of information on zoonoses is based on the Zoonoses Directive 2003/99/EC, which obliges EU MS to collect relevant and, where applicable, comparable data on zoonoses, zoonotic agents, antimicrobial resistance and food-borne outbreaks. In addition, MS are required to assess trends and sources of these agents, as well as outbreaks in their territory, submitting an annual report each year by the end of May to the EC covering the data collected. EFSA is assigned the tasks of examining these data and publishing the EU annual Summary Reports. In accordance with Article 9 of the Zoonoses Directive 2003/99/EC, EFSA shall examine the submitted national reports of the EU MS and publish by the end of November a summary report on the trends and sources of zoonoses, zoonotic agents and antimicrobial resistance in the EU.

[1] 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 EFSA and laying down procedures in matters of food safety. OJ L 31, 1.2.2002, pp. 1–24.

[2] 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, pp. 1–11.

1. Introduction

This European Union (EU) Summary Report 2014 on zoonoses, zoonotic agents and food-borne outbreaks was prepared by the European Food Safety Authority (EFSA) in collaboration with the European Centre for Disease Prevention and Control (ECDC). Member States, other reporting countries, the European Commission (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 Member States (MS), the reporting non-MS and the EC in the reporting of zoonoses data and in the preparation of this report are gratefully acknowledged.

The 2014 data on antimicrobial resistance in zoonotic agents submitted and validated by the MS are published in a separate EU Summary Report.

The present EU Summary Report on zoonoses and food-borne outbreaks focuses on the most relevant information on zoonoses and food-borne outbreaks within the EU in 2014. If substantial changes compared with the previous year were observed, they have been reported.

1.1. The structure of the report

The current report, the EU Summary Report 2014, includes an abstract, a summary, an introduction to the zoonoses reporting, a description of materials and methods and an EU assessment of the specific zoonoses. It is available in printable format. The Appendix contains hyperlinks to all data summarised for the production of this report, for humans, food, animals and food-borne outbreaks. It also includes hyperlinks to summary tables and figures that were not included in this printable report because they did not trigger any marked observation. The validated and summarised data are presented in downloadable Excel and PDF files, and listed by subject.

Monitoring and surveillance schemes for most zoonotic agents covered in this report are not harmonised among MS, and findings presented in this report must, therefore, be interpreted with care. The data presented may not have 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 between MS 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. They are available online at http://www.efsa.europa.eu/en/biological-hazards-data/reports.

2. Materials and methods

2.1. Data received in 2014

2.1.1. Human data

The human data analyses in the EU Summary Report for 2014 were prepared by the Food- and Waterborne Diseases and Zoonoses programme at the ECDC and were based on the data submitted via the European Surveillance System (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 6 August 2015. The denominators used for the calculation of the notification rates were the human population data from EUROSTAT April 2015 update.

Data on human zoonoses cases were received from 28 MS and also from two non-MS: Iceland and Norway. Switzerland sent its data on human cases directly to EFSA.

The data should be interpreted with caution and taking into account data quality issues and differences between MS surveillance systems. The reader should refrain from making direct comparisons between countries without taking into account the limitations in the data which may differ between countries depending on the characteristics of their surveillance systems.

2.1.2. Data on food, animals and feed

In 2014, 27 MS submitted data and national zoonoses reports; Luxembourg did not submit any data or national report. In addition, data and reports were submitted by the four non-MS: Iceland, Norway, Switzerland and Liechtenstein.[3] Sixteen MS and two non-MS submitted data on animals, food and food-borne outbreaks electronically to the EFSA zoonoses database, through EFSA's Data Collection Framework (DCF). Seven MS and one non-MS submitted data using the web-based zoonoses reporting system maintained by EFSA. Four MS used both systems. This is the last year MS can report data using the web based reporting system.

In 2014, 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*. In addition, based on the epidemiological situations in MS, data were reported on the following agents and zoonoses: *Yersinia*, *Toxoplasma*, lyssavirus (rabies), *Coxiella burnetii* (Q fever), West Nile virus (WNV), *Cysticercus*, *Francisella*, *Chlamydia* and *Sarcocystis*, and *Bacillus*. Data on *Staphylococcus*, meticillin-resistant *Staphylococcus aureus* (MRSA) and antimicrobial resistance in indicator *E. coli* and enterococci isolates were also submitted. Furthermore, MS provided data on certain other microbiological contaminants in food – histamine, staphylococcal enterotoxins and *Enterobacter sakazakii* (*Cronobacter* spp.), for which food safety criteria are set down in EU legislation.

The deadline for data submission was 31 May 2015. Two data validation exercises were implemented, by 3 June 2015 and by 3 July 2015. Validated data on food, animals, and feed used in the report were extracted from the EFSA zoonoses database on 24 September 2015.

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

The draft EU Summary Report was sent to MS for consultation on 30 October 2015 and comments were collected by 20 November 2015. The utmost effort was made to incorporate comments and data amendments within the available time frame. The report was finalised by 2 December 2015 and published online by EFSA and ECDC on 17 December 2015.

In this report, data are presented on the eight mandatory zoonotic agents and also on rabies, *Toxoplasma*, Q fever, WNV, *Yersinia*, *Francisella*, *Cysticercus* and *Sarcocystis*.

For each pathogen, an overview table presenting all MS reported data is available. However, for the summary tables, data from industry own-control programmes and Hazard Analysis and Critical Control Point (HACCP) sampling and, unless stated otherwise, data from suspect sampling, selective sampling and outbreak or clinical investigations are excluded. Specifically, the following criteria have been applied:

- data from industry own-control programmes and Hazard Analysis and Critical Control Point (HACCP) sampling are excluded in all the summary tables;
- data from suspect sampling, selective sampling and outbreak or clinical investigations are excluded in the summary tables for *Salmonella*, *Campylobacter*, *Listeria*, VTEC, *Yersinia* and *Trichinella*;
- data from suspect sampling, selective sampling and outbreak or clinical investigations are included in the summary tables for *Echinococcus*, rabies, *Toxoplasma*, *Francisella tularensis*, WNV, *Brucella*, *M. bovis, Coxiella burnetii*.

More details regarding the 2014 zoonoses models for data entry and the picklists (qualitative classifications) of variables are available online (http://www.efsa.europa.eu/en/supporting/pub/776e) and in an EFSA supporting publication (EFSA, 2015a). As regards the number of samples of investigations, there was no restriction and also smaller sample sizes, of fewer than 25 units, are included in all tables. It is acknowledged that sampling biases and imprecision due to limited numbers of specimens examined preclude extending findings to reflect actual prevalence or accurate prevalence estimations.

The detailed description of the terms used in the report is available in the EFSA's manual for reporting on zoonoses (EFSA, 2015b).

2.1.3. Data on food-borne outbreaks

Twenty-six MS and three non-MS reported data on food-borne outbreaks during 2014. No outbreak data were reported by Cyprus and Luxembourg. The non-reporting of food-borne outbreak data does not necessarily mean that no outbreaks were notified in non-reporting countries.

If in rare cases, the MS do not provide any information on the number of human cases, hospitalisation and/or deaths the numbers are assumed to be zero.

Data on food-borne outbreaks used in the report were extracted from the EFSA zoonoses database on 30 November 2015.

The detailed description of the terms used in the report is available in the EFSA's manual for reporting on food-borne outbreaks (EFSA, 2015c). This year, 2014, was the first year of reporting when it was possible to report detailed information on weak-evidence outbreaks.

2.2. Statistical analysis of trends over time

2.2.1. 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 MS, throughout the study period 2008–2014, were included in the time series analysis. Diseases were analysed 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®14.

2.3. Cartographic and other representation of data

2.3.1. Animal data

ArcGIS from the Economic and Social Research Institute (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.

A Sankey diagram of reported *Salmonella* serovar isolates was produced using the open source data visualisation website: http://app.raw.densitydesign.org/#%2F.

For lyssavirus and WNV 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).

2.4. 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 2014.

2.4.1. *Salmonella* data

Humans

The notification of non-typhoidal salmonellosis in humans is mandatory in most MS, Iceland, Norway and Switzerland, except for four MS where reporting is based on a voluntary system (Belgium, France and Luxembourg) 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 MS except four (Belgium, France, the Netherlands and Spain). The coverage in Spain, France and in the Netherlands is estimated to be 48%, 30%, 48% and 64%, respectively. These proportions of populations were used in the calculation of notification rates for Spain, France and the Netherlands. Diagnosis of human *Salmonella* infections is generally done by culture from human stool samples. The majority of countries perform serotyping of strains (ECDC, 2012a).

Food

Salmonella in food is notifiable in 16 MS (Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Romania, Slovakia, Slovenia, Spain and Sweden) and in two non-MS (Norway and Iceland). Information was not provided from Cyprus, Croatia, Greece, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal and Switzerland.

Commission Regulation (EC) No 2073/2005[4] on microbiological criteria for food 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,[5] entering into force in December 2007. Sampling schemes for monitoring *Salmonella* in food, e.g. place of sampling, sampling frequency and diagnostic methods, vary between MS and according to food types, as do sampling objectives. For a full description of monitoring schemes and diagnostic methods in individual MS, please refer to the national reports. The monitoring schemes are based on various types of samples, such as neck skin

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

[5] 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, pp. 12–29.

samples, carcase swabs and meat cuttings; these samples were collected at slaughter, at processing plants, at meat cutting plants and at retail. Several MS 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.

Animals

Salmonella in *Gallus gallus* (fowl) and/or other animal species is notifiable in all MS, except for Hungary, and also in three non-MS (Iceland, Norway and Switzerland). In France, *Salmonella* detection is mandatory only for breeding flocks and laying hens of *G. gallus*, and in Malta for broilers and laying hen flocks of *G. gallus*. In Poland and in Romania, the notification of *Salmonella* is mandatory only in poultry; in Poland only findings of *S.* Enteritidis, *S.* Typhimurium, *S.* Pullorum and *S.* Gallinarum, and in Romania findings of *S.* Enteritidis and *S.* Typhimurium.

The monitoring of *Salmonella* in animals is mainly conducted through active routine monitoring of flocks of breeding and production animals in different age groups, and tests on organs during meat inspection, but also includes passive, laboratory-based surveillance of clinical samples. Community Regulation (EC) No 2160/2003[6] with subsequent amendments prescribes a sampling plan for the control of *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and *S.* Hadar in breeding flocks of *G. gallus* and for the control of *S.* Enteritidis and *S.* Typhimurium in laying hen flocks and broiler flocks of *G. gallus* and for turkey flocks to ensure comparability of data among MS. Non-MS (European Free Trade Association members) must also apply the Regulation in accordance with the Decision of the European Economic Area (EEA) Joint Committee No 101/2006.[7] No specific requirements for the monitoring and control of other commercial poultry production systems or in other animals were applicable in 2014.

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.

Feed

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 feed that are considered at risk. Samples of raw material, materials used during processing and final products are collected from batches of feed 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 MS 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 feed 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 feed (mixture of feed materials intended for feeding specific animal groups). Data on the detection of *Salmonella* in feed material of land animal origin, marine animal origin, cereals, oil seeds and products, and compound feed for cattle, pigs and poultry in 2014 are presented. Single-sample and batch-based data from the different monitoring systems are summarised.

2.4.2. *Campylobacter* data

Humans

The notification of campylobacteriosis is mandatory in most MS, Iceland, Norway and Switzerland, except for six MS, where notification is based on a voluntary system (Belgium, France, Italy,

[6] 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, pp. 1–15.

[7] 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, pp. 6–9.

Luxembourg and the Netherlands) 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 MS except five (Belgium, France, Italy, the Netherlands and Spain). The coverage of the surveillance system is estimated to be 20% in France, 52% in the Netherlands and 30% in Spain. These proportions of populations were used in the calculation of notification rates for these three MS. Diagnosis of human infection is generally based on culture from human stool samples and both culture and non-culture methods (polymerase-chain reaction (PCR)-based) are used for confirmation. Biochemical tests or molecular methods are used for species determination of isolates submitted to the National Reference Level Laboratory.

Food

In food, *Campylobacter* is notifiable in the following 11 MS: 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 Croatia, 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 section, data from suspect and selective sampling and outbreak or clinical investigations were also excluded.

Animals

Campylobacter is notifiable in *G. 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 Bulgaria, Croatia, Cyprus, France, Lithuania, Malta and Poland. The most frequently used methods for detecting *Campylobacter* in animals at farm, slaughter and in food were bacteriological methods (ISO, 2006; Nordic Committee on Food Analysis (NMKL), 2007) 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.

2.4.3. *Listeria* data

Humans

The notification of listeriosis in humans is mandatory in most MS, Iceland, Norway and Switzerland, except for three MS, 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 MS except Spain, where the estimated coverage is 30%. This population proportion was used in the calculation of notification rates for Spain. Diagnosis of human infections is generally done by culture from blood, cerebrospinal fluid and vaginal swabs.

Food

Notification of *L. monocytogenes* in food is required in 11 MS (Belgium, Estonia, France, Germany, Hungary, Italy, Latvia, the Netherlands, Slovakia, Slovenia and Spain); however, several other MS reported data. Commission Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs lays down food safety criteria for *L. monocytogenes* in ready-to-eat (RTE) foods. This Regulation came into force in January 2006. Surveillance in RTE foods was performed in most MS. However, owing to differences in sampling and analytical methods, comparisons from year to year were difficult.

Animals

Listeria in animals was notifiable in 13 MS (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, Croatia, 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.

2.4.4. VTEC data

Humans

The notification of VTEC infections is mandatory in most MS, Iceland, Norway and Switzerland, except for five MS, where notification is based on a voluntary system (Belgium, France, Italy and Luxembourg) or other system (the United Kingdom). No surveillance system exists in Portugal. The surveillance systems for VTEC infections have full national coverage in all MS except three (Belgium, France and Italy). The VTEC surveillance in France is centred on paediatric haemolytic uraemic syndrome (HUS) surveillance, and in Italy is primarily based on the National registry of HUS. 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.

Food and animals

VTEC is notifiable in food in 10 MS (Belgium, Estonia, Germany, Italy, Latvia, the Netherlands, Romania, Slovakia, Slovenia and Spain) and in animals in eight MS (Belgium, the Czech Republic, Estonia, Finland, Latvia, Lithuania, Spain and Sweden). Information is missing from Bulgaria, Croatia, 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 MS. Most of the animal samples were collected at the slaughterhouse or at the farm.

2.4.5. *Yersinia* data

Humans

Notification of yersiniosis in humans is mandatory in most MS, Iceland, Norway and Switzerland. Belgium, France, Italy and Luxembourg have a voluntary notification system and the United Kingdom has another system. No surveillance system exists in Greece, the Netherlands and Portugal. The surveillance systems for *Yersinia* infections have full national coverage in all MS except three (Belgium, France and Italy). In Switzerland, yersiniosis in human is not notifiable. The estimated coverage of the sentinel surveillance for yersiniosis in Spain is 30%, and this population proportion was used in the calculation of notification rates. Diagnosis of human gastrointestinal infections is generally done by culture from human stool samples.

Food and animals

Yersinia is notifiable in food in nine MS (Belgium, Estonia, Germany, Italy, Latvia, the Netherlands, Slovakia, Slovenia and Spain) and Norway, and in animals in seven MS (Belgium, Ireland, Latvia, Lithuania, the Netherlands, Slovenia and Spain) and two non-MS (Norway and Switzerland). Information was not provided from Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, France, Greece, Hungary, Lithuania, Malta, Portugal, Romania and Switzerland for food, and from Bulgaria, Croatia, Cyprus, France, Germany, Greece, Malta and Poland for animals. Only eight MS reported data on *Yersinia,* and primarily, domestic animals were tested. The reporting of specific human pathogenic serotypes/biotypes found in food and animals is often lacking and differences in sampling and analytical methods make comparison between countries difficult.

2.4.6. Tuberculosis data

Humans

The notification of tuberculosis in humans is mandatory in all MS, Iceland, Norway and Switzerland with full national coverage. In France, the notification system for human tuberculosis, however, does not distinguish between tuberculosis cases caused by different species of *Mycobacterium*. Therefore, no reporting of cases due to *M. bovis* is available from France.

Animals

Tuberculosis in animals is notifiable in 25 MS, 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,[8] as last amended by Commission Decision 2007/729/EC.[9] More detailed information regarding the status of EU MS, Norway and Switzerland and regions thereof in relation to cattle tuberculosis can be found in European Commission's DG SANCO's annual reports on bovine and swine diseases (EC, online).

2.4.7. *Brucella* data

Humans

The notification of brucellosis in humans is mandatory in all MS, Iceland, Norway and Switzerland except Belgium, Denmark and the United Kingdom. Both the voluntary surveillance system in Belgium and the one in the United Kingdom however have full national coverage. In Denmark, brucellosis is not notifiable and no surveillance system is in place.

Food

The notification of *Brucella* in food is mandatory in nine MS (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 MS, Norway and Switzerland (information was not provided from Bulgaria, Cyprus and Malta). 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. 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,[10] as last amended by Council Directive 2008/73/EC.[11] More detailed information regarding the status of EU MS, Norway and

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[8] Council Directive 64/432/EEC of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine. OJ L 121, 29.07.1964, pp. 1977–2012.

[9] 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, pp. 26–35.

[10] 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, pp. 19–36.

[11] 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, pp. 40–54.

Switzerland and regions thereof in relation to cattle tuberculosis can be found in European Commission's DG SANCO's annual reports on bovine and swine diseases (EC, online).

2.4.8. *Trichinella* data

Humans

The notification of *Trichinella* infections in humans is mandatory in all MS, Iceland, Norway and Switzerland, except Belgium, Denmark, France and the United Kingdom. Belgium, France and the United Kingdom have voluntary surveillance systems for trichinellosis with full national coverage in France and the United Kingdom. No surveillance system for trichinellosis exists in Denmark. In humans, diagnosis of *Trichinella* infections is primarily based on clinical symptoms and serology (indirect enzyme-linked immunosorbent assay (i-ELISA) and Western blot). Histopathology on muscle biopsies is rarely performed.

Food and animals

Trichinella in food is notifiable in 17 MS and Norway. Ireland and Switzerland report that *Trichinella* is not notifiable. Information was not provided from Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Latvia, Lithuania, Luxembourg, Malta and the Netherlands.

Trichinella infections in animals are notifiable in all MS except Hungary (information was not provided from Croatia and Malta) and Switzerland.

Rules for testing for *Trichinella* in slaughtered animals are laid down by Commission Regulation (EC) No 2075/2005.[12] In accordance with this Regulation, all finisher pigs, sows, boars, horses, wild boar and some other wild species must be tested for *Trichinella* at slaughter. Some MS reported using digestion and compression methods as described in Council Directive 77/96/EEC.[13] In 2014 Commission Regulation (EU) No 216/2014[14] amending Regulation (EC) No 2075/2005 came into force. The Regulation states that the reporting of data on domestic swine shall, at least, provide specific information related to number of animals raised under controlled housing conditions and number of breeding sows, boars and fattening pigs tested. Further, the Regulation states that a negligible risk status for a country or region is no longer recognised in an international context by the World Organisation for Animal Health (OIE). Instead, such recognition is linked to compartments of one or more holdings applying specific controlled housing conditions. Belgium and Denmark have had such a status since 2011, and holdings and compartments in those two MS which complied with the conditions for controlled housing at the date of entry into force of this Regulation, are allowed to apply for the status as negligible risk without additional prerequisites.

2.4.9. *Echinococcus* data

Humans

Cases of both cystic and alveolar echinococcosis are reported jointly to ECDC as echinococcosis since the EU case definition does not distinguish between the two forms of the disease. ECDC can differentiate between the two forms in the data only by analysing the reported species. The notification of echinococcosis in humans is mandatory in most MS, Iceland and Norway. Four MS (Belgium, France, the Netherlands and the United Kingdom) have a voluntary surveillance system for echinococcosis. Denmark and Italy have no surveillance system for echinococcosis. In Switzerland, echinococcosis in human is not notifiable.

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[12] 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, pp. 60–82.

[13] 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, pp. 67–77.

[14] Commission Regulation (EU) No 216/2014 of 7 March 2014 amending Regulation (EC) No 2075/2015 laying down specific rules on official controls for *Trichinella* in meat. OJ L 69/85, 8.3.2014. pp. 85–92.

Food and animals

Echinococcus is notifiable in food in 10 MS (Belgium, Estonia, Finland, Hungary, Italy, Latvia, the Netherlands, Slovenia, Spain and Sweden) and Norway and not notifiable in food in Ireland, Slovakia and the United Kingdom. Information was not provided from Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, France, Greece, Germany, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania and Switzerland. *Echinococcus* is notifiable in animals in 18 MS (Austria, Belgium, Denmark, Estonia, Finland, Germany, Greece, Italy, Latvia, Lithuania, the Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom), Norway and Switzerland and not notifiable in animals in the Czech Republic, France, Hungary and Luxembourg (information was not provided from Bulgaria, Croatia, Cyprus, Ireland, Malta and Poland).

Guidelines for the control of *E. granulosus* through inspection at slaughtering are provided through Council Directive 64/433/EC,[15] whereby visual inspection of all slaughtered animals is carried out by official veterinarians examining organs. Organs are destroyed in cases where *Echinococcus* cysts are found.

2.4.10. *Toxoplasma* data

Humans

Data on congenital toxoplasmosis in the EU in 2014 are not included in this report but the data will be available in the ECDC Surveillance Atlas (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 active monitoring programmes are in place in Switzerland. 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).

2.4.11. Rabies data

Humans

The notification of rabies in humans is mandatory in most MS, Iceland, Norway and Switzerland. Belgium has a voluntary notification system and the United Kingdom has another system. Most countries use the EU case definition apart from Belgium, Denmark, Finland, France, Germany and Italy who have other/non specified case definitions. 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 real time reverse transcriptase-polymerase chain reaction (RT-PCR) and/or isolation of virus.

Animals

Rabies is a notifiable disease in all MS and Switzerland. 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 by both World Health Organization (WHO, 1996) and World Organisation for Animal Health (OIE, 2009), and the cell isolation virus test. However, PCR and real time PCR are also used.

[15] Council Directive 64/433/EC of 26 June 1964 on health problems affecting intra-Community trade in fresh meat. OJ L 121, 29.7.1964, pp. 2012–2032.

2.4.12. Q fever data

Humans

The notification of Q fever in humans is mandatory in 23 MS, 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 30% for Spain and unknown for Belgium, but is reported constantly over the study years. Cases are reported in an aggregated format by Bulgaria and Croatia, and case-based for the other countries. Countries use EU case definitions apart for Belgium, Finland, France, Germany and Romania (not specified).

Animals

C. burnetii in animals is notifiable in 15 MS (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 MS 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 (IFA) tests or direct identification methods such as real-time PCR.

2.4.13. West Nile virus data

Humans

The notification of West Nile fever (WNF) in humans is mandatory in 20 MS, Norway and Switzerland. Croatia did not report in 2014. 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 Austria and the United Kingdom on another, unspecified, surveillance system. The population covered by the sentinel surveillance systems is unknown, but in both cases is reported constantly over the study years. Italy also has no national coverage. EU case definitions are used by most countries apart from Belgium, Finland, Italy and the United Kingdom (not specified). The reporting is case-based in all countries.

Total case numbers for WNF were used because case confirmation according to the EU case definition is usually carried out only when cases occur in previously unaffected areas. Subsequently, some of the 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 WNV in animals is not mandatory. But where the epidemiological situation in a MS so warrants, WNV in animals shall also be monitored. WNV infection is notifiable in horses in Great Britain and in animals in Switzerland.

2.4.14. Tularaemia data

Humans

The notification of tularaemia in humans is mandatory in most MS, Norway and Switzerland. The disease is not notifiable in Denmark, Liechtenstein and Portugal. Two MS (Belgium and the United Kingdom) have a voluntary surveillance system for tularaemia in humans, and it is not specified for the Netherlands. Reporting is in aggregated format for Bulgaria, case-based for the other countries. Most countries use the EU case definition; Belgium, Finland, France, Germany, Italy and the Netherlands use another non-specified case definition.

Animals

The notification of tularaemia in animals is mandatory in Switzerland.

2.4.15. Other zoonoses and zoonotic agent data

Food and animals

Cysticercus in food 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.[16]

2.4.16. Food-borne outbreak 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.

In 2014, for the first time MS had the possibility of providing the same information for 'weak-evidence' food-borne outbreaks as for the 'strong-evidence' food-borne outbreaks. For all outbreaks the type of evidence should be reported, and if available, information on 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 should be reported. All food-borne outbreaks are included in the general tables and figures. The denominators used for the calculation of the reporting rates were the human populations from the EUROSTAT as extracted on 12 December 2014.

2.5. 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 food:

Rare: < 0.1%

Very low: 0.1–1%

Low: > 1–10%

Moderate: > 10–20%

High: > 20–50%

Very high: > 50–70%

Extremely high: > 70%

[16] 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, pp. 206-320.

3. Assessment

This report section provides a descriptive and qualitative EU assessment of the specific zoonoses during 2014.

3.1. *Salmonella*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans, food, animals, feed and for food-borne outbreaks. It also includes hyperlinks to *Salmonella* summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by each specific subject.

3.1.1. Salmonellosis in humans

A total of 90,238 salmonellosis cases were reported by 28 EU MS for 2014, with 88,715 confirmed cases and an EU notification rate of 23.4 cases per 100,000 (Table 2). This represented a 15.3% increase in the EU notification rate compared with 2013 (20.3 cases per 100,000). The inclusion of Croatia for the first time in 2014 and the exclusion of Italy in 2014 due to incomplete reporting in notification rate calculations increased the notification rate by 4.9% and 10.4% respectively.

The highest notification rates in 2014 were reported by the Czech Republic (126.1 cases per 100,000 population) and Slovakia (75.3 per 100,000), while the lowest rates were reported by Portugal and Greece (≤ 4.0 per 100,000). The large increase in notification rate in the Czech Republic was accompanied by an increase in the number of *Salmonella* outbreaks in 2014. This was also seen in Slovenia where nine *Salmonella* outbreaks were reported from April to October 2014; eight were foodborne and caused by *S.* Enteritidis and one was waterborne caused by *S.* Typhimurium. In Spain, improved coverage of the surveillance system for salmonellosis in 2014 resulted in an increase in reported cases and notification rate.

The proportion of domestic cases versus travel-associated cases varied markedly between countries, with the highest proportions of domestic cases ranging from 81.5% to 99.9% in the Czech Republic, Estonia, Germany, Greece, Hungary, Latvia, Malta, the Netherlands and Slovakia. The highest proportion of travel-related cases were reported by three Nordic countries – Finland, Norway and Sweden – where more than 70% of the cases were classified as travel-related.

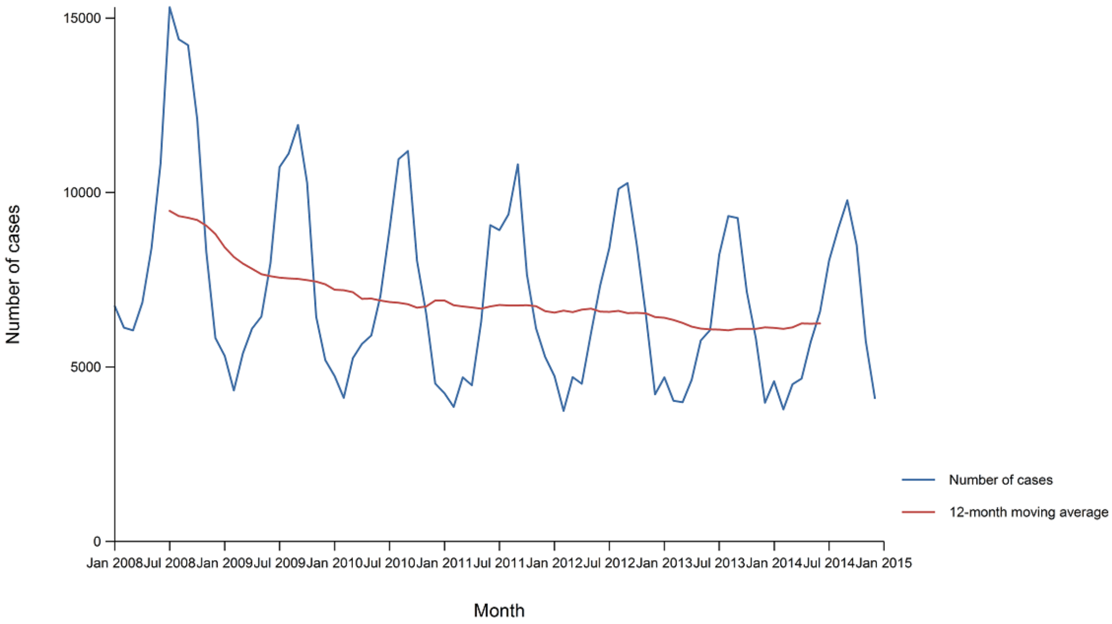
Table 2: Reported human cases of salmonellosis and notification rates per 100,000 population in the EU/EEA, by country and year, 2010–2014

Country	2014					2013		2012		2011		2010	
	National coverage[a]	Data format[a]	Total cases	Confirmed cases & rates		Confirmed cases &rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	1,659	1,654	19.4	1,404	16.6	1,773	21.1	1,432	17.0	2,179	26.0
Belgium[b]	N	C	2,698	2,698	–	2,528	–	3,101	–	3,177	–	3,169	–
Bulgaria	Y	A	730	730	10.1	766	10.5	839	11.5	924	12.5	1,154	15.5
Croatia	Y	A	1,494	1,494	35.2	–	–	–	–	–	–	–	–
Cyprus	Y	C	88	88	10.3	79	9.1	90	10.4	110	13.1	136	16.6
Czech Republic	Y	C	13,478	13,255	126.1	9,790	93.1	10,056	95.7	8,499	81.0	8,209	78.5
Denmark	Y	C	1,124	1,124	20.0	1,137	20.3	1,207	21.6	1,170	21.0	1,608	29.1
Estonia	Y	C	93	92	7.0	183	13.9	249	18.8	375	28.2	381	28.6
Finland	Y	C	1,622	1,622	29.8	1,986	36.6	2,199	40.7	2,098	39.0	2,421	45.2
France[c]	Y	C	8,860	8,860	28.0	8,927	28.4	8,705	27.8	8,685	27.8	7,184	23.1
Germany	Y	C	16,222	16,000	19.8	18,696	22.8	20,493	25.1	23,982	29.4	24,833	30.4
Greece	Y	C	349	349	3.2	414	3.7	404	3.6	471	4.2	297	2.7
Hungary	Y	C	5,523	5,249	53.1	4,953	50.2	5,462	55.2	6,169	62.8	5,953	60.4
Ireland	Y	C	259	259	5.6	326	7.1	309	6.7	311	6.8	349	7.7
Italy[d]	–	–	1,168	1168	–	4,660	7.8	4,829	8.1	4,467	7.5	5,319	9.0
Latvia	Y	C	282	278	13.9	385	19.0	547	26.8	995	48.0	877	41.4
Lithuania	Y	C	1,145	1,145	38.9	1,199	40.4	1,762	58.7	2,294	75.2	1,962	62.4
Luxembourg	Y	C	110	110	20.0	120	22.3	136	25.9	125	24.4	211	42.0
Malta	Y	C	132	132	31.0	84	19.9	88	21.1	129	31.1	160	38.6
Netherlands[e]	N	C	969	969	9.0	979	9.1	2,198	20.5	1,284	12.0	1,447	13.6

Country	2014					2013		2012		2011		2010	
	National coverage(a)	Data format(a)	Total cases	Confirmed cases & rates		Confirmed cases &rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Poland	Y	A	8,392	8,038	21.1	7,308	19.0	7,952	20.6	8,400	21.8	9,257	24.3
Portugal	Y	C	267	261	2.5	167	1.6	185	1.8	174	1.7	205	2.0
Romania	Y	C	1,644	1,512	7.6	1,302	6.5	698	3.5	989	5.0	1,285	6.4
Slovakia	Y	C	4,380	4,078	75.3	3,807	70.3	4,627	85.6	3,897	72.3	4,942	91.7
Slovenia	Y	C	597	597	29.0	316	15.4	392	19.1	400	19.5	363	17.7
Spain(f)	N	C	6,643	6643	47.6	4,537	32.4	4,224	36.1	3,786	32.5	4,420	38.0
Sweden	Y	C	2,211	2,211	22.9	2,842	29.7	2,922	30.8	2,887	30.7	3,612	38.7
United Kingdom	Y	C	8,099	8,099	12.6	8,465	13.2	8,812	13.9	9,455	15.1	9,670	15.6
EU Total	–	–	90,238	88,715	23.4	87,360	20.3	94,259	22.0	96,685	20.9	101,603	22.1
Iceland	Y	C	40	40	12.3	48	15.2	38	11.9	45	14.1	34	10.7
Norway	Y	C	1,120	1,118	21.9	1,361	26.9	1,371	27.5	1,290	26.2	1,370	28.2
Switzerland(g)	Y	C	1,238	1,238	15.2	1,271	15.8	1,242	15.6	1,301	16.5	1,177	15.1

(a): Y: yes; N: no; A: aggregated data; C: case-based data; –: no report.
(b): Sentinel surveillance; no information on estimated coverage. Thus, notification rate cannot be estimated.
(c): Sentinel system; notification rates calculated with an estimated population coverage of 48%.
(d): Provisional data for 2014.
(e): Sentinel system; notification rates calculated with an estimated population coverage of 64%.
(f): Notification rates calculated with an estimated population coverage of 30% in 2013–2014 and 25% in 2009–2012.
(g): Switzerland provided data directly to EFSA. The human data for Switzerland also include the ones from Liechtenstein.

A seasonal trend was observed for confirmed salmonellosis cases reported in the EU/EEA in 2008–2014, with most cases reported during summer months (Figure 3). Over the same 7-year-period, despite the overall increase in reported cases in 2014, there was a statistically significant ($p < 0.01$) decreasing trend for salmonellosis in the EU/EEA with significantly decreasing trends in nine MS (Belgium, Cyprus, Denmark, Finland, Germany, Ireland, Slovakia, Sweden and the United Kingdom). A significant increasing trend was observed in two MS (France and Spain).



Source: Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. Austria, Bulgaria, Croatia, Italy, Latvia, Poland and Romania did not report data to the level of detail required for the analysis.

Figure 3: Trend in reported confirmed human cases of non-typhoidal salmonellosis in the EU/EEA, by month of reporting, 2008–2014

Fourteen MS provided information on hospitalisation for some or all of their cases. Latvia reported hospitalisation status for the first time in 2014, increasing the proportion of confirmed cases at the EU level with known hospitalisation status from 26.4% to 32.2% and resulting in a decrease of the proportion of cases hospitalised from 36.0% to 34.4%. The highest hospitalisation proportions were reported in Cyprus, Greece Portugal and Romania (77–86% of cases hospitalised). 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.

Fifteen MS provided data on the outcome and follow-up of their cases reported in 2014, and, among them, 11 MS reported a total of 65 fatal cases. This gives an EU case fatality of 0.15% among the 43,995 confirmed cases for which this information was reported (49.6% of all confirmed cases).

Information on *Salmonella* serovars from cases of human infection was available from 25 MS (Bulgaria, Croatia and Poland reported no case-based serovar data) and Iceland and Norway. As in previous years, the two most commonly reported *Salmonella* serovars in 2014 were *S.* Enteritidis and *S.* Typhimurium, representing 44.4% and 17.4%, respectively, of all reported serovars in 74,024 confirmed human cases with known serovar (Table 3). *S.* Enteritidis and *S.* Typhimurium were reported by all MS. In 2014, the proportion of *S.* Enteritidis increased by 13.0% compared with 2013 with data from the Czech Republic being responsible for over 90% of the rise. The Czech Republic also reported an increase in the number of *Salmonella* outbreaks in 2014. *S*. Typhimurium decreased by 28.4% from 2012 to 2014. Monophasic *S.* Typhimurium 1,4,[5],12:i:-, the third most common serovar, had almost returned to the level of 2012 after an increase in 2013 and were reported by about half of the MS. Adding the cases of *S.* Typhimurium and its monophasic strains, a decrease by 21.7% was observed from 2012 to 2014.

S. Infantis, the fourth most common serovar, was reported by almost all MS and decreased to the level of 2012 after the increase in 2013 (Table 3) *S.* Stanley, reported by 23 MS, was the fifth most common serovar in 2014 and continued to decrease. Following the multi-country outbreak of *S.* Stanley in the EU linked to contamination in the turkey production chain in 2011–2012, cases peaked in 2012 and then decreased somewhat in 2013, but still remained at a higher level in 2014 than before the outbreak. Human case clusters were still being reported with the same molecular type as the outbreak strain, suggesting that it was still circulating in the European food market in 2014 (ECDC and EFSA, 2014).

Two new serovars entered the list of the 20 most common serovars in 2014: *S.* Braenderup and *S.* Chester. The highest increase compared with 2012 was observed for *S.* Chester (177.4%) with several countries contributing from August 2014 onwards: Belgium, France, the Netherlands, Spain and the United Kingdom. France accounted for the largest proportion of the increase with 126 confirmed cases in 2014. About one third of the cases in Belgium, France and Spain were related to travel to Morocco. In France, more than 67%, and in Belgium, more than 86% of the cases were reported in August–October 2014. Germany, Sweden and the United Kingdom also reported *S.* Chester cases with a history of travel to Morocco, but did not see any increase in notified cases. Germany accounted for a large proportion of the increase in *S.* Muenchen with 163 confirmed outbreak-related cases reported in June–July 2013 and with 194 cases in June–July 2014.

The other serovars among the 20 most common remained at the same level or slightly decreased from 2012 to 2014 with the largest decrease observed for serovars *S.* Agona (16.4%) and *S.* Oranienburg (16.1%).

Table 3: Distribution of reported confirmed cases of human salmonellosis in the EU/EEA, 2012–2014, by the 20 most frequent serovars in 2014

Serovar	2014			2013			2012		
	Cases	MS	%	Cases	MS	%	Cases	MS	%
Enteritidis	32,878	27	44.4	29,090	27	39.5	32,917	27	41.0
Typhimurium	12,867	27	17.4	14,852	27	20.2	17,975	27	22.4
Monophasic Typhimurium 1,4,[5],12:i:-	5,770	13	7.8	6,313	14	8.6	5,836	12	7.3
Infantis	1,841	26	2.5	2,226	25	3.0	1,929	26	2.4
Stanley	757	23	1.0	714	21	1.0	969	20	1.2
Derby	753	23	1.0	813	21	1.1	730	21	0.9
Newport	752	20	1.0	818	21	1.1	754	21	0.9
Kentucky	605	21	0.8	651	23	0.9	626	23	0.8
Virchow	509	22	0.7	571	22	0.8	532	20	0.7
Bovismorbificans	441	22	0.6	412	20	0.6	410	20	0.5
Java	388	15	0.5	581	24	0.8	445	18	0.6
Agona	378	23	0.5	401	18	0.5	452	18	0.6
Saintpaul	374	19	0.5	448	17	0.6	354	18	0.4
Muenchen	368	17	0.5	434	14	0.6	242	20	0.3
Napoli	333	14	0.4	290	17	0.4	365	16	0.5
Brandenburg	294	20	0.4	111	13	0.2	302	17	0.4
Chester	294	18	0.4	267	19	0.4	106	13	0.1
Hadar	286	16	0.4	238	10	0.3	300	20	0.4
Braenderup	276	17	0.4	245	19	0.3	454	17	0.6
Oranienburg	261	17	0.4	274	15	0.4	311	16	0.4
Other	13,599	–	18.4	13,883	-	18.9	14,286	–	17.8
Total	74,024	27	100.0	73,632	27	100.0	80,295	27	100.0

MS: Member State. Source: 25 MS and two non-MS; 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, animals and feedingstuffs

Comparability of data

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. In addition, at EU-level, overall results are highly influenced by the reporting MS and the sample sizes in their investigations, both of which vary between years. Moreover, it should be taken into consideration that the proportion of positive samples observed might have been influenced by the sampling season, because *Salmonella* are known to be more prevalent in animals and to multiply in foods during the summer (Hald and Andersen, 2001; Zdragas et al., 2012).

Only results for the most important food products and animals that might serve as a source for human infection in the EU are presented.

Food

Twenty-six MS and three non-MS reported data on *Salmonella* in various foodstuffs. Most MS reported data on *Salmonella* in food of animal origin, primarily pig meat, broiler meat and bovine meat (Table 2014_SALMOVERVIEW).

Compliance with microbiological criteria

The *Salmonella* criteria laid down by Regulation (EC) No 2073/2005 on microbiological criteria in foodstuffs have been in force since 1 January 2006 (revised by Regulations (EC) No 1441/2007, 1086/2011[17] and 217/2014[18]). The regulations prescribe sampling and testing requirements, and set limits for the presence of *Salmonella* in specific food categories. These specified foods have a rather diverse marketing pattern across the EU, contributing to not all MS reporting on them. Prescribed samples are to be taken by food business operators; however, competent authorities are obliged to verify correct implementation e.g. by taking similar official samples or scrutinising records. According to these food safety criteria, *Salmonella* must be absent in these products when placed on the market, during their shelf-life. Absence is defined by testing five or, depending on the food category, 30 samples of 25 g per batch. However, the definition of a batch varies widely and in official controls, often only single samples are used to verify compliance with the criteria.

An evaluation of compliance with the *Salmonella* criteria at the EU level for 2011–2014 is summarised in Figure 4 and the underpinning 2014 data are in Table 2014_SALMCOMPLFOOD in the appendix. The evaluation includes only investigations where the sampling unit (single samples or batches) and sampling stage at the retail level have been reported for the relevant food types. As 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. For these foods, minced meat and meat preparations from poultry had the highest level of non-compliance (8.1% of single samples and 3.2% of batches) (Figure 4). Low non-compliance was also reported for meat products from poultry meat (1.7% of single samples and 0% of batches) and for minced meat and meat preparations from animal species other than poultry (1.0% of single samples and 1.4% of batches). As regards foods of meat origin intended to be eaten raw, in the product category minced meat and meat preparations 1.8% of single samples were non-compliant, compared to 0.5% in 2013. In meat products intended to be eaten raw there were only a few non-compliant findings. The occurrence of *Salmonella* in these foods of meat origin intended to be eaten raw is of particular relevance because of the risk such foods pose to human health in the absence of a mitigation step in preparation of the food.

In minced meat and meat preparations from poultry to be eaten cooked before consumption, in meat products from poultry intended to be eaten cooked, and in minced meat and meat preparations from other animal species than poultry intended to be eaten cooked there was no obvious trend in the proportions of non-compliant units during the last 3 years.

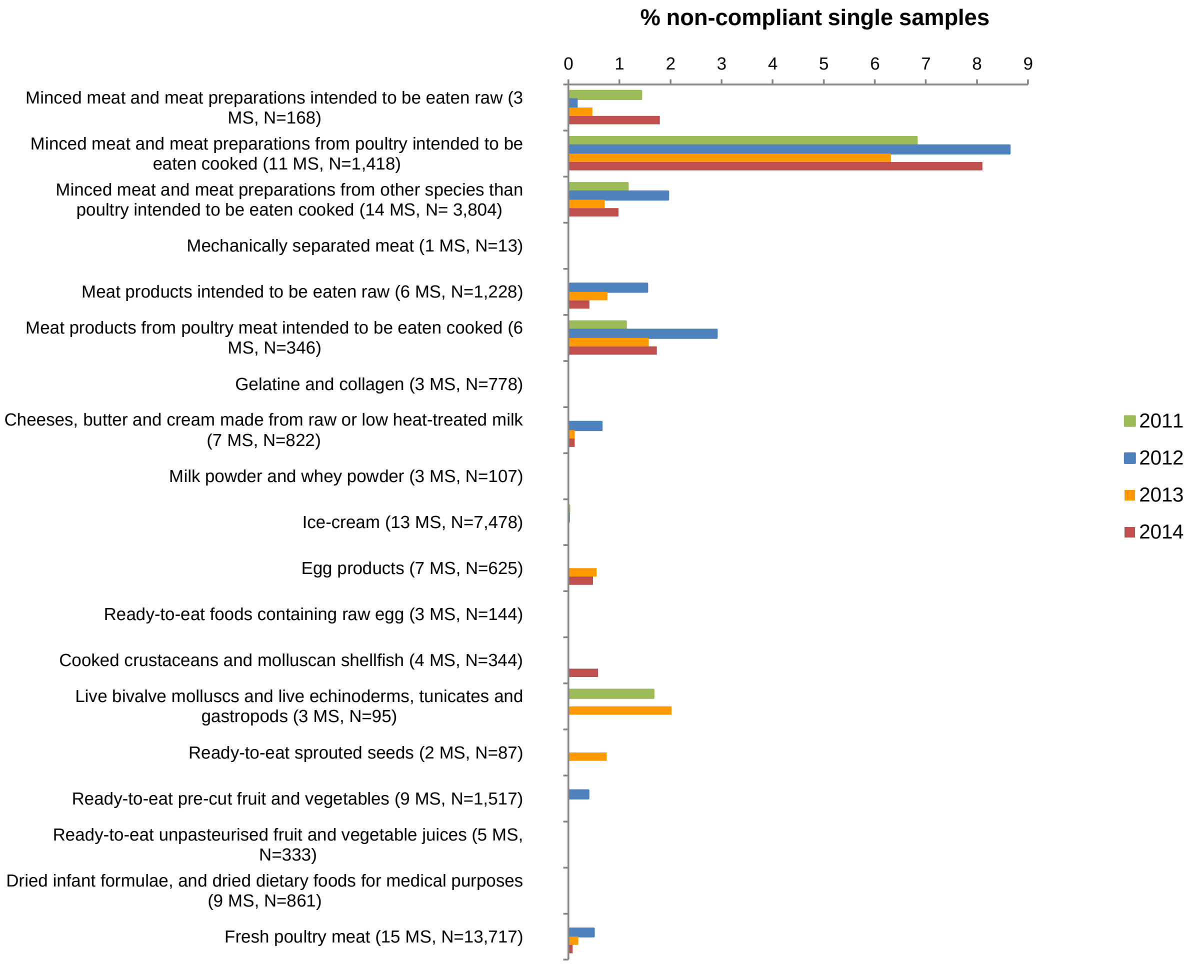
Since December 2011, a *Salmonella* food safety criterion for *S.* Enteritidis and *S.* Typhimurium (including monophasic *S.* Typhimurium strains with the antigenic formula 1,4,[5],12:i:-) in fresh poultry meat (including fresh meat from breeding flocks of *G. gallus*, laying hens, broilers and breeding and fattening flocks of turkeys) has been in force (Regulation (EC) No 1086/2011). As in 2013, reported non-compliance has remained a rare event; 0.1% of single samples and 0.2% of batches non-compliant. Over the last 3 years, there is an overall decrease in the proportion of non-compliant single samples and batches of fresh poultry meat.

For egg products, non-compliance with the microbiological criteria was low (three samples (0.5%) *Salmonella*-positive in a total of 636 single samples, and none of 17 batches found positive).

All samples/batches of dried infant formulae and dried dietary foods for medical purposes, milk and whey powder and live bivalve molluscs and live echinoderms, tunicates and gastropods were found to be compliant with the *Salmonella* criteria. Very low levels of non-compliance were reported for cooked crustaceans and molluscan shellfish (0.6% of single samples and no batches). In 2014, all samples of live bivalve, molluscs and lice echinoderms, tunicates and gastropods were in compliance with the criteria which is the same as in 2012; however, in 2011 and in 2013 low levels of non-compliance were reported. The proportion of non-compliant samples for the other food categories was very low or rare, as observed in previous years.

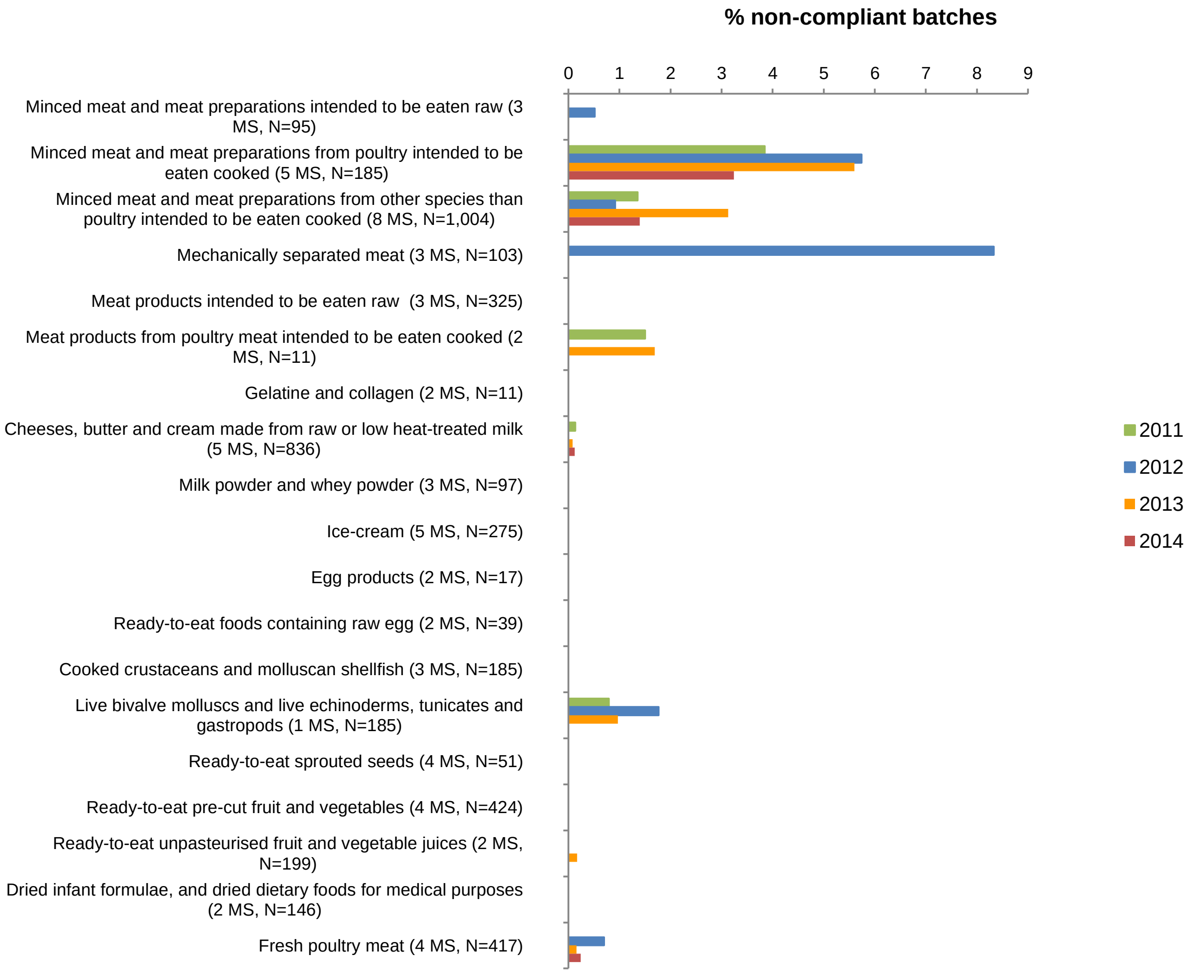
[17] Commission Regulation (EU) No 1086/2011 of 27 October 2011 amending Annex II to Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Annex I to Commission Regulation (EC) No 2073/2005 as regards salmonella in fresh poultry meat. OJ L 281, 28.10.2011, pp. 7–11.

[18] Commission Regulation (EU) No 217/2014 of 7 March 2014 amending Regulation (EC) No 2073/2005 as regards salmonella in pig carcasses. OJ L 69, 8.3.2014, pp. 93–94.



The number of reporting MS and tested samples (in brackets after the food categories) refers to 2014 data. 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.

Figure 4: Proportion of units (single samples) not complying with the EU *Salmonella* criteria, 2011–2014



The number of reporting MS and tested samples (in brackets after the food categories) refers to 2014 data. 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.

Figure 4 (cont): Proportion of units (batches) not complying with the EU *Salmonella* criteria, 2011–2014

Broiler meat and products thereof

Monitoring activities and control programmes for *Salmonella* in fresh broiler meat are based on sampling at the slaughterhouse, where mainly neck skin samples are taken, and/or at processing or cutting plants and at retail, where meat samples are usually collected.

Overall, *Salmonella* was detected in 2.8% of the 125,922 units tested (2.2% of single samples, down from 3.5% in 2013, and 9.5% of batches, up from 5.6% in 2013). The overall proportion of *Salmonella*-positive samples at retail was 2.3% which was lower than at the slaughterhouse (4.7%) and similar to the processing plant (2.4%) level (Table 4).

Twelve MS reported at all three sampling stages, although, in some cases, the main monitoring or surveillance activities were clearly at one or two sampling stages, with only a smaller number of samples obtained at the other levels.

In 2014, *Salmonella* was found in 0.6% of the 2,263 units of RTE broiler meat products tested at retail or at processing (0.4% of single samples and 1.7% of batches; Table 2014_SALMRTEBROIL).

Table 4: *Salmonella* in fresh broiler meat at slaughter, processing/cutting level and retail level, 2014

Sampling stage	Country	Matrix	Description	Sample origin	Sampling unit	Sample weight	Tested	Positive	Percent positive
Retail	Austria	carcase	food sample, Surveillance	Austria	single	25 Gram	2	1	50
		fresh	food sample, Surveillance	Austria	single	10 Gram	2	1	50
						25 Gram	89	16	17.98
				European Union	single	25 Gram	29	9	31.03
				Unknown	single	25 Gram	5	0	0
	Belgium	carcase	Surveillance		single	25 Gram	91	1	1.1
	Bulgaria	fresh	food sample - meat, Surveillance	Bulgaria	single	25 Gram	11	0	0
	Cyprus	fresh, chilled	food sample - meat, Surveillance	Cyprus	single	25 Gram	1	0	0
		fresh, frozen	food sample - meat, Surveillance	Cyprus	single	25 Gram	1	0	0
	Czech Republic	fresh	food sample, Surveillance	Czech Republic	batch	25 Gram	26	1	3.85
				European Union	batch	25 Gram	2	0	0
				Unknown	batch	25 Gram	7	0	0
	Estonia	fresh	food sample - meat, Surveillance		single	25 Gram	4	1	25
	Germany	fresh, with skin	food sample - meat, Monitoring	Germany	single	25 Gram	429	20	4.66
	Hungary	fresh	food sample - meat, Surveillance		single	25 Gram	328	60	18.29
	Ireland	fresh	food sample - meat, Surveillance	Germany	single	25 Gram	1	0	0
				Ireland	single	25 Gram	1	0	0
	Italy	fresh	food sample, Surveillance	Italy	single	25 Gram	7	0	0
	Latvia	fresh	food sample, Surveillance	European Union	single	25 Gram	120	9	7.5
				Latvia	single	25 Gram	145	0	0
	Netherlands	fresh	food sample, Surveillance		single	25 Gram	628	23	3.66
	Poland	fresh	food sample - neck skin, Surveillance		single	25 Gram	10,773	127	1.18
	Portugal	carcase, chilled	food sample, Surveillance	Portugal	batch	25 Gram	5	0	0
		fresh, chilled	food sample, Surveillance	Portugal	batch	25 Gram	115	0	0
	Romania	fresh	food sample - meat, Surveillance		batch	25 Gram	128	5	3.91
	Slovakia	fresh	food sample, Surveillance	European Union	batch	25 Gram	28	0	0
		fresh, chilled	food sample, Surveillance	European Union	batch	25 Gram	17	4	23.53
				Slovakia	batch	25 Gram	11	0	0
		fresh, frozen	food sample, Surveillance	European Union	batch	25 Gram	4	2	50
				Slovakia	batch	25 Gram	1	0	0
	Slovenia	fresh	food sample, Surveillance		single	25 Gram	50	18	36
	Spain	fresh	food sample - meat, Surveillance	Unknown	single	25 Gram	110	1	0.91
	Sweden	fresh	food sample, Surveillance		single	25 Gram	1	0	0
	Iceland	fresh, frozen	food sample, Surveillance	European Union	single	.	86	0	0
Batch							344	12	3.49
Single							12,828	287	2.24
Total Retail							13,172	299	2.27
Processing plant	Austria	fresh	food sample, Surveillance	Austria	single	10 Gram	2	1	50
						25 Gram	12	0	0
	Bulgaria	fresh	food sample - meat, Surveillance	Bulgaria	batch	25 Gram	264	0	0
	Cyprus	fresh	food sample - meat, Surveillance		batch	25 Gram	41	1	2.44
	Czech Republic	fresh	food sample - meat, Surveillance	Unknown	single	25 Gram	150	107	71.33
	Estonia	fresh	food sample - meat, Monitoring	Estonia	batch	25 Gram	12	0	0
	Finland	fresh	food sample - meat, Control and eradication programmes	Finland	batch	25 Gram	3	0	0
	Greece	carcase	food sample, Surveillance	Unknown	single	25 Gram	52	6	11.54
		fresh, frozen	food sample, Surveillance	Unknown	single	25 Gram	5	5	100
	Hungary	fresh	food sample - meat, Surveillance		single	25 Gram	357	66	18.49
	Ireland	fresh	food sample - meat, Surveillance	Ireland	batch	25 Gram	1	0	0
	Italy	fresh	food sample, Surveillance	Italy	single	25 Gram	6	0	0
	Netherlands	fresh	food sample, Surveillance		batch	25 Gram	6	1	16.67

Sampling stage	Country	Matrix	Description	Sample origin	Sampling unit	Sample weight	Tested	Positive	Percent positive
	Poland	carcase	food sample - neck skin, Surveillance		single	25 Gram	3,747	57	1.52
		fresh	food sample - meat, Surveillance		batch	125 Gram	606	187	30.86
						25 Gram	4,041	464	11.48
					single	1,000 Gram	1,517	7	0.46
						125 Gram	6	0	0
						25 Gram	17,559	460	2.62
			food sample - neck skin, Surveillance		single	25 Gram	52,345	544	1.04
	Portugal	fresh	food sample - meat, Surveillance	Portugal	single	25 Gram	52	2	3.85
	Romania	fresh	food sample - meat, Surveillance		batch	25 Gram	37	7	18.92
	Slovakia	fresh, chilled	food sample, Surveillance	Slovakia	batch	25 Gram	6	0	0
	Spain	fresh	food sample - meat, Surveillance	Unknown	single	25 Gram	31	1	3.23
	Sweden	fresh	food sample - meat, Surveillance		batch	25 Gram	781	0	0
Batch							5,798	660	11.38
Single							75,841	1,256	1.66
Total Processing plant							81,639	1,916	2.35
Slaughter-house	Austria	fresh	food sample, Surveillance	Austria	single	25 Gram	6	0	0
	Belgium	carcase	Surveillance		single	1 Gram	293	1	0.34
			animal sample - caecum, Surveillance		single	25 Gram	175	4	2.29
			food sample - neck skin, Surveillance		single	25 Gram	904	50	5.53
		fresh, laying hens	Surveillance		single	1 Gram	585	47	8.03
			animal sample - caecum, Surveillance		single	25 Gram	43	9	20.93
	Bulgaria	carcase	food sample - neck skin, Surveillance	Bulgaria	batch	25 Gram	307	7	2.28
	Cyprus	carcase	food sample - meat, Surveillance	Cyprus	batch	25 Gram	46	1	2.17
		fresh	food sample, Surveillance	Cyprus	batch	25 Gram	15	0	0
	Czech Republic	carcase	food sample - neck skin, Monitoring	Czech Republic	single	25 Gram	1,005	136	13.53
			food sample - neck skin, Surveillance	Unknown	single	25 Gram	133	8	6.02
	Denmark	carcase	food sample - neck skin, Surveillance	Denmark	batch	300 Gram	277	4	1.44
	Estonia	carcase	food sample - neck skin, Monitoring	Estonia	batch	25 Gram	14	0	0
	Finland	carcase	food sample - neck skin, Control and eradication programmes	Finland	batch	25 Gram	183	0	0
	Germany	carcase	food sample - neck skin, Monitoring	Germany	batch	25 Gram	502	35	6.97
	Hungary	carcase	food sample - neck skin, Surveillance		single	25 Gram	342	64	18.71
	Ireland	carcase	food sample - neck skin, Surveillance	Ireland	single	25 Gram	215	24	11.16
		carcase, spent hens	food sample - neck skin, Surveillance	Ireland	single	25 Gram	17	2	11.76
	Latvia	carcase	food sample - neck skin, Surveillance	Latvia	single	25 Gram	100	2	2
	Poland	carcase	food sample - neck skin, Surveillance		batch	125 Gram	120	0	0
						25 Gram	1,541	74	4.8
					single	25 Gram	15,113	520	3.44
						250 Gram	405	3	0.74
	Romania	carcase	food sample - neck skin, Surveillance		batch	25 Gram	136	15	11.03
	Slovakia	carcase	food sample - neck skin, Monitoring	Slovakia	batch	25 Gram	163	98	60.12
	Spain	carcase	food sample - carcase swabs, Surveillance	Unknown	single	25 Gram	1,004	141	14.04
	Sweden	carcase	food sample - neck skin, Surveillance		single	25 Gram	2,923	0	0

Sampling stage	Country	Matrix	Description	Sample origin	Sampling unit	Sample weight	Tested	Positive	Percent positive
	Iceland	carcase	food sample - neck skin, Surveillance	Iceland	batch	25 Gram	712	1	0.14
Batch							3,304	234	7.08
Single							23,263	1,011	4.35
Total Slaughter-house							26,567	1,245	4.69
Border inspection activities	Cyprus	fresh, frozen	food sample, Surveillance	Non EU	batch	25 Gram	2	0	0
	Greece	fresh	food sample, Surveillance	Unknown	single	25 Gram	80	0	0
	Portugal	fresh	food sample - meat, Surveillance		batch	25 Gram	90	4	4.44
Batch							92	4	4.35
Single							80	0	0
Total Border inspection activities							172	4	2.33
Unspecified	Cyprus	fresh	food sample - meat, Surveillance	Unknown	batch	25 Gram	1	0	0
	Ireland	fresh	food sample - meat, Surveillance	Ireland	single	25 Gram	1	0	0
	Poland	carcase	food sample - neck skin, Surveillance		single	25 Gram	1,913	1	0.05
		fresh	food sample - meat, Surveillance		single	25 Gram	2,440	56	2.3
	Sweden	fresh	food sample, Surveillance		single	25 Gram	18	1	5.56
		fresh, frozen	food sample, Surveillance		single	25 Gram	2	0	0
Batch							1	0	0
Single							4,374	58	1.33
Total Unspecified							4,375	58	1.33
Batch							9,539	910	9.54
Single							116,386	2,612	2.24
Total (MS)							125,925	3,522	2.8

Turkey meat and products thereof

In total, 7,482 units of fresh turkey meat were sampled and tested and, overall, 3.5% were *Salmonella*-positive (3.5% of single samples and 3.6% of batches) (Table 2014_SALMTURKMEAT). Most of the samples were taken at the slaughterhouse or processing plant (87%) and only a small proportion at retail (7%). The majority of the tested units were from Poland, which reported 60.9% of all units tested in the EU MS. The overall results for 2014 are lower compared with 2011–2013, where the proportion of positive samples of turkey meat was between 4.6 and 5.6%. However, the 2014 overall EU result is strongly influenced by the results of investigations in Poland.

Of the 1,274 tested units of RTE products from turkey meat, only four single samples in an Italian investigation at a processing plant were found to be *Salmonella*-positive (0.35% in total) (Table 2014_SALMRTETURK). In 2013, 2,100 samples were examined and three single samples were positive (0.14%).

Eggs and egg products

Since 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 and fresh eggs from flocks found positive for *S.* Typhimurium or *S.* Enteritidis must be heat treated before consumption (Regulation (EC) No 1237/2007[19]).

In 2014 in total, 0.4% of the 13,394 tested table egg units were found to be *Salmonella*-positive (0.3% of single samples and 1.0% of batches) (Table 2014_SALMEGGS). Most of the tested units were reported by Germany (53%) and Poland (23%). In 2013, a total of 23,441 units of table eggs were reported to have been tested, 0.1% of which were *Salmonella*-positive.

[19] 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.

Generally, the proportion of positive units has been very low for the last couple of years. However, only few MS report data, reporting MS change between years. Further, it should be noted that what constituted a batch or single sample varied considerably in terms of weight (25–500 g) and content (white, yolk or whole eggs) among the MS. Samples larger than 25 g accounted for 2% of the total number of samples; however, this together with the variation in sample content should be kept in mind when comparing the results. Lastly, it should be noted that a very large number of eggs are consumed and multiplication of *Salmonella* in pooled raw egg products or before cooking is associated with many outbreaks.

For egg products, none of 17 batches were found to be positive for *Salmonella*, whereas three out of 636 (0.5%) single samples tested positive (Figure 4). In 2013, 0.5% of 553 samples of egg products were positive.

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 by swabbing an area of the carcase and/or at the processing or cutting plants where meat samples or environmental samples are usually collected. On 1 June 2014, Regulation (EC) No 2073/2005 was amended by Regulation (EC) No 217/2014 reducing the number of accepted *Salmonella* positive samples from 5 out of 50 (10%) to 3 out of 50 (6%).

Within the EU, a total of 68,134 units of fresh pig meat were tested, of which 0.5% tested *Salmonella*-positive (Table 2014_SALMSPRSEED). In comparison, in 2013, 78,624 units of pig meat were examined and 0.7% were positive. Most of these samples were tested at the slaughterhouse level (84%) and were mainly reported by five MS, accounting for 84% of samples tested at this stage. Of the total number of samples tested, 44% were from Poland, who reported data from some very large investigations at the slaughterhouse and processing plant stages. Samples collected at slaughterhouses were carcase swabs, while the sample types at processing plants and at retail level were not specified. Four MS reported HACCP-based monitoring of *Salmonella* in pig carcases according to Commission Regulation (EU) No 218/2014[20] that came into force from 1 January 2015. Most of these (9,821 of a total of 10,030 units (3,038 batches and 6,992 single samples)) were carcases swabs, while the rest were environmental samples or unspecified. Overall 0.2% of the units were positive (Table 2014_SALMPIGCARCASHACCP).

In 2014, 0.7% of the 20,259 tested samples of RTE minced meat, meat preparations and meat products from pig meat tested positive for *Salmonella* (Table 2014_SALMRTEPIG). Sixteen MS tested 3,463 samples at the retail level (17% of all samples of RTE pig meat), and three of them reported 21 positive samples (0.6%). In 2013, 27,662 samples of RTE pig meat were examined for *Salmonella*, with 0.7% of samples positive.

Bovine meat and products thereof

Data from the testing of fresh bovine meat mainly originate from surveillance programmes, where samples are collected at slaughterhouses (carcase swabs or meat samples) and/or at processing plants, at retail or during border inspections (meat samples).

The overall proportion of positive samples among the 45,639 samples of fresh bovine meat tested in MS was 0.1% (Table 2014_SALMBOVINEMEAT). Most of the samples were tested at the slaughterhouse (53%). Sample sizes at slaughterhouses varied considerably, which should be taken into account when assessing the results.

Two of the 2,873 units of RTE minced meat, meat preparations and meat products from bovine meat tested in the MS were found to be *Salmonella* positive at the processing level (Table 2014_SALMRTEBOVINE).

[20] Commission Regulation (EU) No 218/2014 of 7 March 2014 amending Annexes to Regulations (EC) No 853/2004 and (EC) No 854/2004 of the European Parliament and of the Council and Commission Regulation (EC) No 2074/2005. OJ L 69, 8.3.2014, pp. 95–98.

Salmonella in other foodstuffs

Apart from the results in dried seeds, the proportion of *Salmonella*-positive samples in other foodstuffs was very low during 2014 and has remained low since 2011 (Figure 4).

Out of the 195 tested units of imported dried seeds, 10.8% were positive for *Salmonella*, all as a result of analyses carried out by two MS as part of border inspection activities (Table 2014_SALMDRIEDSEED); Cyprus reported two positive samples of non-EU origin, while for Greece the origin of 19 positive samples was reported to be unknown.

Of the 3,609 units of vegetables tested, 0.3% was *Salmonella* positive (Table 2014_SALMVEGET). Several investigations included imported vegetables, generally specified as originating from other EU countries or from non-EU states. Most units were tested at retail (87%) and at that sampling stage only 10 positive samples were obtained by three MS: Austria found *Salmonella* in one single sample originating from EU; Germany found four positive samples of domestic origin; and Italy reported five positive samples from unspecified products of domestic origin.

In fruits, of the 1,267 tested units, none were positive for *Salmonella,* and the same applied to the 1,338 samples reported as 'Fruit and vegetables' (Table 2014_SALMFRUITVEG).

In sprouted seeds, overall 1.2% of the 420 units tested were positive and *Salmonella* was detected by four MS (two at retail (Belgium and Germany) and two in investigations of this RTE foodstuff in processing plants (Bulgaria and the Netherlands) (Table 2014_SALMSPRSEED)

Of 5,938 units of spices and herbs tested for *Salmonella*, four MS found nine positive (0.2%). Six positive products reported by Germany and Slovakia originated from EU, and three were from unknown origin and found as a result of analyses carried out by Greece as part of border inspection activities (Table 2014_SALMHERBS). A major surveillance conducted by Poland accounted for 71% of the units examined, none of them positive.

Lastly, 1,266 units of live bivalve molluscs were reported to be tested during 2014. Only Greece found *Salmonella* positive samples, 2 out of 766 units tested (0.3%), in a major surveillance programme conducted in processing plants (Table 2014_SALMBIVMOLLUSC).

Animals

All MS, except Luxembourg, and three non-MS reported data on *Salmonella* in various animal populations (Table 2014_SALMOVERVIEW).

EU MS have compulsory or voluntary *Salmonella* control or monitoring programmes in place for a number of farm animal species. To protect human health against *Salmonella* infections transmissible between animals and humans, EU Regulation (EC) No 2160/2003 obliges MS to set up national control programmes in poultry and pigs for specific *Salmonella* serovars, which were deemed to be of particular importance for public health at the time the regulation was drafted. The animal populations which are currently targeted include breeding flocks, laying hens, broilers of chickens (*G. gallus*) and breeding and fattening turkeys. The National Control Programmes are established in individual MS to achieve EU reduction targets to decrease the *Salmonella* prevalence in those animal populations at the primary production level. National control programmes have to be approved by the EC. The results of the programmes have to be reported to the EC and EFSA in the framework of the annual EU zoonoses monitoring.

Breeding flocks of Gallus gallus

The year 2014 was the eighth year in which MS were obliged to implement *Salmonella* control programmes in breeding flocks of *G. gallus* in accordance with Regulation (EC) No 2160/2003 and Regulation (EC) No 200/2010.[21] 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 (including monophasic *S.* Typhimurium), *S.* Infantis, *S.* Virchow and *S.* Hadar. The target was set for all commercial-scale adult breeding flocks, during the production period, comprising at least 250 birds.

[21] 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, pp. 1–9.

However, MS with fewer than 100 breeding flocks would attain the target if only one adult breeding flock remained positive.

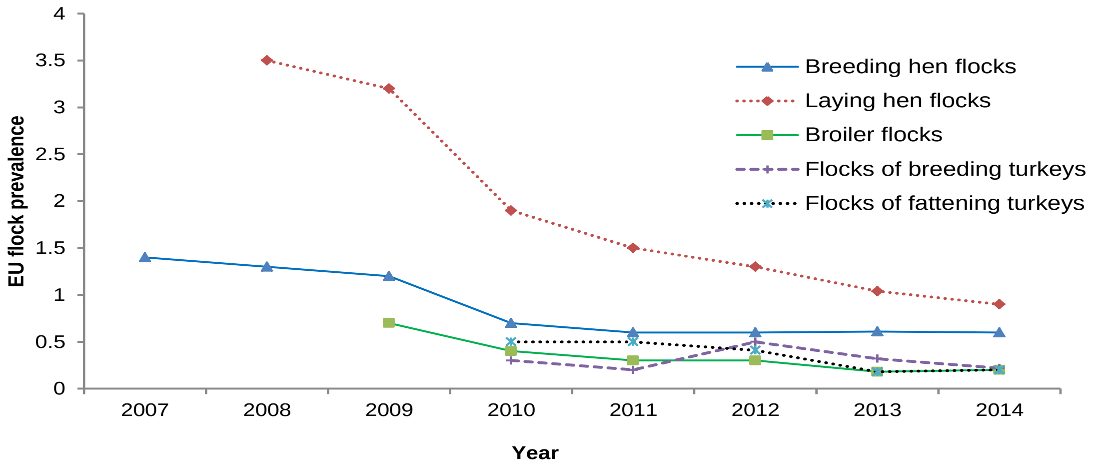
In 2014, 25 MS and three non-MS reported data within the framework of the programme. This is because Luxembourg and Malta do not have breeding flocks of *G. gallus* and Lithuania did not report data. During 2014, *Salmonella* was found in 1.73% of breeding flocks in the EU during the production period (Table 5), compared with 1.1% in 2013.

Table 5: *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, 2014

Country	Tested	Percent positive	Five target serovars %	*S.* Enteritidis %	*S.* Typhimurium %	*S.* Infantis %	*S.* Virchow %	*S.* Hadar %	Other than target %
Austria	133	0.75	0	0	0	0	0	0	0.75
Belgium	503	4.17	1.19	0.4	0.8	0	0	0	2.98
Bulgaria	87	0	0	0	0	0	0	0	0
Croatia	112	0.89	0.89	0	0.89	0	0	0	0
Cyprus	39	5.13	0	0	0	0	0	0	5.13
Czech Republic	647	0.62	0.31	0.31	0	0	0	0	0.31
Denmark	153	1.96	1.31	0	1.31	0	0	0	0.65
Estonia	18	0	0	0	0	0	0	0	0
Finland	164	0	0	0	0	0	0	0	0
France	2,004	0.55	0.55	0.25	0.25	0.05	0	0	0
Germany	768	1.56	0.65	0.13	0	0.52	0	0	0.91
Greece	234	6.41	1.71	0.85	0.43	0.43	0	0	5.56
Hungary	1,045	1.91	0.48	0.29	0	0.19	0	0	1.44
Ireland	161	0	0	0	0	0	0	0	0
Italy	1,129	1.15	0.27	0	0	0.27	0	0	0.89
Latvia	26	0	0	0	0	0	0	0	0
Netherlands	1,570	0.83	0.83	0.64	0.19	0	0	0	0
Poland	1,627	1.91	1.48	1.23	0.06	0.06	0.12	0	0.43
Portugal	530	0.19	0	0	0	0	0	0	0.19
Romania	358	5.59	0	0	0	0	0	0	7.26
Slovakia	159	0	0	0	0	0	0	0	0
Slovenia	141	1.42	0	0	0	0	0	0	1.42
Spain	1,716	4.31	0.52	0.12	0.12	0.06	0.12	0.12	3.79
Sweden	159	0.63	0	0	0	0	0	0	0.63
United Kingdom	1,464	0.96	0.34	0	0.34	0	0	0	0.61
Iceland	40	0	0	0	0	0	0	0	0
Norway	170	0	0	0	0	0	0	0	0
Switzerland	111	0	0	0	0	0	0	0	0
Total (MS)	14,947	1.73	0.6	0.31	0.16	0.09	0.03	0.01	1.18

The prevalence of the five targeted *Salmonella* serovars was 0.60% in 2014 (Table 5). A total of 12 MS and three non-MS reported no positive flocks for the target serovars in 2014.

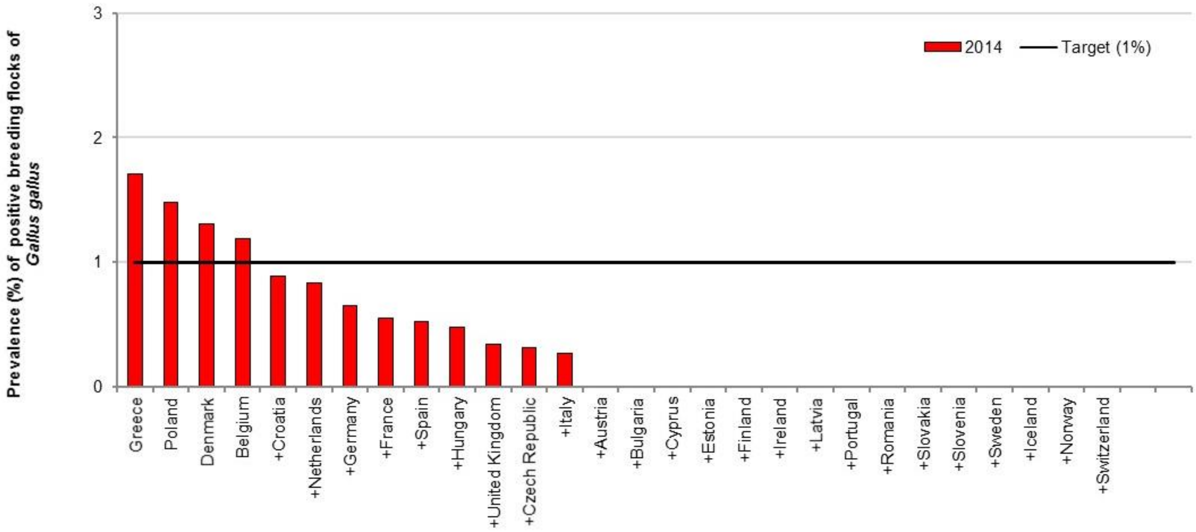
Romania updated during 2015 its historical *Salmonella* prevalence data for breeding flocks for the years 2013 and 2012 (EFSA and ECDC, 2014, 2015a) and corrected the number of flocks tested that was previously erroneously reported as the number of samples tested. Its prevalence of breeding flocks positive for the five targeted *Salmonella* serovars was 0% instead of <0.1% for 2012, and remained 0% for 2013; prevalence of Romanian breeding flocks positive for non-target *Salmonella* serovars was 7.4% instead of 0.3% for 2012, and 6.7% instead of 0.3% for 2013. The substantial reduction in the reported number of breeding flocks in Romania resulted in the overall prevalence of the five targeted *Salmonella* serovars at the EU level being revised to 0.6% instead of 0.4% for 2012, and 0.6% instead of 0.4% for 2013. The decreasing trend noted since 2007 in EU breeding flocks remaining positive for the five target serovars seemed to discontinue from 2010 onwards and stabilise at around 0.6% (Figure 5).



For 2013 and 2014 no data for Luxembourg and Malta as they have no fowl breeding flocks. Lithuania did not report data for 2014.

Figure 5: Prevalence of *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and/or *S.* Hadar-positive breeding flocks of *Gallus gallus* during production in the EU, 2007–2014; and prevalence of *S.* Enteritidis and/or *S.* Typhimurium-positive laying hen flocks, broiler flocks, flocks of breeding and fattening turkeys, during the production period in the EU, 2008–2014

In total, 21 MS and three non-MS met the target of max 1% set for 2014. The MS that did not meet the target were Belgium, Denmark, Greece and Poland with the highest flock prevalence of 1.71% reported by Greece (Table 5, Figure 6 and Figure 7). The number of flocks positive for target serovars is similar to last year in Poland. Denmark had two flocks positive for the target serovars, whereas Belgium had six. The most commonly reported target serovar in breeding flocks of *Gallus gallus* in 2014 was *S.* Enteritidis (0.31%), reported by nine MS (Belgium, Czech Republic, France, Germany, Greece, Hungary, Netherlands, Poland and Spain). It was followed by *S.* Typhimurium including the monophasic variants (0.16%) reported also by nine MS (Belgium, Croatia, Denmark, France, Greece, the Netherlands, Poland, Spain and the United Kingdom); *S.* Infantis (0.09%) reported by seven MS (France, Germany, Greece, Hungary, Italy, Poland and Spain), *S.* Virchow (0.03%) reported by Poland and Spain and *S.* Hadar (0.01%) reported by Spain.



MS are ordered by prevalence of *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and/or *S.* Hadar-positive fowl breeding flocks. No data for Luxembourg and Malta as they have no fowl breeding flocks. Lithuania did not report data for 2014. Twenty-one MS and three non-MS met the target in 2014, indicated with a '+'.

Figure 6: Prevalence of *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and/or *S.* Hadar-positive breeding flocks of *Gallus gallus* during the production period and target for MS, Iceland, Norway and Switzerland, 2014

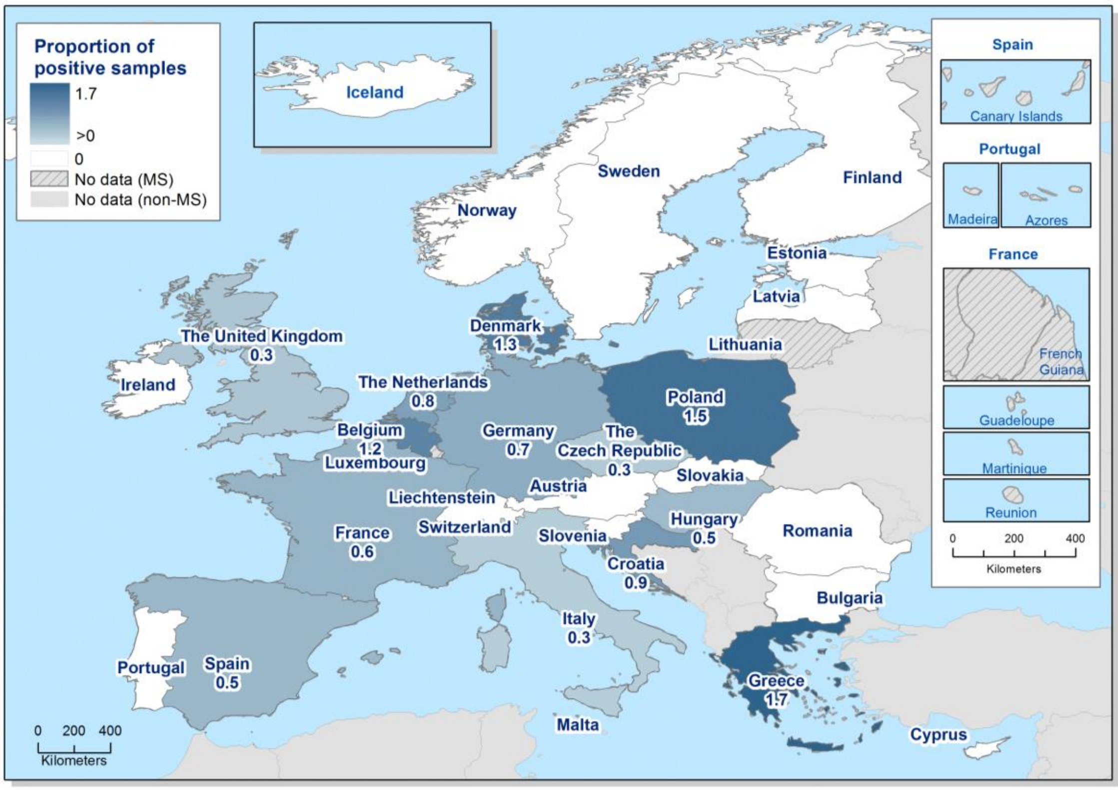


Figure 7: Prevalence of the five target serovars (*S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and/or *S.* Hadar)-positive breeding flocks of *Gallus gallus* during the production period, 2014

Laying hen flocks

The EU target for laying hens is defined in Regulation (EC) No 517/2011[22] 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 ultimate EU target is defined as a maximum percentage of adult flocks remaining positive at 2%. Any reporting of monophasic *S.* Typhimurium is included within the *S.* Typhimurium total and as such is counted as a target serovar. However, MS with fewer than 50 flocks of adult laying hens would attain the target if only one adult flock remained positive.

In 2014, the seventh year in which MS were obliged to implement *Salmonella* control programmes, all MS implemented control programmes approved by the EC. In total, 26 MS (all MS except Lithuania and Luxembourg) and three non-MS reported data within the framework of the commercial scale laying hen flock programme for 2014.

Six MS and two non-MS reported no flocks positive for *S.* Enteritidis or *S.* Typhimurium (Table 6).

Romania updated during 2015 its historical *Salmonella* prevalence data for adult laying hen flocks positive for *S.* Enteritidis and/or *S.* Typhimurium for the years 2013 and 2012 (EFSA and ECDC, 2014, 2015a) and corrected the number of flocks tested that was previously erroneously reported as the number of samples tested. The prevalence of laying flocks positive for the target *Salmonella* serovars was revised to 1.4% instead of 1.2% for 2012, and 1.4% instead of 0.8% for 2013; prevalence of Romanian laying flocks positive for non-target *Salmonella* serovars was 14.1% instead of 2.4% for 2012, and 14.9% instead of 2.4% for 2013. The substantial reduction in the reported number of laying flocks in Romania led to the reported EU level prevalence of adult laying hen flocks positive for

[22] 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, pp. 45–51.

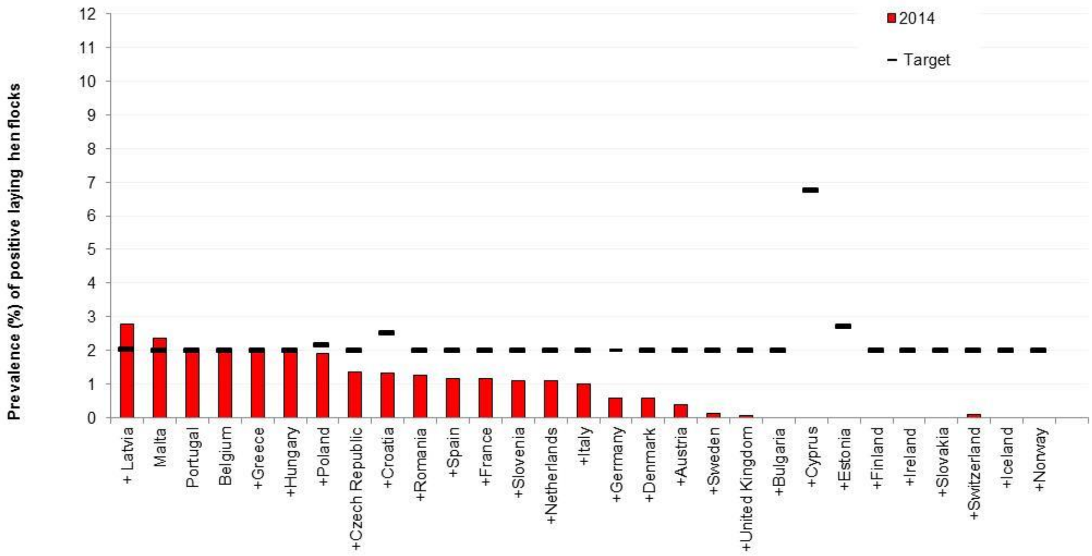
S. Enteritidis and/or *S.* Typhimurium to remain 1.3% in 2012, and was 0.8% instead of 1.0% for 2013. Taking into account these new data, the EU level prevalence of laying flocks positive for the target *Salmonella* serovars decreased further to 0.9% in 2014, following the decreasing trend observed since 2008 (Figure 6). The EU level prevalence of adult laying hen flocks positive for *Salmonella* spp. was 2.54% (Table 6), compared with 2.8% in 2013.

Overall, 23 MS and three non-MS met their 2014 reduction targets (Figure 8 and Figure 9). The MS that did not meet the target were Belgium, Malta and Portugal. Latvia reported flock prevalence for target serovars of above 2% but had fewer than 50 flocks of adult laying hens and only one adult flock remaining positive, thus attaining the target.

The most common of the target serovars in laying hen flocks was *S.* Enteritidis (0.7% compared with 0.2% *S.* Typhimurium including the monophasic variants).

Table 6: *Salmonella* in laying hen flocks of *Gallus gallus* during the production period (flock-based data) in countries running control programmes, 2014

Country	Tested	Percent positive	*S.* Enteritidis, *S.* Typhimurium %	*S.* Enteritidis %	*S.* Typhimurium %	Other than SET %
Austria	2,759	1.52	0.4	0.25	0.14	1.23
Belgium	644	4.35	2.02	1.86	0.16	2.33
Bulgaria	679	0.88	0	0	0	0.88
Croatia	301	1.33	1.33	1	0.33	0
Cyprus	115	16.52	0	0	0	16.52
Czech Republic	441	1.36	1.36	1.36	0	0
Denmark	347	0.58	0.58	0.29	0.29	0
Estonia	32	3.13	0	0	0	3.13
Finland	715	0	0	0	0	0
France	4,928	1.16	1.16	0.77	0.39	0
Germany	5,256	1.39	0.59	0.44	0.15	0.8
Greece	401	9.48	2	1.75	0.25	7.48
Hungary	966	5.49	1.97	1.86	0.1	3.52
Ireland	190	0	0	0	0	0
Italy	3,059	3.73	1.01	0.65	0.36	4.35
Latvia	36	13.89	2.78	2.78	0	11.11
Malta	85	45.88	2.35	0	2.35	43.53
Netherlands	3,041	1.09	1.09	1.02	0.07	0
Poland	2,362	2.84	1.91	1.86	0.04	0.93
Portugal	440	5.45	2.05	1.82	0.23	3.41
Romania	551	8.35	1.27	0.91	0.36	7.08
Slovakia	270	0	0	0	0	0
Slovenia	179	2.23	1.12	0	1.12	4.47
Spain	2,374	7.67	1.18	0.76	0.42	6.49
Sweden	646	0.31	0.15	0	0.15	0.15
United Kingdom	3,940	0.94	0.08	0.08	0	0.86
Iceland	41	0	0	0	0	0
Norway	775	0	0	0	0	0
Switzerland	927	0.11	0.11	0.11	0	0
Total (MS)	34,757	2.54	0.9	0.7	0.2	1.81



MS are ordered by prevalence of *S.* Enteritidis and/or *S.* Typhimurium-positive laying hen flocks. No data were reported by Lithuania and Luxembourg. Twenty-three MS and three non-MS have met the 2014 targets, indicated with a '+'.

Figure 8: Prevalence of *S.* Enteritidis and/or *S.* Typhimurium-positive laying hen flocks of *Gallus gallus* during the production period and targets for Member States, Norway and Switzerland, 2014

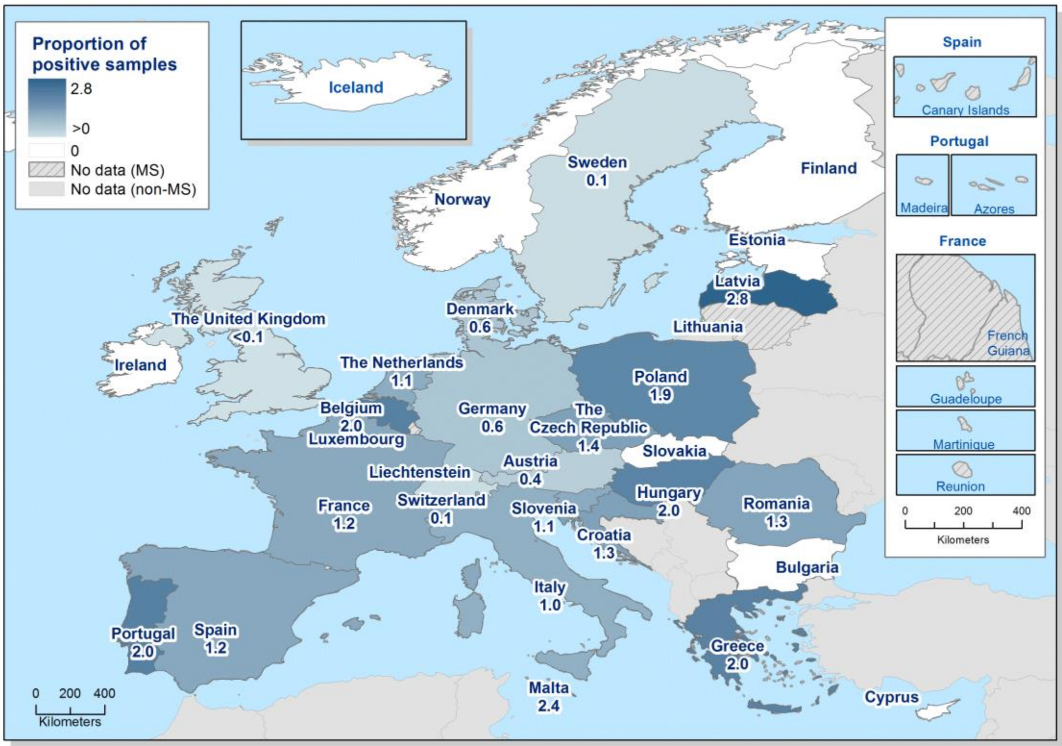


Figure 9: Prevalence of the two target serovars (*S.* Enteritidis and/or *S.* Typhimurium)-positive laying hen flocks of *Gallus gallus* during the production period, 2014

Broiler flocks

The EU target for broiler flocks is defined in Regulation (EC) No 200/2012[23] 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.

In 2014, the sixth year in which MS were obliged to implement *Salmonella* control programmes, all MS had control programmes approved by the EC. Twenty-five MS and three non-MS reported data on broiler flocks before slaughter. In France the number of tested broiler flocks is not known because the French IT system totals the number of broiler and fattening turkey flocks. In 2014, the EU level prevalence of broiler flocks positive for *Salmonella* spp. was 3.4% (Table 7), compared with 3.7% in 2013.

The reported prevalence of *S.* Enteritidis and *S.* Typhimurium in the EU was 0.2%, almost the same as in 2013 (0.18%) (Figure 5). Five MS and one non-MS reported no flocks positive for *S.* Enteritidis and/or *S.* Typhimurium (Table 7).

Romania updated during 2015 its historical *Salmonella* prevalence data on broiler flocks positive for *S.* Enteritidis and/or *S.* Typhimurium for the years 2013 and 2012 (EFSA and ECDC, 2014, 2015a) and corrected the number of flocks tested that was previously erroneously reported. The prevalence of broiler flocks positive for the target *Salmonella* serovars remained <0.1% for 2012, and was 0.4% instead of 0.6% for 2013; prevalence of Romanian laying flocks positive for non-target *Salmonella* serovars was revised to 10% instead of 5.9% for 2012, and 13.5% instead of 13.4% for 2013. These corrected data did not affect the EU prevalence of *Salmonella* -positive broiler flocks or the prevalence of target serovar positive broiler flocks.

In 2014, 21 MS and three non-MS met the target of 1% or less of broiler flocks positive for *S.* Enteritidis and/or *S.* Typhimurium. The MS that did not achieve the reduction target were the Czech Republic, Malta and Croatia (Figures 2014_SALMTARGETBROIBS and 2014_SALMMAPBROIBS).

The most common target serovar in broiler flocks was *S.* Enteritidis; 0.13% compared with 0.07% *S.* Typhimurium including the monophasic variants.

Table 7: *Salmonella* in broiler flocks of *Gallus gallus* before slaughter (flock-based data) in countries running control programmes, 2014

Country	Tested	Percent positive	*S.* Enteritidis, *S.* Typhimurium %	*S.* Enteritidis %	*S.* Typhimurium %	Other than SET %
Austria	3,868	2.9	0.44	0.41	0.03	2.48
Belgium	8,946	1.98	0.29	0.08	0.21	1.69
Bulgaria	492	0.61	0.2	0	0.2	0.41
Croatia	3,100	1.23	1.23	0.87	0.35	0
Cyprus	1,184	3.63	0.08	0	0.08	3.55
Czech Republic	4,676	4.53	2.95	2.91	0.04	1.58
Denmark	3,470	0.75	0.4	0.03	0.37	0.35
Estonia	513	0	0	0	0	0
Finland	3,467	0	0	0	0	0
Germany	21,934	1.95	0.14	0.01	0.12	1.81
Greece	7,504	0.25	0	0	0	0.25
Hungary	8,180	13.48	0.48	0.24	0.23	13.01
Ireland	39	2.56	0	0	0	2.56
Italy	26,431	7.59	0.01	< 0.01	< 0.01	8.02
Latvia	594	0	0	0	0	0
Malta	475	13.05	1.26	0.21	1.05	11.79
Netherlands	15,739	7.84	0.24	0.1	0.14	7.61
Poland	35,662	0.27	0.15	0.15	< 0.01	0.11
Portugal	11,773	0.48	0.08	0.08	< 0.01	0.4
Romania	9,435	9.66	0.19	0.18	0.01	9.46
Slovakia	2,140	0.28	0.28	0.28	0	0
Slovenia	2,226	0.27	0.09	0.04	0.04	6.33
Spain	37,442	3.63	0.12	<0.01	0.11	3.52

[23] 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, pp. 31–36.

Country	Tested	Percent positive	S. Enteritidis, S. Typhimurium %	S. Enteritidis %	S. Typhimurium %	Other than SET %
Sweden	3,276	0.06	0.06	0	0.06	0
United Kingdom	37,860	1.41	0.03	0	0.03	1.38
Iceland	658	2.58	0	0	0	2.58
Norway	5,265	0.08	0.02	0	0.02	0.06
Switzerland	614	0.65	0.65	0.65	0	0
Total (MSs)	250,426	3.37	0.2	0.13	0.07	3.27

French 2014 data for broiler flocks are not included, as the number of tested broiler flocks is not known, because at this point in time the French IT system totals the number of broiler and of fattening turkey flocks.

Breeding and fattening turkeys

Year 2014 was the fifth year in which MS were obliged to implement *Salmonella* control programmes in turkey flocks. In 2012, a final annual *Salmonella* reduction target for turkey flocks came into force. This target was an extension of the transitional target implemented in the period of 2010–2012. The EU definitive target for turkey flocks is defined in Regulation (EU) No 1190/2012[24] as a maximum percentage of breeding and fattening turkey flocks remaining positive for the target serovars *S.* Enteritidis and/or *S.* Typhimurium (including monophasic *S.* Typhimurium) of 1% or less. Positive flocks have to be counted and reported once only (flock level prevalence), irrespective of the number of sampling and testing operations. For MS 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. All results are presented at flock level.

For breeding turkeys, 15 MS and two non-MS reported data from *Salmonella* testing in adult turkey flocks in 2014 (Table 8). Data show that 91% of the 1,818 turkey breeding flocks at the EU level were reported by France, Germany, Hungary, Italy, Poland and the United Kingdom, whereas smaller numbers of flocks were reported by the other countries. The overall EU prevalence of *Salmonella* was 3.3% (Table 8), a decrease from 4.9% in 2013.

Overall, the EU level prevalence for the target serovars was 0.2%, continuing the decrease since 2012 (Figure 5). Only two MS (France and Croatia) reported flocks positive for the target serovars.

All 15 reporting MS and two non-MS met the target prevalence of *S.* Enteritidis and/or *S.* Typhimurium set for adult turkey breeding flocks in 2014. Croatia met the target even though the proportion of positive flocks was higher than 1%, as they reported only one positive flock out of four that were tested (Figures 2014_SALMTARGETBREEDTURK and 2014_SALMMAPBREEDTURK).

The most common of the target serovars in breeding turkey flocks was *S.* Typhimurium including the monophasic strains (0.17% compared with 0.06% *S.* Enteritidis). France reported to have isolated *S.* Enteritidis that is rare in turkeys and especially in breeders.

Table 8: *Salmonella* in breeding flocks of turkeys (adults, flock-based data) in countries running control programmes, 2014

Country	Tested	Percent positive	S. Enteritidis, S. Typhimurium %	S. Enteritidis %	S. Typhimurium %	Other than SET %
Bulgaria	45	0	0	0	0	0
Croatia	4	25	25	0	25	0
Czech Republic	7	28.57	0	0	0	28.57
Finland	7	0	0	0	0	0
France	729	0.41	0.41	0.14	0.27	0
Germany	84	1.19	0	0	0	1.19
Greece	1	0	0	0	0	0
Hungary	179	10.06	0	0	0	10.06
Ireland	5	0	0	0	0	0
Italy	277	6.5	0	0	0	7.58
Poland	142	0	0	0	0	0
Slovakia	35	0	0	0	0	0
Spain	64	9.38	0	0	0	9.38
Sweden	4	0	0	0	0	0

[24] Commission Regulation (EU) No 1190/2012 of 12 December 2012 concerning a Union target for the reduction of *Salmonella* Enteritidis and *Salmonella* Typhimurium in flocks of turkeys, as provided for in Regulation (EC) No 2160/2003 of the European Parliament and of the Council. OJ L 340, 13.12.2012, pp. 29–34.

Country	Tested	Percent positive	*S.* Enteritidis, *S.* Typhimurium %	*S.* Enteritidis %	*S.* Typhimurium %	Other than SET %
United Kingdom	235	4.68	0	0	0	4.68
Iceland	3	0	0	0	0	0
Norway	12	0	0	0	0	0
Total (MS)	1,818	3.3	0.22	0.06	0.17	3.25

For fattening turkeys, in total, 22 MS and three non-MS provided data from commercial scale flocks before slaughter. In 2014, the EU level prevalence of turkey fattening flocks positive for *Salmonella* spp. was 9.32% (Table 9), which is a decrease compared with 2013, when a prevalence of 11.1% was reported.

The overall prevalence at the EU level for the target serovars was 0.2% (Table 9), about the same as in 2013 (0.18%) (Figure 5). Fourteen MS and three non-MS reported no flock positive for *S.* Enteritidis and/or *S.* Typhimurium.

Romania updated during 2015 its historical *Salmonella* prevalence data for broiler flocks positive for *S.* Enteritidis and/or *S.* Typhimurium for the years 2013 and 2012 (EFSA and ECDC, 2014, 2015a) and corrected the number of flocks tested that was previously erroneously reported. The prevalence of fattening turkey flocks positive to the target *Salmonella* serovars remained 0% for 2012 and as well for 2013; prevalence of Romanian fattening turkey flocks positive to non-target *Salmonella* serovars remained 0% for 2012, and was 2.7% instead of 2.6% for 2013. These corrective data did not noticeably impact on the EU prevalence of *Salmonella*-positive fattening turkey flocks or on the prevalence of target serovar positive fattening turkey flocks.

Twenty-one reporting MS and three non-MS met the reduction target set for fattening turkeys, whereas Belgium did not meet the target (Figures 2014_SALMTARGETFATTURKBS and 2014_SALMMAPFATTURKBS).

The most common of the target serovars in fattening turkey flocks was *S.* Typhimurium including the monophasic strains (0.15% compared with 0.05% *S.* Enteritidis).

Table 9: *Salmonella* in fattening flocks of turkeys before slaughter (flock-based data) in countries running control programmes, 2014

Country	Tested	Percent positive	*S.* Enteritidis, *S.* Typhimurium %	*S.* Enteritidis %	*S.* Typhimurium %	Other than SET %
Austria	365	3.29	0	0	0	3.84
Belgium	82	7.32	2.44	0	2.44	4.88
Bulgaria	37	0	0	0	0	0
Croatia	334	0.9	0.9	0.6	0.3	0
Cyprus	9	44.44	0	0	0	44.44
Czech Republic	301	5.65	0	0	0	5.65
Denmark	10	0	0	0	0	0
Finland	324	0	0	0	0	0
Germany	3,637	0.38	0	0	0	0.38
Greece	56	0	0	0	0	0
Hungary	3,209	24.18	0.16	0.03	0.12	24.03
Ireland	8	0	0	0	0	0
Italy	5,031	19.14	0.12	0	0.12	20.23
Netherlands	252	0.4	0	0	0	0.4
Poland	5,838	1.54	0.29	0.17	0.12	1.25
Portugal	887	0.11	0.11	0	0.11	0
Romania	260	0	0	0	0	0
Slovakia	18	0	0	0	0	0
Slovenia	137	1.46	0	0	0	2.92
Spain	3,150	17.52	0.25	0	0.25	17.27
Sweden	164	0	0	0	0	0
United Kingdom	3,359	3.6	0.36	0	0.36	3.25
Iceland	31	0	0	0	0	0
Norway	208	0	0	0	0	0
Switzerland	42	2.38	0	0	0	2.38
Total (MSs)	27,468	9.33	0.2	0.05	0.15	9.37

French 2014 data for fattening turkey flocks are not included, as the number of tested fattening turkey flocks is not known, because at this point in time the French IT system totals the number of broiler and of fattening turkey flocks.

Ducks and geese

In 2014, the overall EU prevalence in flocks of ducks and geese was 15.0% for *Salmonella* spp. and 3.4% for *S*. Enteritidis and *S*. Typhimurium (Table 2014_SALMDUCKGEESE). Owing to differences in types of flocks sampled (breeding or meat production flocks), sampling strategy and sample type and size, prevalence is not comparable across MS.

Pigs

The overall proportion of *Salmonella*-positive samples from the bacteriological monitoring of pigs was 7.9%, which is slightly lower than in 2013 (8.1%). At the herd level, the *Salmonella* prevalence was 10.1%; it was lower at the individual animal level (7.7%) (Table 2014_SALMPIGSBACT).

Investigations were reported from breeding and fattening pigs, and from different sampling stages: at the farm, slaughterhouse or unspecified sampling stage. Sample types reported were faeces, lymph nodes, organ or tissue samples, carcase swabs and environmental samples, therefore comparisons between MS and between years should be made with caution.

Cattle

The overall proportion of *Salmonella*-positive samples from the bacteriological monitoring of cattle was 3.9%, compared to 2.4% for 2013. The *Salmonella* prevalence was similar at the herd/flock and animal level was 2.6% and 4.0%, respectively (Table 2014_SALMCATBACT).

Investigations were reported from breeding animals, dairy cows or calves, or were unspecified, and were from farms or slaughterhouses or unspecified. Tested sample types were faeces, lymph nodes, organ or tissue samples or carcase swabs, or sample types were unspecified.

Other animal species

Salmonella was also investigated in other animal species and detected in cats, dogs, sheep, goats, domestic solipeds, wild boar, mink, badgers, deer, wolves, foxes, quails, pheasants, pigeons, parrots, reptiles, snakes, hedgehogs, badgers, minks and other wild and zoo animals.

Feedingstuffs

Data on *Salmonella* in feedingstuffs collected by MS are generated from various 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. In 2014, 20 MS and one non-MS reported data from 18,827 units tested for *Salmonella*. The Netherlands reported 36.2% of the units tested and Norway reported 22.9%.

The overall level of *Salmonella* contamination in animal- and vegetable-derived feed material in 2014, was low, with 3.8% of positive units out of 4,041 units reported by 19 MS (Table 2014_SALMDERIVEDFEED), compared to 1.4% in 2013. However, data from 2013 were heavily influenced by the reports of the United Kingdom as they reported 50% of the units (10,000 samples) with very low proportions of positive samples. The United Kingdom did not report any data in 2014. As in 2013, the majority of the data in 2014 was from feed mills. High levels of positive samples were observed at all sampling stages except for farm level. However, it is important to bear in mind that a large proportion of the investigations contained less than 10 samples. The highest proportion of positive samples in individual investigations was reported for the feed category 'Feed material of oil seed or fruit origin', mainly soya (bean)-derived and sunflower seed-derived feed. *Salmonella* contamination was also detected in 'Feed material of marine animal origin (fish meal)' and 'Feed material of land animal origin (meat meal)', as well as in feed of cereal origin. In meat and bone meal, *Salmonella* contamination is to be considered only an indicator, and it does not pose any risk to food-producing animals because meat and bone meal is still prohibited in the EU for feeding the main food-producing animal species, although it is used in pet foods and may be used in aquaculture.

In compound feedingstuffs (the finished feed for animals), the proportion of *Salmonella*-positive findings in 2014 was low to very low for all animal populations: 0.7% of 1,654 tested samples for cattle, 1.9% of 1,077 tested samples for pigs and 0.8% of 7,741 tested samples for poultry (Tables

2014_SALMCOMPFEEDCATTLE, 2014_SALMCOMPFEEDPIGS and 2014_SALMCOMPFEEDPOULTRY). The proportion of positive samples ranged among the reporting MS from 0% to about 10%, with only a few exceptions. For poultry, the result for all MS was lower compared to 2013, where 1.9% of units tested were positive (total of 2,551 units). This is the effect of an intensive testing program carried out by the Netherlands (5,662 samples with very few positive findings). 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, and representative sampling of feedingstuff is difficult.

Serovars in food and animals

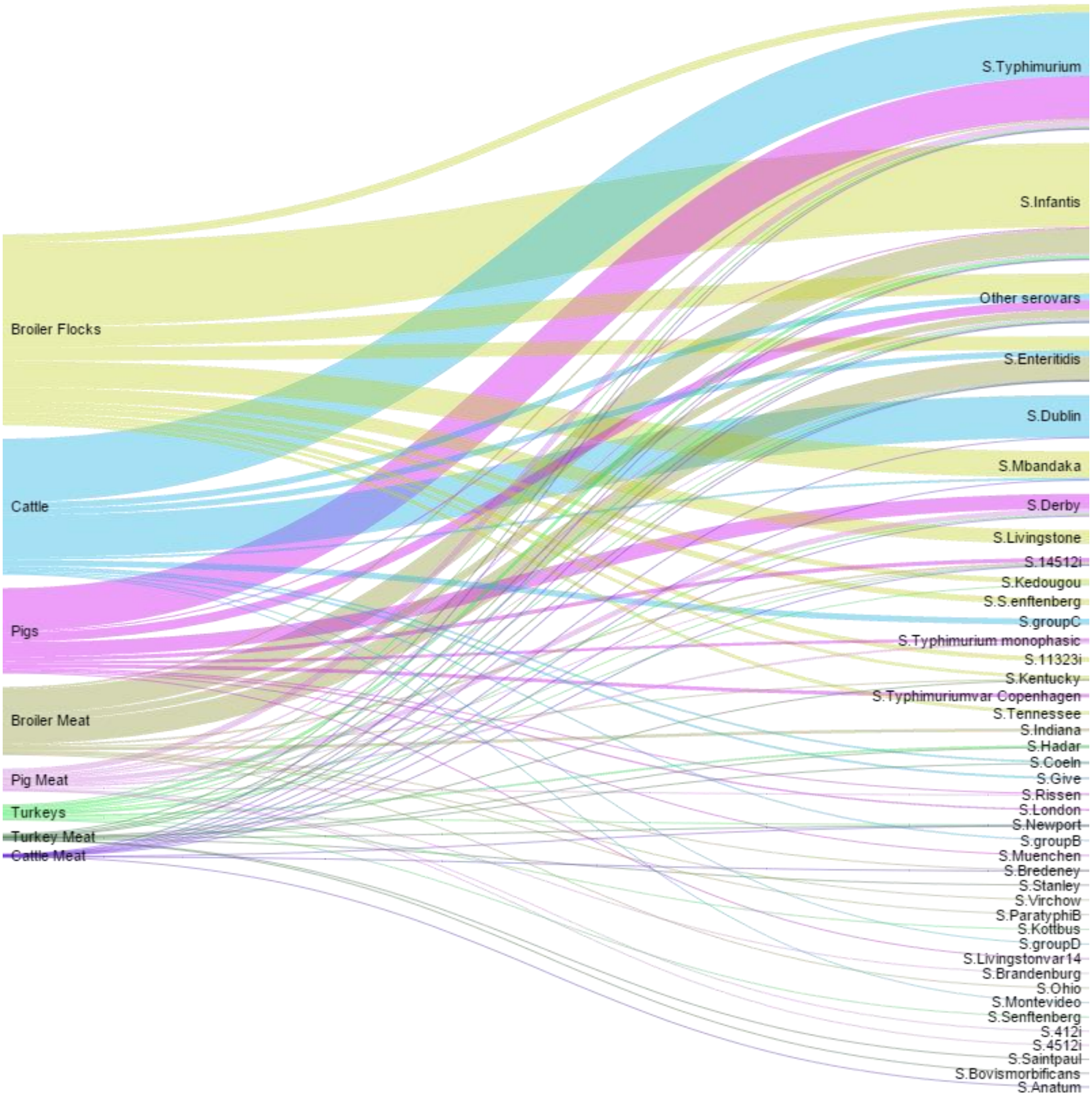
In the following paragraphs, data relating to *Salmonella* serovars from animal species, food of animal origin and animal feedingstuffs, isolated in 2014, are descriptively analysed. These analyses are underpinned by *Salmonella* serovar frequency distribution tables of the most commonly isolated serovars, specific to every matrix (category). These data are compared, where the quality of data allows, with data from the previous 4 years 2010-2013.

Data were collated into the following 13 matrices (Table 2014_SERALLMATRIX): chickens (*G. gallus)*, broiler flocks, broiler meat, turkeys, turkey meat, pigs, pig meat, cattle, bovine meat and compound feed for chickens, turkeys, pigs and cattle. *Salmonella* spp. were isolated from all matrices except compound feed for turkeys. In each category, only the 10 most common serovars from 2014 are listed, and all other isolates are referred to under 'other serovars'. This means that data on low prevalence MS are not covered. In this context it should be noted that some MS do not fully serotype all isolates, which means that some isolates from the 'top 10' serovars may be included under 'other serovars' in those MS. MS are obliged to report the five regulated serovars (*S.* Enteritidis, *S.* Typhimurium, *S.* Hadar, *S.* Virchow and *S.* Infantis) for breeding chickens, while for other poultry production sectors, only *S.* Enteritidis and *S.* Typhimurium are regulated serovars. Therefore, some MS only report *S.* Enteritidis and *S.* Typhimurium for categories other than breeding chickens, including broiler chickens, laying hens and broiler meat. This results in a possible bias towards the regulated serovars (*S.* Enteritidis and *S.* Typhimurium) for some MS. It also implies that the true occurrence of serovars other than the regulated ones is uncertain.

A total of 13,463 *Salmonella* isolates were reported from all MS across all matrices in 2014. The most common serovar was *S.* Typhimurium (3,010 isolates), followed by *S.* Infantis (2,834 isolates), *S.* Enteritidis (1,397 isolates) and *S.* Dublin (1,021 isolates). *S.* Typhimurium was isolated from 12 matrices (all except compound feed for turkeys), while *S.* Enteritidis was isolated from nine matrices and *S.* Infantis was isolated from eight matrices. *S.* Dublin, although accounting for the fourth highest number of isolates, was isolated from two matrices only (cattle and bovine meat) (Table 2014_SERALLMATRIX).

The number of isolates reported in the different categories varied greatly between MS and between categories. These differences in reporting between MS and differences in the total number of isolates make it difficult to directly compare these results.

The highest number of isolates was reported from *G. gallus* (5,377 isolates), with 26 MS reporting *Salmonella* spp., whereas the lowest number of isolates was from cattle feed (n=2; two reporting MS) and no isolates were reported from compound feed for turkeys. From pigs and cattle, respectively 2,037 and 3,243 isolates were reported, originating from ten and eight MS. However, more than 50% of pig and bovine isolates were reported from Germany, leading to a substantial bias towards one MS. Nineteen MS reported *Salmonella* from broiler meat, with a total of 1,626 isolates, and 17 MS reported *Salmonella* from pig meat, with a total of 533 isolates. Isolates from compound feed were reported in very low numbers from a small number of MS only, which is most likely due to the fact that there are no EU-wide statutory requirements for testing of animal feed. Animal feed is also a difficult matrix to representatively sample, and the likelihood of detection is therefore significantly lower compared to other matrices, such as faecal material. Figure 10, a so-called Sankey diagram, illustrates the overall distribution of the reported *Salmonella* serovars across different food, animal and meat sectors in the EU in 2014. The diagram was produced using the open source data visualisation website http://app.raw.densitydesign.org/#%2F.



The left-hand of the diagram shows across different animals and meat thereof testing positive for *Salmonella*; broiler flocks, broiler meat, turkeys, turkey meat, pigs, pig meat, cattle and bovine meat. The sample categories shown are broilers (brown/yellow), cattle (blue), pigs (red) and turkeys (green) as well as meat from these species. The list at the right-hand of the diagram shows the reported *Salmonella* serovar results (including 'other serovars'). The wider the coloured band joining each side, the larger the number of samples with the linked isolated *Salmonella* serovar.

Figure 10: Sankey diagram of reported *Salmonella* serovar isolates, in animal species, food of animal origin and animal feedingstuffs, by matrix, EU, 2014

Serovars in poultry production

In 2014, 7,539 isolates from poultry production (chickens, turkeys, broiler meat and turkey meat) were reported from a total of 26 MS.

The most commonly reported serovar from poultry production was *S.* Infantis (2,752 isolates), followed by *S.* Enteritidis (1,215 isolates) and *S.* Mbandaka (651 isolates). *S.* Livingstone and *S.* Typhimurium accounted for 360 and 302 isolates, respectively.

Gallus gallus (breeding hens, layers and broilers)

The distribution of the most commonly isolated serovars from chickens in 2014 is shown in Table 2014_SERGAL. In 2014, 26 MS (all MS except Lithuania and Luxembourg) reported the isolation of *Salmonella* spp. from *G. gallus*. Of all categories described in this chapter, this was the category with the highest number of countries reporting *Salmonella* isolates. This is due to the fact that *Salmonella* control in *G. gallus* is a statutory requirement for all EU MS. A total of 5,377 isolates were reported in 2014, which is a decrease of 5.0% compared to 2013, when 5,660 isolates were recorded. Compared to 2010, when 8,968 isolates were reported, the decrease was 40.0%.

The number of isolates varied greatly between MS. Romania reported the highest number of isolates in 2014 (1,735), followed by Italy (1,582) and the United Kingdom (565 isolates). These three MS together reported 72.2% of all isolates.

850 isolates, or 15.9% of all isolates, were either *S.* Enteritidis or *S.* Typhimurium, which are regulated serovars for all production types. However, as monophasic strains of *S.* Typhimurium were not among the top 10 serovars in *G. gallus* in 2014, the number of isolates belonging to regulated serovars is likely to be slightly higher than that. Compared to 2010, when 1,964 out of 8,968 isolates (21.9%) were regulated serovars, this is a substantial reduction in the proportion of regulated serovars and also a reduction by 56.7% in terms of absolute numbers.

A retrospective analysis of *Salmonella* data published by EFSA, covering the period from 2007 to 2009, came to the conclusion that laying hens were the most important reservoir for human salmonellosis in Europe during that time period, with 42.4% of cases attributed to the consumption of eggs, 95.9% of which were caused by *S.* Enteritidis. 31.1% of cases were attributable to pigs, while broilers and turkeys were considered less important sources (causing 12.6% and 3.8% of cases respectively) (De Knegt et al., 2015).

The most commonly reported serovar in *G. gallus* was *S.* Infantis, accounting for 2,057 or 38.3% of isolates, followed by *S.* Mbandaka (651 isolates; 12.1%) and *S.* Enteritidis (641 isolates; 11.9%). *S.* Livingstone and *S.* Typhimurium were reported from 360 (6.7%) and 209 isolates (4.8%) respectively. While the number of *S.* Enteritidis and *S.* Typhimurium reports has steadily declined over the past 5 years, the number of reported *S.* Infantis isolates has increased and is now more than the double reported in 2010 (see Figure 2014_SERTRENDGAL).

S. Infantis was reported from 17 MS, but clustered mainly in Central, Eastern and Southern Europe, with 1,018 isolates reported from Romania, 757 from Italy, 123 from Slovenia, 60 from Austria, 41 from the Czech Republic and 21 from Cyprus, while it was only reported in much lower numbers from other MS. An apparent dip in the number of *S.* Infantis isolates reported in 2011 is an artefact due to Italy not reporting any *S.* Infantis isolates in that year and Romania only reporting two isolates, while both countries reported considerably more isolates in other years.

S. Infantis is one of the five regulated serovars in the breeding chicken control programme and has been among the top 10 serovars isolated from human salmonellosis cases for at least the past 3 years. In 2014, *S.* Infantis was the fourth most commonly isolated serovar from humans, accounting for 1,846 confirmed cases of human salmonellosis (2.4%). Between 2011 and 2013, human *S.* Infantis cases increased from 1,760 (2.2% of all cases) to 2,226 (3% of all cases) in 2013. The year 2014 saw a slight reduction in the number of human *S.* Infantis cases. While the majority of *S.* Infantis isolates are fully susceptible to antimicrobials, a proportion of *S.* Infantis isolates showing resistance to seven or eight antimicrobial classes, including fluoroquinolones and third-generation cephalosporins, have been reported in 2013 (EFSA and ECDC, 2015b), and carbapenem-resistant isolates have been found in broiler production in Germany (EFSA BIOHAZ Panel, 2013d). Multi-drug resistant *S.* Infantis isolates, which have been described from broiler meat and faecal samples from several European countries, are not only of concern because of their multidrug resistant properties, but also because of their ability to persist in poultry houses and the environment (Nógrády et al., 2012).

While *S.* Infantis was the most common serovar found in *G. gallus* (38.3% of isolates) and broiler flocks (44.1% of isolates), it represented only 4.9% of isolates from laying hens with a downward trend compared to 2013 (8.3% of isolates).

S. Mbandaka, which is considered to be a mainly feed-related serovar with limited virulence, was reported in large numbers from Italy and the United Kingdom, but was only reported from nine MS in total.

S. Enteritidis was reported from 20 MS, with a total of 641 isolates. The Czech Republic (146), Poland (118) and the Netherlands (56) reported the highest absolute numbers, and *S.* Enteritidis was also the predominant serovar from *G. gallus* in these three MS. In the Czech Republic, 63.2% of isolates from *G. gallus* were reported as *S.* Enteritidis, in Poland 92.9% and in the Netherlands, it was 67.5%. Compared to 2010, when 1,507 *S.* Enteritidis isolates were reported from all MS, this represents a 57.5% reduction in the total number of *S.* Enteritidis isolates across the EU, despite the fact that the number of MS has increased since 2010. This reduction was seen across many MS, indicating that the *Salmonella* control programmes have been successfully implemented across Europe. The reduction in *S.* Enteritidis isolates from chickens during this period, as observed across Europe, was in line with the reduction of human salmonellosis cases caused by this serovar (36,064 cases in 2011 versus 33,965 cases in 2014; a reduction of 5.8%) and supports the conclusion drawn by De Knegt et al. (2015) that the majority of human *S.* Enteritidis infections are attributable to the laying hen reservoir.

However, 2014 saw a higher number of human *S.* Enteritidis infections compared to 2013 (33,965 in 2014 versus 29,090 in 2013, an increase of 16.8%, see Table 3), and the reasons for that increase are likely to be multi-factorial and different for the individual MS. That increase in human cases was mainly attributed to an increase in cases in two MS – in the Czech Republic, cases increased by 70.5% (3,438 cases), and in Spain the increase was 20.7% (1,008 cases). The increase in the Czech Republic may be explained by an increase in the number of *Salmonella* outbreaks in 2014, whereas in Spain, coverage of the surveillance system was improved for *Salmonella* in 2014.

When analysing the most recent serovar data from laying hens, a reduction in *S.* Enteritidis isolates is not so clear for data from *G. gallus*. Between 2013 and 2014, the total number of *Salmonella* isolates from laying hens went down from 758 to 598, which is a reduction of 21.1%. At the same time, the number of *S.* Enteritidis isolates reduced from 282 to 257, which is a reduction of only 8.9%. Therefore, the proportion of *Salmonella* isolates from laying hens being typed as *S.* Enteritidis has actually increased from 37.2% to 43%, and this serovar is recognised as being the only one of major significance in terms of contamination of eggs, because of its special ability to invade, survive and multiply within intact eggs (EFSA BIOHAZ Panel, 2014).

It is difficult to draw conclusions from these figures, as in the MS where a substantial increase in human *S.* Enteritidis cases was observed in 2014 (the Czech Republic), the number of *S.* Enteritidis isolates from laying hens was lower compared to 2013 (reduction from seven to six isolates in the Czech Republic). Noticeable increases in the number of *S.* Enteritidis isolates from laying flocks were observed in France (19 versus 40 isolates) and in the Netherlands (19 versus 31 isolates) and in France the number of *S.* Enteritidis cases in humans increased in 2014 with 22.8% whereas decreased with 17.1% in the Netherlands as compared to 2013 (ECDC TESSy data 2014). It should be noted that some of the major egg-producing MS export a significant proportion of table eggs to other MS, which can make it difficult to link *Salmonella* isolates from laying hens and from human patients within one MS, except in the case of defined outbreaks (Inns et al., 2015).

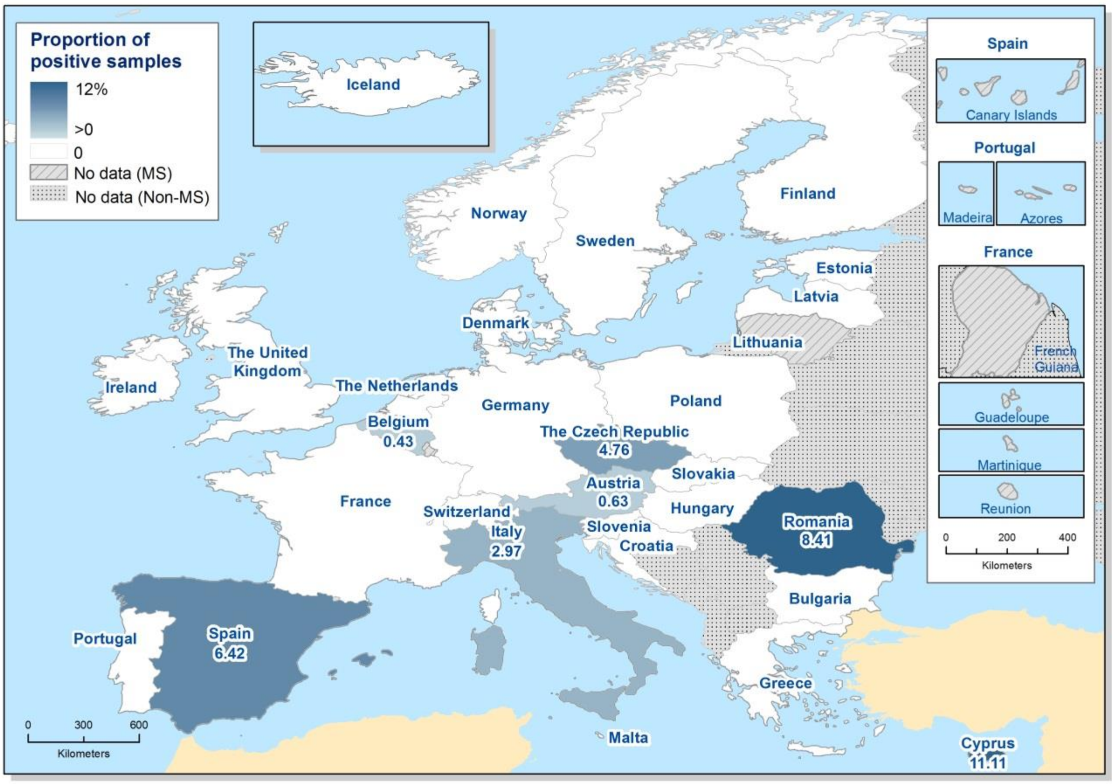
S. Typhimurium was reported from 22 MS, and the total number of reports has been fairly stable since 2012. However, compared to 2010, when 420 isolates were reported, only half as many isolates were reported in 2014. Numbers reported varied between one and 39 isolates per country. Monophasic variants of *S.* Typhimurium were not among the top 10 serovars from chickens in 2014 and are therefore not reported here. Interestingly, the proportion of *Salmonella* isolates from *G. gallus* being typed as *S.* Typhimurium was 3.9%, while it was 10.4% from laying hens. *S.* Typhimurium therefore seems to be overrepresented in laying hen flocks compared to broiler and breeder flocks.

Other serovars which occurred mainly in few countries were *S.* Livingstone (302 isolates from Italy, 22 from Belgium and 15 from Romania), *S.* Senftenberg (Romania 73, the United Kingdom 26, Austria 15) and *S.* Montevideo (the United Kingdom 44, Austria 23). These serovars are usually either feed related or are known to be hatchery contaminants. They play a minor role in human salmonellosis, although there have been outbreaks of *S.* Montevideo in several countries and it is one of the 'top 20' serovars in humans, representing around 0.5% of human salmonellosis cases. *S.* Montevideo has also seen an upward trend in laying hens in 2014 compared to 2013 and accounted for 4% of isolates from laying hens in 2014, while it was not among the top 10 serovars in 2013.

S. Kentucky isolates were reported from a small number of MS only (Romania, 146; Italy, 47; Czech Republic, 11; Cyprus and Spain, 7 each; Austria, 1), but are of particular public health concern because of the multidrug resistance pattern of some strains and, in particular, high levels of resistance to fluoroquinolones. In 2013, 67.3% of human *S.* Kentucky isolates across the EU were multidrug resistant (EFSA and ECDC, 2015b). It is not clear whether the number of *S.* Kentucky isolates reported here represents the true picture, as some isolates may not have been fully serotyped in some MS and may therefore not be identified at serovar level in all cases.

While a trend of *S.* Kentucky cases from broiler meat, turkeys and turkey meat cannot be clearly identified, or is difficult to interpret due to low numbers, the proportion of *S.* Kentucky isolates from *G. gallus* has steadily increased since 2010, and *S.* Kentucky isolates represented 4.1% of all *Salmonella* isolates in 2014. In laying hens, *S.* Kentucky represented 8.9% of isolates with an upward trend compared to 2013 (7.4%). In contrast, *S.* Kentucky was not one of the 10 major serovars found in turkeys in 2014, but represented 4.9% of turkey meat isolates; however, as the total number of isolates from turkey meat is much lower than the number of isolates from chickens or turkeys, it is not clear how representative this figure may be.

Figure 11 shows *S.* Kentucky as a proportion of all isolates from *G. gallus*. Although relative percentages are significantly lower compared to *S.* Infantis, clustering can be seen in Southern, Central and Eastern European MS.



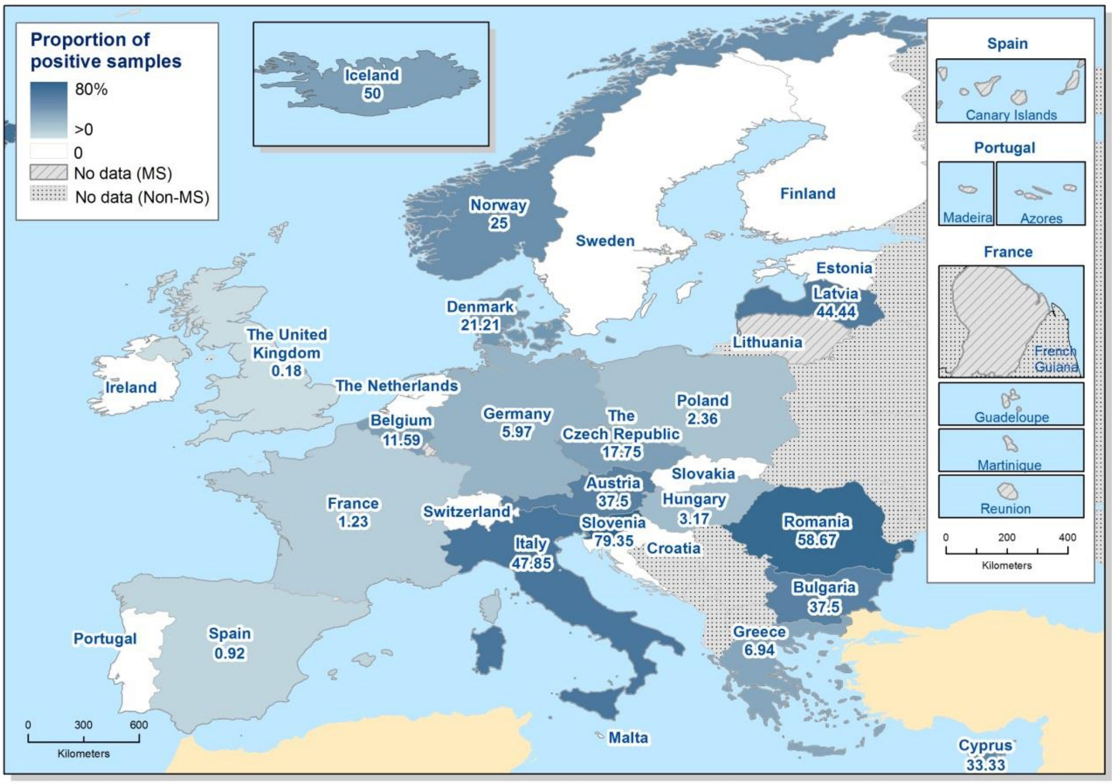
Note: number of units with serotyped *Salmonella* isolates; Austria (160), Belgium (233), Cyprus (63), Czech Republic (231), Italy (1,582), Romania (1,735) and Spain (109).

Figure 11: Distribution of *S.* Kentucky reported from *Gallus gallus,* 2014.

S. Kedougou (94 isolates) and *S.* 13,23:i:- (80 isolates) were reported in significant numbers from the United Kingdom only, where they accounted for 14.6 and 14.2% of all isolates of the United Kingdom respectively and where they have also been found in animal feed and feed mills, as well as hatcheries and broiler parent and production meat flocks. Molecular analysis of some strains indicated that *S.* 13,23:i:- strains are likely to be monophasic variants of *S.* Kedougou and, to a lesser extent, *S.* Idikan.

Table 2014_SERBRO shows the distribution of the ten most common *Salmonella* serovars in broiler flocks in 2014. The majority of *Salmonella* isolates from *G. gallus* originated from broiler chickens (4,568 of the 5,377 isolates). While the distribution of most of the top 10 serovars was fairly similar in *G. gallus* and in broiler flocks, *S.* Enteritidis represented 11.9% of *G. gallus* isolates, but only 7.3% of broiler isolates, indicating that *S.* Enteritidis was more prevalent in laying hen flocks than in broiler flocks. *S.* Infantis, on the other hand, represented 38.3% of *G. gallus* isolates, but 44.0% of broiler isolates and was therefore more prevalent in broiler chickens than in laying hens or breeding chickens.

Figure 12 shows *S.* Infantis as a proportion of all isolates from *G. gallus*. As described previously, the proportion of *S.* Infantis isolates is highest in some MS in Central and Eastern Europe, with Slovenia and Romania reporting the highest relative percentages.



Number of units with serotyped *Salmonella* isolates; Austria (160), Belgium (233), Bulgaria (8), Cyprus (63), Czech Republic (231), Denmark (33), France (81), Germany (67), Greece (72), Hungary (63), Latvia (9), Poland (127), Iceland (14), Italy (1,582), Norway (4), Romania (1,735), Slovenia (155), Spain (109) and the United Kingdom (563).

Figure 12: Distribution of *S.* Infantis reported from *Gallus gallus,* 2014.

The trends in commonly reported *Salmonella* serovars from *G. gallus* between 2010 and 2014 are displayed in Figure 13. The number of isolates belonging to the regulated serovars *S.* Enteritidis and *S.* Typhimurium has more than halved between 2010 and 2014, indicating that the introduction of the National Control Programmes, which started between 2007 and 2009 for the different production sectors, has had a beneficial impact on the reduction of regulated serovars. However, the continual increase in *S.* Infantis isolates over recent years is a matter of concern.

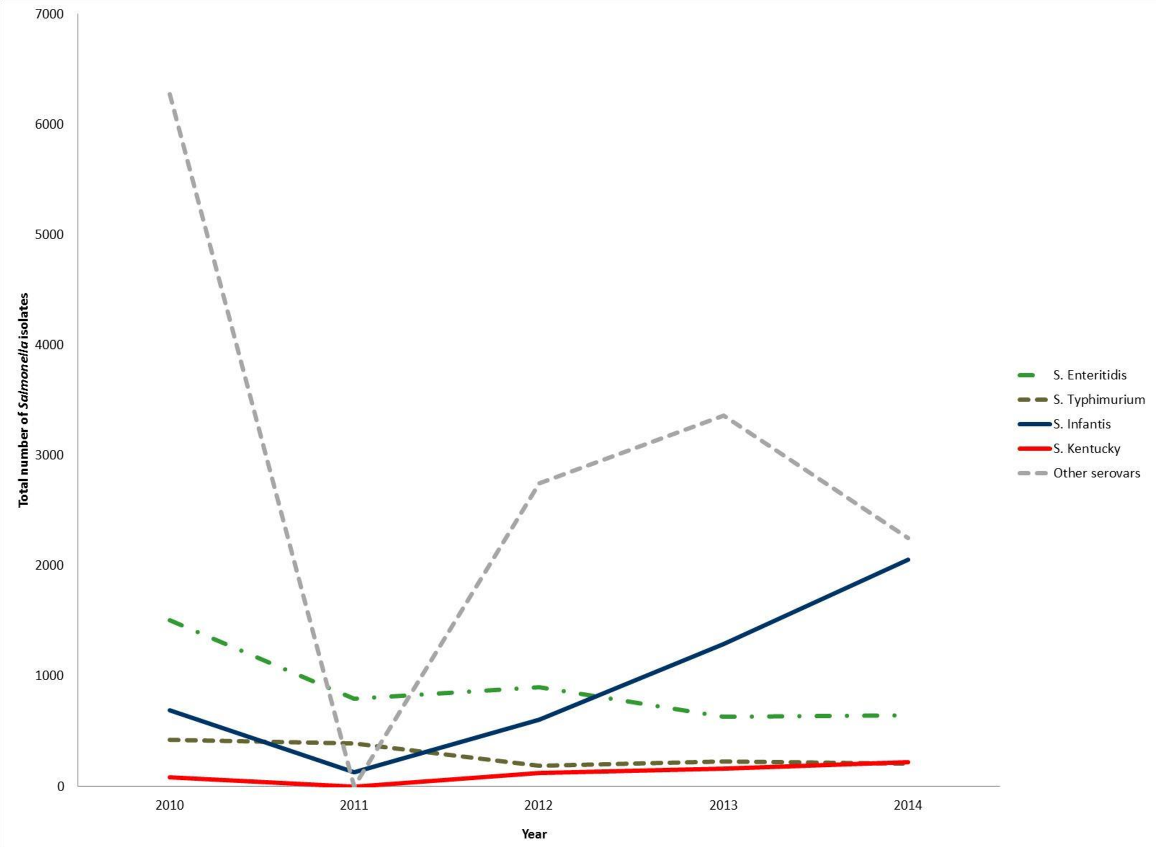


Figure 13: *Salmonella* trends from *Gallus gallus* between 2010 and 2014.

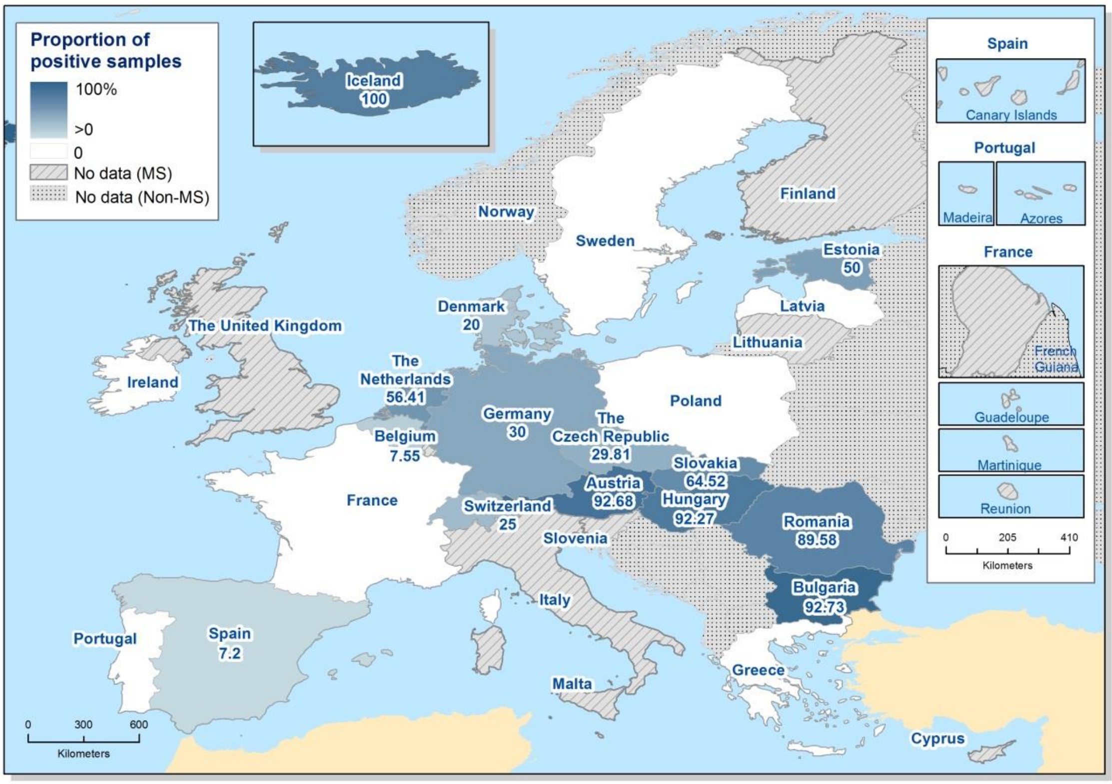
Broiler meat

Table 2014 SERBROMEAT shows the distribution of the 10 most common *Salmonella* serovars in broiler meat. In 2014, 19 MS reported a total of 1,626 *Salmonella* isolates from broiler meat. This was an increase of 22.3% from 2013, when 1,329 isolates were reported, but less than in 2010, when 2,189 isolates were reported.

Poland (478 isolates), the Czech Republic (312 isolates) and Hungary (207 isolates) together accounted for 61.3% of all reported isolates.

S. Infantis was the most common serovar, accounting for 582 isolates (35.8%). This is in line with serovar reports from *G. gallus*, where *S.* Infantis also represents the most commonly reported serovar.

Figure 14 shows *S.* Infantis as a proportion of all isolates from broiler meat, and again, clustering in Central and Eastern European MS can be seen, with Austria, Hungary, Bulgaria and Romania all reporting around 90% of broiler meat isolates as *S.* Infantis.



Number of units with serotyped *Salmonella* isolates; Austria (41), Belgium (53), Bulgaria (55), Czech Republic (312), Denmark (5), Estonia (2), Germany (20), Hungary (207), Iceland (1), Netherlands (39), Romania (96), Slovakia (124), Spain (125) and Switzerland (4).

Figure 14: Distribution of *S.* Infantis reported from broiler meat, 2014

The number of *S.* Infantis reports fluctuates over the years, from 1,294 isolates in 2010 to 217 in 2012 and 582 in 2014, and it is not clear whether or not these figures may be biased by differences in surveillance activities, by the proportion of fully serotyped isolates in individual MS and/or by differences in the reporting of non-regulated serovars. For example, in 2012, Hungary did not report *S.* Infantis from broiler meat. This led to a significant reduction in the overall number of isolates in the EU in that particular year.

Of the three MS reporting the highest numbers of *S.* Infantis isolates from broiler meat (Hungary 191; Czech Republic 93; Romania 86), only Romania and the Czech Republic also reported significant numbers of *S.* Infantis from chickens.

In contrast, Italy, reporting the highest number of *S.* Infantis isolates from chickens (757), did not report any *Salmonella* from broiler meat at all.

The steady increase in the number of isolates of *S.* Enteritidis from broiler meat over the past 5 years (from 106 in 2010 to 551 in 2014), in spite of harmonised control programmes and apparent progress at broiler flock level, has resulted in *S.* Enteritidis becoming the second most commonly reported serovar from broiler meat in 2014 (33.9%). However, it should be noted that the majority of *S.* Enteritidis isolates (412; 74.8%) originated from Poland and another 70 (12.7%) originated from the Czech Republic, meaning that the number of isolates reported from all other MS together was only 69.

A total of 50 *S.* Typhimurium isolates were reported from broiler meat in nine MS, with Poland (19 isolates), Spain (12 isolates) and France (10 isolates) reporting the majority of these; Poland was the only MS that also reported monophasic strains of *S.* Typhimurium (47).

Some other serovars were reported in mainly one or two countries only, such as *S.* Indiana in the Czech Republic, *S.* Virchow in the Czech Republic and in Spain, *S.* Paratyphi B (variant Java) in Belgium, *S.* Kentucky in Spain and *S.* Ohio in the Czech Republic.

Reporting of these non-regulated serovars seems to be inconsistent over the years, with some countries reporting in one year but not in others. This may be due to changes in serotyping priorities, changes in reporting serovars other than the regulated ones or the fact that only the 10 most common serovars are reported by name each year by EFSA. In some cases, individual MS may run intensive monitoring programmes in one year, leading to a higher number of isolates, but may not do so in the following year.

The trends in commonly reported *Salmonella* serovars from broiler meat between 2010 and 2014 are displayed in Figure 15.

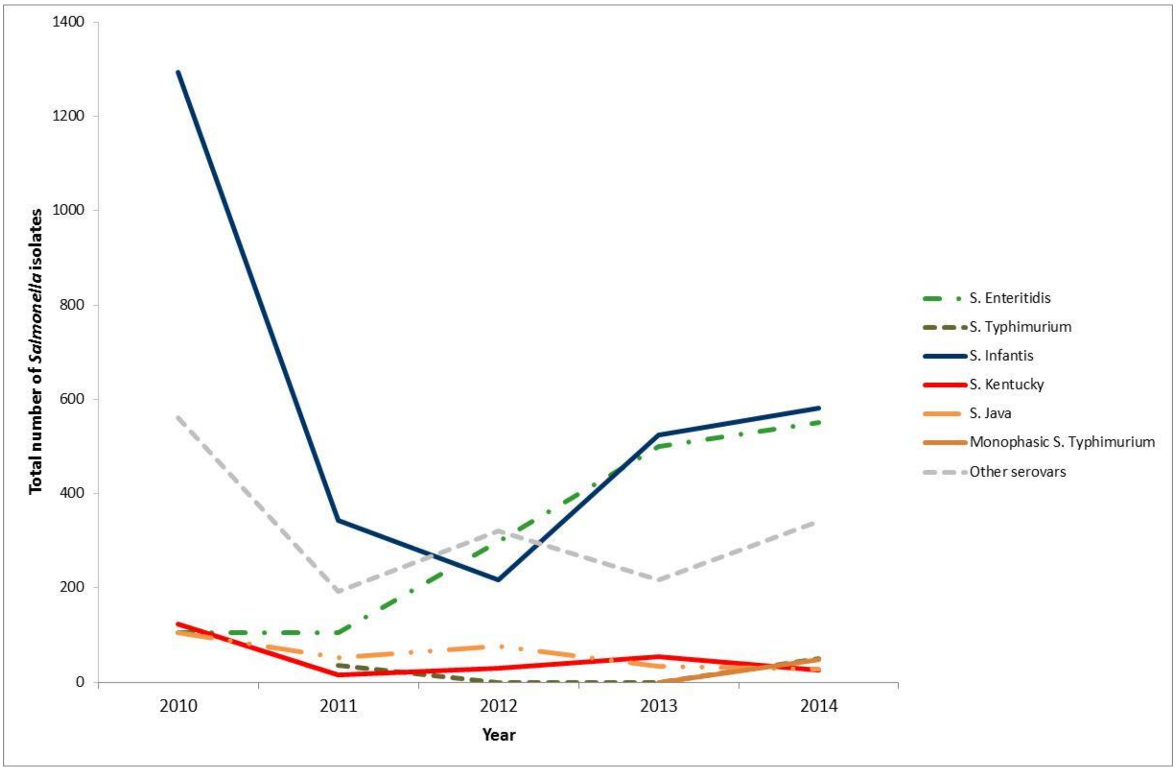


Figure 15: *Salmonella* trends in broiler meat between 2010 and 2014

Turkeys

Table 2014_SERTURK shows the distribution of the 10 most common *Salmonella* serovars in turkeys in 2014. Twelve MS provided information on *Salmonella* serovars from turkeys, with a total of 374 isolates being reported.

For the first time in 2014, *S.* Infantis was the most common serovar, with 83 isolates, or 22.2% of all turkey isolates. However, it should be noted that 82 of the 83 *S.* Infantis isolates were reported from one MS (Italy) only. *S.* Infantis reports have increased over the past 5 years, but differences in serotyping priorities and differences in reporting between MS might result in an underestimation of *S.* Infantis presence in some countries.

S. Infantis was also reported in high numbers from *G. gallus* in Italy, and a link and/or common source of the infection in chickens and turkeys in Italy is a possibility (Dionisi et al., 2011).

In general, serovars reported at high numbers from turkeys seem to cluster in usually one country only, such as *S.* Hadar, the second most commonly reported serovar in 2014, which was only found in Italy (53 isolates). Other examples include *S.* Derby, *S.* Kedougou and *S.* Kottbus (all United Kingdom), *S.* Newport (Italy, United Kingdom and Czech Republic) and *S.* Senftenberg (United Kingdom and Austria).

S. Newport, which is regularly reported in small numbers from different MS, is a diverse group of strains, some of which are of concern with regard to their antimicrobial resistance pattern. It is not known whether any of the *S.* Newport strains found in Europe belong to the multidrug resistant clones circulating in the USA and Canada (Varma et al., 2006).

The regulated serovars were found to be more widespread across different MS although at lower numbers, with 24 isolates of *S.* Typhimurium from six MS, 15 isolates of monophasic *S.* Typhimurium from three MS and 14 isolates of *S.* Enteritidis from four MS.

S. Saintpaul, which was reported in high numbers from Italy in previous years and which made up a significant proportion of all *Salmonella* isolates previously (30.9% in 2013; 21.1% in 2012) was not reported by Italy in 2014.

The trends in commonly reported *Salmonella* serovars in turkeys between 2010 and 2014 are displayed in Figure 16. The number of *S.* Typhimurium isolates reported from turkeys has fallen significantly since 2010, when the National Control Programmes were introduced across the EU, with 97 and 105 isolates recorded in 2010 and 2011 respectively, compared to 24 isolates in 2014.

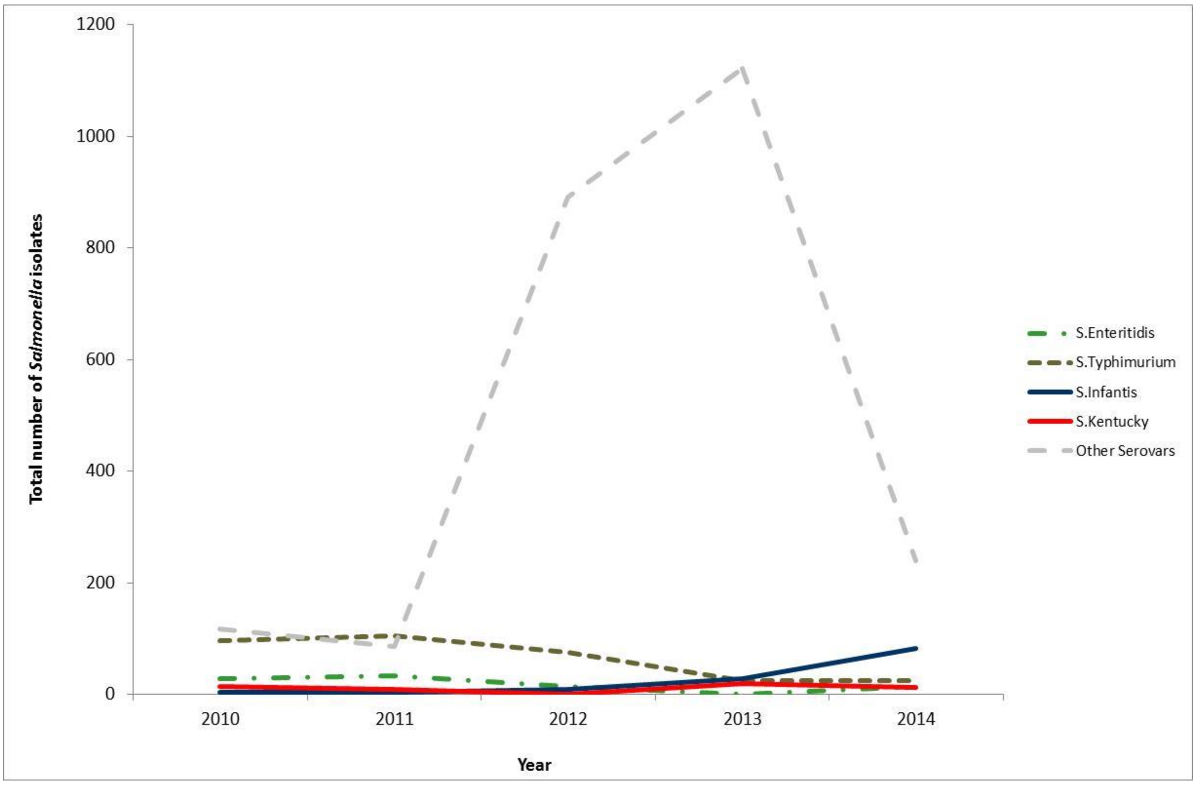


Figure 16: *Salmonella* trends in turkeys between 2010 and 2014

Turkey meat

Table 2014 SERTURKMEAT shows the distribution of the 10 most common *Salmonella* serovars in turkey meat in 2014. Eleven MS reported *Salmonella* isolates from turkey meat in 2014, and a total of 162 isolates were reported. Hungary (48 isolates), Italy (45 isolates) and the Czech Republic (28 isolates) accounted together for 74.7% of all isolates. The low number of isolates and the low number of reporting countries make it difficult to assess the true incidence of *Salmonella* found in turkey meat across the EU. The most common serovars were *S.* Stanley and *S.* Infantis with 30 isolates each, followed by *S.* Typhimurium with 19 isolates.

Interestingly, *S.* Stanley was not among the top 10 serovars isolated from turkey flocks in 2014, raising the question of whether it may have been undetected or reported under 'other serovars' in some MS. The occurence of *S.* Stanley isolates found in the turkey production chain in previous years (since 2011) led to high numbers of human cases in the affected countries. It is not clear to what extent *S.* Stanley is still present in turkey flocks in those MS and if present, why it may remain largely undetected (ECDC and EFSA, 2014).

Serovars in pig production

Pigs

Table 2014_SERPIGS shows the distribution of the 10 most common serovars in pigs in 2014. Reports on *Salmonella* serovars in pigs tend to be less comprehensive compared to poultry, as there are no statutory requirements to regularly test pigs in primary production for the presence of *Salmonella.* Serological monitoring of pigs, which gives no serovar information, is widely used for surveillance. Therefore, only 10 MS submitted reports on *Salmonella* in pigs for 2014, which was less than in previous years (16 in 2013, 16 in 2012, 16 in 2011, 10 in 2010). Revised carcase swab testing according to new process hygiene criteria (PHC) requirements was introduced in 2014, but there has been no requirement to serotype the isolates obtained. This situation is likely to change in future as representative isolates from approved National Control Programmes, which may include PHC testing, are now required to be tested for antimicrobial resistance and serotyped, which should result in greater availability of harmonised *Salmonella* serotype data from pig populations in future years.[25]

Since 2012, more than half of the reported isolates each year have originated from Germany, which leads to a substantial bias towards one MS. For the above mentioned reasons, it is difficult to analyse trends of serovars over time.

In total, 2,037 *Salmonella* isolates were reported in 2014, of which 54.7% were *S.* Typhimurium. *S.* Typhimurium has been the predominant serotype over the past 5 years, accounting for as much as 72.8% of isolates in 2012. *S.* Typhimurium was found in 9 out of the 10 reporting MS in 2014, and was also common in the baseline surveys of slaughter pigs and breeding pigs in 2006/7 and 2009 respectively, so it can therefore be assumed that it is widely present across the EU (EFSA, 2008, 2009c).

S. Derby was the second most common serovar, accounting for 357 isolates (17.5% of isolates), and was found in 7 out of the 10 reporting MS.

The proportion of isolates belonging to the group of monophasic strains of *S.* Typhimurium has not changed substantially over the past 5 years and ranged between 8.4% of isolates in 2014 and 14% in 2013. In Poland, Malta, the United Kingdom and Italy, monophasic strains of *S.* Typhimurium (*S.* 1,4,5,12:i:- and *S.* 1,4,12:i:-) accounted for a large proportion of pig isolates.

S. Choleraesuis, which had been reported mainly from Estonia and Romania in previous years, did not make it into the top 10 serovars in 2014. However, it has to be noted that no reports of *Salmonella* in pigs were received from Romania in 2014.

S. Rissen, which is one of the main serovars in pork production and human cases in some parts of the world, has only been seen at low numbers in the EU for at least the past 5 years, and the number of reports seems to be fairly stable (31 reports in 2014). The proportion of the Far Eastern strains of epidemic multi-drug resistant *S.* Rissen isolates present in European pigs is not known, but these appear to occur in some countries (Antunes et al., 2011).

Pig meat

Table 2014_SERPIGMEAT shows the distribution of the 10 most common serovars in pig meat in 2014. Seventeen MS submitted reports on *Salmonella* from pig meat, but the overall number of reports is significantly lower compared to the number of isolates obtained from pigs. This may be due to the fact that it is not compulsory to serotype isolates that are obtained from carcase swabs taken to fulfil the requirements of the EU Process Hygiene and Microbiological Criteria testing programmes (Gradassi et al., 2015).

A total of 533 *Salmonella* isolates were reported from 17 MS, and the number of isolates per country ranged between 2 and 92. Denmark reported the highest number of isolates (92), followed by

[25] Commission Implementation Decision 2013/652/EU of 12 November 2013 on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria. OJ L 303, 14.11.2003, pp. 26–39.

Belgium (62), Romania (59) and Germany (57). Across the EU, *S.* Typhimurium was the most commonly reported serovar (27.8%), followed by *S.* Derby (24.4%) and monophasic strains of *S.* Typhimurium (18%).

Although *S.* Typhimurium was the most commonly isolated serovar from both pigs and pig meat, the proportion of *S.* Typhimurium in pigs was significantly higher (54.7%) compared to pig meat (27.8%). This might be due to the fact that Germany, which isolated the highest number of *S.* Typhimurium from pigs (851 isolates out of 1025 *S.* Typhimurium isolates across the EU), only submitted a relatively small number of *S.* Typhimurium isolates from pig meat (29). The United Kingdom, which submitted the second highest number of *S.* Typhimurium isolates from pigs (84) did not submit data on *Salmonella* from pig meat.

There is no clear trend regarding the reports of *Salmonella* serovars from pig meat over the past 5 years. While the overall number of reports in 2010 was much higher than in the subsequent years, the proportion of the individual serovars does not change much over the years.

Serovars in cattle production

Cattle

Table 2014_SERBOV shows the distribution of the ten most common serovars in cattle in 2014. Eight MS submitted *Salmonella* data from cattle, and even though the number of submitting MS was relatively low compared to other animal species, data on a total of 3,243 isolates were submitted.

The vast majority of those isolates came from Germany (1,866), which therefore reported 57.5% of all cattle isolates. The United Kingdom reported 554 isolates, followed by the Netherlands (508 isolates) and Ireland (264 isolates).

The most common serovar was *S.* Typhimurium (1,516 isolates; 46.8%), which was the predominant serovar isolated in Germany and the Netherlands. Ireland and the United Kingdom, however, reported *S.* Typhimurium in much lower proportions (11% and 5.2% respectively). These two MS isolated mainly *S.* Dublin (87.1% and 71.3% of isolates respectively), which was the second most common serovar across the EU, with a total of 1,016 isolates reported (31.3% of isolates). The third most common serovar, *S.* Enteritidis, accounted for 4.6% of isolates only. However, it is worth mentioning that 145 *S.* Enteritidis reports (98% of all *S.* Enteritidis isolates) were from Germany.

The trends of *Salmonella* serovars from cattle over the past 5 years are difficult to interpret, as the total number of submitted reports varies greatly between years and ranges from 1,150 in 2011 to 4,859 in 2013. The reasons for the fluctuations are not known, but some of the variation might be explained by the fact that the data submitting system used by MS and EFSA was not the same for each year. Also, some MS may have done surveys during one year which were not continued in the following years. Some MS did not submit any cattle data in certain years, which may have an impact on the overall number of serovars as well as the proportions of serovars reported.

Bovine meat

Table 2014_SERBOVMEAT shows the distribution of the 10 most common serovars in bovine meat in 2014. Although 11 MS submitted data relating to *Salmonella* from bovine meat, the total number of isolates was only 73, of which 28 were reported from the Czech Republic and 15 were reported from Spain. These low numbers make it difficult to assess the data in depth and compare them to previous years. *S.* Typhimurium and *S.* Derby have been the most prevalent serovars found in bovine meat over the past 5 years, but *S.* Enteritidis has been more prevalent in 2013 and 2014 compared to previous years. In 2014, 24.7% of isolates from bovine meat were *S.* Derby, 20.6% were *S.* Typhimurium and 17.8% were *S.* Enteritidis.

Salmonella in compound feed for animals

In the absence of microbiological criteria for *Salmonella* in animal feed, testing of feedstuffs for the presence of *Salmonella* is not routinely reported across at the EU. Sampling and testing of feed is also not harmonised across MS, which makes it difficult to assess the distribution of feed contamination. This, together with the fact that feed is a difficult matrix to effectively sample for *Salmonella* means that only a very small number of isolates from feed are reported each year, and feed contamination is likely to be substantially underestimated (Jones and Richardson, 2004).

Compound feed for Gallus gallus

Eight MS provided data on *Salmonella* in compound feed for chickens, with a total of 29 isolates reported. Ten of those isolates were *S.* Enteritidis, seven were *S.* Senftenberg, five were *S.* Livingstone, two were *S.* Typhimurium and one isolate each was reported from other serovars. The low number of reported isolates makes it impossible to further interpret these data, but the occurrence of regulated serovars in feed is a cause for concern in terms of the importance of feed as a primary source of infection for food animals, particularly poultry (Li et al., 2012). Table 2014_SERGALFEED shows the distribution of the 10 most common serovars in compound feed for chickens in 2014.

Compound feed for turkeys

No reports on *Salmonella* from compound feed for turkeys were received between 2010 and 2014.

Compound feed for pigs

Seven *Salmonella* isolates from compound feed for pigs were reported in 2014, with reports from Belgium, Bulgaria, Hungary and Spain. Reported serovars include *S.* Give, *S.* Mbandaka, *S.* Agona, *S.* Anatum, *S.* Typhimurium and *S.* Cerro. Table 2014_SERPIGSFEED shows the distribution of the 10 most common serovars in compound feed for pigs in 2014.

Compound feed for cattle

Only two *Salmonella* isolates from compound feed for cattle were reported in 2014 – one *S.* Typhimurium from Spain and one *S.* Paratyphi B from Bulgaria. Table 2014_SERBOVFEED shows the distribution of the 10 most common serovars in compound feed for cattle in 2014.

3.1.3. Discussion

From 2008 to 2014, there has been a statistically significant decreasing trend in salmonellosis cases in the EU/EEA. Food-borne outbreaks of salmonellosis reported in 2014 continued to decrease. Nonetheless, salmonellosis remains the second most common zoonosis in humans in the EU with 88,715 confirmed cases and 1,050 food-borne outbreaks reported in 2014. The increase in the EU notification rate was partly attributable to the inclusion of Croatia in notification rate calculations for the first time in 2014 and particularly to the exclusion of Italy due to incomplete reporting. The EU reported case fatality due to non-typhoidal salmonellosis remained stable in 2014.

The salmonellosis notification rates for human infections vary between MS, reflecting differences in, for example, disease prevalence in the production animal population, food and animal trade between MS, the proportion of travel-associated cases and the quality and coverage of the surveillance systems. One example is that countries reporting the lowest notification rate for salmonellosis had the highest proportions of hospitalisation, suggesting that the surveillance systems in these countries are focusing on the most severe cases.

The reporting of human *S.* Enteritidis cases increased, whereas *S.* Typhimurium and its variants decreased in 2014. Together, these two serovars accounted for 70% of human cases with a known serovar making them the most common serovars as in previous years. The increase in *S.* Enteritidis was mainly attributed to one MS, the Czech Republic, and was at least partly explained by the increase number of outbreaks. The increase in several other serovars was also driven by outbreaks in EU. The largest increase in all serovars was observed for *S.* Chester which caused an outbreak linked to travel to Morocco in several MS in autumn 2014. The increase of cases in serovar *S.* Muenchen was attributed to an outbreak in Germany, comprising more than half (53%) of all cases of this serovar reported in 2014.

An outbreak of *S.* Stanley, which started in 2011 and peaked in 2012, affected several MS and was linked to the turkey production chain. The number of outbreaks declined in 2013 and 2014. Still, *S.* Stanley outbreaks with a molecular pattern indistinguishable from the 2011–2012 outbreak strain were still identified by some MS in 2014, indicating that the outbreak strain was still circulating in the European food market and at the primary production level (ECDC and EFSA, 2014). The number of outbreak strain cases increased in 2015 in Austria and five other MS also reported the same strain (ECDC, 2015). This highlights the long-lasting public health impact that substantial contamination by any *Salmonella* serovar at the farm level can have in the EU.

As in previous years, *Salmonella* was most frequently detected in poultry meat, less often in pig or bovine meat, and rarely in table eggs, products of vegetable origin and RTE broiler meat and pig meat. Still, because RTE food products are intended for consumption without, or in the case of eggs, often with only marginal heat treatment, the fact that *Salmonella* was detected in these foodstuffs, albeit rarely, helps to explain why *Salmonella* was the most frequent bacterial cause of food-borne outbreaks in 2014. The most frequently identified food vehicle, associated with 44.0% of the reported *Salmonella* strong-evidence outbreaks was 'eggs and egg products' as in previous years. The fact that eggs and egg products were still the most important source of food-borne *Salmonella* outbreaks in 2014 might be explained by the fact that, as mentioned in the EFSA BIOHAZ Panel opinion (2014), very large numbers of eggs are eaten and eggs are very important and complete foods not only for their nutritional aspects, but also for their functional properties, i.e. the coagulant capacity of proteins, the foaming capacity of albumen proteins, the emulsifying capacity of the yolk, etc. Moreover, these properties are used in different ways to produce and enrich many types of foods (e.g. bakery products including pastries, meat pies, sauces and dressings, sweets and pasta) and in several (homemade) dishes (e.g. mayonnaise, custard and ice cream). In such products eggs are often used raw or only lightly heat-treated. *S.* Enteritidis is considered the only pathogen currently posing a major risk of egg-borne diseases in the EU. The use of eggs and egg products is very diverse and the risk derived from egg-borne hazards such as *S.* Enteritidis is affected by the storage conditions of the eggs, such as temperature and time; however, the pooling of eggs is also important in household, food service and institutional settings. On the other hand, other foods such as broiler meat, that might also be a source of *S.* Enteritidis, are normally consumed cooked, mitigating the risk of human infection.

Data clearly showed that results at the EU level are affected by surveillance programmes in place in individual MS. The interpretation of the data and the results should take account of the variation in number of units tested between years, as well as the weight each individual MS represents in the estimated characteristics across all years, and the fact that it is not the same countries reporting in all years. As regards fresh poultry meat, there has been an overall decrease in recent years in the proportion of non-compliant samples or bacthes at EU-level as regards the *Salmonella* food safety criterion for *S.* Enteritidis and *S.* Typhimurium (including monophasic *S.* Typhimurium strains with the antigenic formula 1,4,[5],12:i:-). On the other hand, at the EU level, there seems to be no obvious trend in the proportions of units (single samples or batches) of minced meat and meat preparations from poultry to be cooked before consumption, or meat products from poultry intended to be eaten cooked that are not compliant with the *Salmonella* food safety criterion. Also, in these product categories the proportions of non-compliant units are much higher compare to other food categories. So, while it may be argued that the setting of targets for specific *Salmonella* serovars in primary production has an overall effect on the proportion of non-compliant units in fresh poultry meat at the EU level, such positive trends are not apparent in data from the *Salmonella* food safety criterion later on in the food chain when poultry meat is further processed. No clear EU trends were observed in units (single samples or batches) of other food categories that do not comply with the EU *Salmonella* food safety criteria. It should be mentioned that, although the proportion of positive samples generally appears to be low, *Salmonella* in RTE products represent a definite hazard to consumers.

In 2014, the EU level prevalence of *Salmonella* target serovar-positive poultry flocks was very low (< 1%), for breeding flocks of *G. gallus*, for laying hen flocks, broiler flocks, as well as for flocks of breeding and of fattening turkeys. Since the implementation of National Control Programmes, the declining trend in the EU prevalence of *Salmonella* target serovar-positive poultry flocks continued in 2014 for all groups of animals during their production period, except for breeding flocks of *G. gallus* for which the prevalence for the five target serovars has remained around 0.6%, since 2010. Most MS met the reduction targets set for poultry species.

The overall trends of reported *Salmonella* serovars in chickens indicate a significant ongoing reduction in infection of flocks, and MS only reported around half as many isolates in 2014 as in 2010. The most significant changes seen were the reduction in *S.* Enteritidis and *S.* Typhimurium, which are likely to be the result of improved control measures following the introduction of the National Control

Programmes. However, the steady increase in *S.* Infantis reports over the past few years is a matter of concern. A similar situation can be seen in the turkey sector, where *S.* Enteritidis and *S.* Typhimurium reports have been declining, but *S.* Infantis reports are increasing. In pigs, an overall increase in the number of *Salmonella* reports can be seen over the past 4 years despite the lack of a harmonised monitoring programme in primary production. This rise mainly involves *S.* Typhimurium, including monophasic strains, which have also been prominent in human cases. Overall *Salmonella* trends in cattle are difficult to interpret, as the reporting of data appears to be incomplete in some years, but there is no indication that the prevalence of the predominant serovars *S.* Dublin and *S.* Typhimurium is declining. The occurrence of regulated serovars in feed is a cause for concern in terms of the importance of feed as a primary source of infection for food animals, particularly poultry, and the lack of sensitivity of feed monitoring programmes in most MS.

3.2. *Campylobacter*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans, food, animals and food-borne outbreaks. It also includes hyperlinks to *Campylobacter* summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and listed by subject.

3.2.1. Campylobacteriosis in humans

Campylobacter has been the most commonly reported gastrointestinal bacterial pathogen in humans in the EU since 2005. In 2014, campylobacteriosis data were reported by 26 MS. The number of reported confirmed cases of human campylobacteriosis in the EU in 2014 was 236,851 which was an increase of 22,067 cases compared with 2013 (Table 10). The EU notification rate was 71.0 per 100,000 population in 2014, which was an increase by 9.6% compared with 2013 (64.8 per 100,000 population). Eleven countries (Austria, France, Hungary, Ireland, Italy, Latvia, Luxembourg, Romania, Poland, Slovakia and Spain) reported improvements in their surveillance system and/or diagnostics for campylobacteriosis; increasing the sensitivity and coverage of surveillance systems, improving data quality, developing electronic/online reporting and more accurate testing of samples e.g. by using PCR. An increase by 23.9% in the notification rate was seen among these 11 countries compared with an average increase of 7.8% in the other MS between 2013 and 2014. This represented 39.5% (8,723 cases) of the increased number of cases reported in 2014.

The highest country-specific notification rates were observed in the Czech Republic (197.4 cases per 100,000), Luxembourg (158.8), Slovakia (124.5) and the United Kingdom (103.9 cases per 100,000 population). The lowest rates were reported in Latvia, Romania, Poland and Bulgaria (≤ 2.0 per 100,000) in 2014.

In several MS, campylobacteriosis was mainly a domestically acquired infection with ≥ 90% domestic cases reported, for example in the Czech Republic, Estonia Germany, Hungary, Latvia, Malta, Poland and Slovakia. The highest proportions of travel-associated cases were reported in Finland and Sweden (≥ 50% of cases).

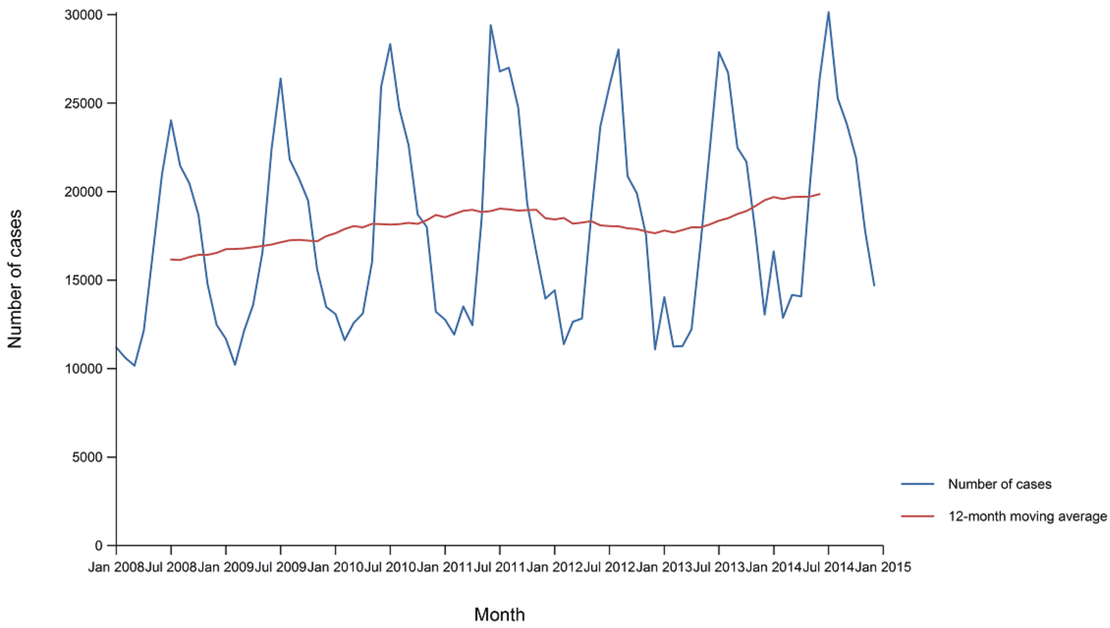
Table 10: Reported human cases of campylobacteriosis and notification rates per 100,000 in the EU/EEA, by country and year, 2010–2014

Country	2014					2013		2012		2011		2010	
	National coverage[a]	Data format[a]	Total cases	Confirmed cases & rates		Confirmed cases &rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases &rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	6,514	6,514	76.6	5,731	67.8	4,710	56.0	5,129	61.0	4,404	52.7
Belgium[b]	N	C	8,098	8,098	–	8,148	–	6,607	–	7,716	–	6,047	–
Bulgaria	Y	A	144	144	2.0	124	1.7	97	1.3	73	1.0	6	0.1
Croatia	Y	A	1,647	1,647	38.8	–	–	–	–	–	–	–	–
Cyprus	Y	C	40	40	4.7	56	6.5	68	7.9	62	7.4	55	6.7
Czech Republic	Y	C	20,902	20,750	197.4	18,267	173.7	18,287	174.1	18,743	178.7	21,075	201.5
Denmark	Y	C	3,773	3,773	67.0	3,772	67.3	3,720	66.7	4,060	73.0	4,037	72.9
Estonia	Y	C	308	285	21.7	382	28.9	268	20.2	214	16.1	197	14.8
Finland	Y	C	4,889	4,889	89.7	4,066	74.9	4,251	78.7	4,267	79.4	3,944	73.7

Country	2014					2013		2012		2011		2010	
	National coverage[(a)]	Data format[(a)]	Total cases	Confirmed cases & rates		Confirmed cases &rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases &rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
France[(c)]	N	C	5,958	5,958	45.2	5,198	39.6	5,079	38.9	5,538	42.6	4,324	33.5
Germany	Y	C	70,972	70,530	87.3	63,271	77.3	62,504	76.5	70,812	86.8	65,108	79.6
Greece[(d)]	–	–	–	–	–	–	–	–	–	–	–	–	–
Hungary	Y	C	8,490	8,444	85.5	7,247	73.5	6,367	64.4	6,121	62.4	7,180	72.9
Ireland	Y	C	2,595	2,593	56.3	2,288	49.8	2,391	52.2	2,433	53.2	1,660	36.5
Italy[(b)]	N	C	1,252	1,252	–	1,178	–	774	–	468	–	457	–
Latvia	Y	C	38	37	1.8	9	0.4	8	0.4	7	0.3	1	0.0
Lithuania	Y	C	1,184	1,184	40.2	1,139	38.3	917	30.5	1,124	36.8	1,095	34.9
Luxembourg	Y	C	873	873	158.8	675	125.7	581	110.7	704	137.5	600	119.5
Malta	Y	C	288	288	67.7	246	58.4	220	52.7	220	53.0	204	49.3
Netherlands[(e)]	N	C	4,159	4,159	47.5	3,702	42.4	4,248	48.8	4,408	50.9	4,322	50.1
Poland	Y	C	652	650	1.7	552	1.4	431	1.1	354	0.9	367	1.0
Portugal[(d)]	–	–	–	–	–	–	–	–	–	–	–	–	–
Romania	Y	C	256	256	1.3	218	1.1	92	0.5	149	0.7	175	0.9
Slovakia	Y	C	6,867	6,744	124.5	5,845	108.0	5,704	105.5	4,565	84.7	4,476	83.0
Slovenia	Y	C	1,184	1,184	57.4	1,027	49.9	983	47.8	998	48.7	1,022	49.9
Spain[(f)]	N	C	11,481	11,481	82.3	7,064	50.4	5,548	47.4	5,469	46.9	6,340	54.6
Sweden	Y	C	8,288	8,288	85.9	8,114	84.9	7,901	83.3	8,214	87.2	8,001	85.7
United Kingdom	Y	C	66,790	66,790	103.9	66,465	104.0	72,560	114.3	72,150	114.5	70,298	112.5
EU Total	–	–	237,642	236,851	71.0	214,784	64.8	214,316	65.9	223,998	69.0	215,395	67.0
Iceland	Y	C	142	142	43.6	101	31.4	60	18.8	123	38.6	55	17.3
Norway	Y	C	3,386	3,386	66.3	3,291	65.2	2,933	58.8	3,005	61.1	2,682	55.2
Switzerland[(g)]	Y	C	7,565	7,565	92.9	7,481	93.1	8,432	106.0	7,963	101.2	6,611	84.9

(a): Y: yes; N: no; A: aggregated data; C: case-based data; –: no report.
(b): Sentinel surveillance; no information on estimated coverage thus notification rate cannot be estimated.
(c): Sentinel surveillance; notification rates calculated on estimated coverage of 20%.
(d): No surveillance system.
(e): Sentinel surveillance; notification rates calculated on estimated coverage of 52%.
(f): Sentinel surveillance; notification rates calculated on estimated coverage of 30% in 2013–2014 and 25% in 2009–2012.
(g): Switzerland provided data directly to EFSA. The human data for Switzerland also include the data from Liechtenstein.

There was a clear seasonal variation of confirmed campylobacteriosis cases reported in the EU/EEA in 2008–2014 with sharp peaks in the summer months. Small peaks were also observed in January from 2012 to 2014. Over the 7-year period from 2008 to 2014, there was a statistically significant increasing ($p < 0.05$) trend in campylobacteriosis in the EU/EEA (Figure 17). Compared to the previous year, there was an increase in the reported confirmed cases in 21 MS, Iceland and Norway in 2014. A statistically increasing ($p < 0.01$) trend was observed in 13 MS (Austria, Belgium, Estonia, France, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, Poland, Slovakia and Spain) in 2008–2014.



Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. Bulgaria, Croatia and Romania did not report data to the level of detail required for the analysis. Greece and Portugal do not have surveillance systems for this disease.

Figure 17: Trend in reported confirmed human cases of campylobacteriosis in the EU/EEA, by month of reporting, 2008–2014

Sixteen MS provided information on hospitalisation for some or all of their cases, which was three MS more than in 2013. As a result information on hospitalisation increased by 50%, but was still only available for 25.4% of all confirmed campylobacteriosis cases in 2014. The reason for this is that many MS have campylobacteriosis surveillance systems which are based on laboratory notifications where information on hospitalisation is usually not available. Of cases with known hospitalisation status, 30.4% were hospitalised. The highest hospitalisation rates (75.0–83.2% of cases) were reported in Cyprus, Lithuania, Poland, Latvia and Romania. Three of these countries also reported low notification rates for campylobacteriosis, which indicates that the surveillance systems in these countries primarily capture the more severe cases.

A decrease from 56 deaths attributed to campylobacteriosis in 2013 to 25 deaths in 2014 resulted in an EU case-fatality rate of 0.01%. This was the lowest rate observed over the last 5 years (average 2009–2013: 0.03%). Information of case-fatality was provided for 73.6% of all reported cases, which was an increase of 39.1% compared with 2013.

Campylobacter species information was provided for 52.6% of confirmed cases reported in the EU, Iceland and Norway, which was a 9.4% increase in reporting compared with 2013 (48.1%). Of these, 81.8% were reported to be *C. jejuni*, 7.13% *C. coli*, 0.13% *C. lari*, 0.09% *C. fetus* and 0.07% *C. upsaliensis*. 'Other' *Campylobacter* species accounted for 10.6% but the large majority of those cases were reported at the national level as '*C. jejuni*/*C. coli* / *C. lari* not differentiated'.

3.2.2. *Campylobacter* in food and animals

Comparability of data

It is important to note that results from different countries are not directly comparable owing to variations in the sampling and testing methods used. In addition, the proportion of positive samples observed could have been influenced by the sampling season because, in most countries, *Campylobacter* infections are known to be more prevalent in poultry during the summer than during the winter (EFSA, 2010).

Only results for the most important food products and animals that might serve as a source for human infection in the EU are presented.

Food

In 2014, 26 MS and three non-MS reported data on *Campylobacter* in food.

The number of samples tested within each food category ranged from one to several hundreds. Most of the MS reported data on food of animal origin, where the majority of tested units were from broiler meat.

Broiler meat and products thereof

Monitoring activities and control programmes for *Campylobacter* in fresh broiler meat are based on sampling at the slaughterhouse (caecum, neck skin, skin or meat samples), at processing or cutting plants and/or at retail, where meat samples are usually collected. Unfortunately, the quality of the data does not support trend analysis.

Broiler meat is considered to be the most important single source of human campylobacteriosis. In 2014, the overall occurrence of *Campylobacter* in fresh broiler meat, reported by 18 MS, sampled at slaughter, processing and retail was 38.4% of the 6,703 tested units (single or batch, aggregated data from all sampling stages) (Table 11). The proportion of positive samples reported in 2014 was comparable to that in 2013, where 31.4% of samples were found to be positive (n=8,022, 18 MS). The small increase is most likely a result of varying reporting from the MS. For example, in 2014 Cyprus reported an investigation with a very high proportion of positive samples, whereas for 2013 Belgium and Denmark submitted together more than 3,000 samples with a rather low proportion of *Campylobacter*-positive samples (17.1%)

The proportion of *Campylobacter*-positive samples of broiler meat varied greatly between reporting MS (Table 11). In 2014, *Campylobacter* was detected in 35.5% of single samples at retail; six of eleven MS reporting at retail level found ≥ 50.0% positive samples. At slaughterhouse level, 44.4% of the single samples tested positive for *Campylobacter*. Overall, only 9.9% of the tested single samples were *Campylobacter* positive; however, this result was heavily dependent on some large Polish investigations with few positive results (Table 11). Most MS report data at retail, but the largest volume of data is at slaughterhouse level. Spain was the only MS reporting data at all levels (slaughterhouse, processing plant and retail) and the proportion of *Campylobacter*-positive samples decreased between these stages.

In general, only a small number of samples of RTE broiler products are tested for the presence of *Campylobacter*. In 2014, four MS reported 196 single samples, of which 19.4% tested positive. No batches out of 13 tested positive (Table 2014_CAMPBROILPROD). The majority of the positive single samples originated from a Spanish investigation at processing. Of 17 investigations, only four comprised more than 20 sample units.

Table 11: *Campylobacter* in fresh broiler meat, 2014

Sampling stage	Country	Matrix	Description	Sample origin	Sampling unit	Sample weight	Tested	Positive	Percent positive
Retail	Austria	fresh	food sample, Surveillance	Austria	single	25 Gram	75	52	69.33
				European Union	single	25 Gram	23	12	52.17
				Unknown	single	25 Gram	5	3	60
	Czech Republic	fresh	food sample	Czech Republic	single	25 Gram	20	5	25
				European Union	single	25 Gram	1	1	100
				Unknown	single	25 Gram	4	0	0
	Finland	fresh	food sample - meat, Survey	Finland	batch	25 Gram	51	14	27.45
	Germany	fresh, with skin	food sample - meat, Monitoring	Germany	single	25 Gram	424	229	54.01
	Hungary	fresh, chilled	food sample - meat, Surveillance		single	25 Gram	240	54	22.5

Sampling stage	Country	Matrix	Description	Sample origin	Sampling unit	Sample weight	Tested	Positive	Percent positive
	Ireland	fresh	food sample - meat, Surveillance	Germany	single	25 Gram	1	0	0
				Ireland	single	25 Gram	1	0	0
	Netherlands	fresh	food sample	Netherlands	single	25 Gram	589	161	27.33
	Slovakia	fresh, frozen	food sample, Surveillance	European Union	single	25 Gram	9	0	0
	Slovenia	fresh, chilled	food sample, Monitoring		single	1 Gram	50	25	50
	Spain	fresh	food sample	Unknown	single	25 Gram	76	16	21.05
	Sweden	fresh	food sample, Surveillance		single	25 Gram	1	0	0
	Iceland	fresh, frozen	food sample, Surveillance	European Union	single	.	86	2	2.33
Slaughter batch							0	0	.
Batch							51	14	27.45
Single							1,519	558	36.73
Total Retail							1,570	572	36.43
Processing plant	Austria	fresh	food sample, Surveillance	Austria	single	25 Gram	12	5	41.67
	Hungary	fresh, chilled	food sample - meat, Surveillance		single	25 Gram	322	86	26.71
	Poland	fresh	food sample		single	25 Gram	334	2	0.6
			food sample - meat		single	25 Gram	12	0	0
						500 Gram	507	5	0.99
	Portugal	fresh	food sample - meat, Surveillance	Portugal	single	25 Gram	53	22	41.51
	Spain	fresh	food sample	Unknown	single	25 Gram	8	3	37.5
Slaughter batch							0	0	.
Batch							0	0	.
Single							1,248	123	9.86
Total Processing plant							1,248	123	9.86
Slaughterhouse	Austria	fresh	food sample, Surveillance	Austria	single	25 Gram	6	4	66.67
	Belgium	carcase	Surveillance		single	1 Gram	545	119	21.83
	Croatia	carcase	food sample - neck skin, Monitoring	Croatia	single	25 Gram	924	636	68.83
	Cyprus	carcase	animal sample - caecum	Cyprus	single	.	327	195	59.63
	Denmark	fresh, chilled	food sample - meat, Monitoring	Denmark	single	10 Gram	927	238	25.67
	Estonia	carcase	food sample - neck skin, Monitoring	Estonia	batch	25 Gram	12	0	0
	Poland	carcase	food sample - carcase swabs		single	25 Gram	503	253	50.3
			food sample - meat		single	25 Gram	7	0	0
	Spain	carcase	food sample	Unknown	single	25 Gram	131	52	39.69
	United Kingdom	carcase	food sample - neck skin, Survey		slaughter batch	.	497	380	76.46
Slaughter batch							497	380	76.46
Batch							12	0	0
Single							3,370	1,497	44.42
Total Slaughterhouse							3,879	1,877	48.39
Unspecified	Ireland	fresh	food sample - meat, Surveillance	Ireland	single	25 Gram	1	1	100
	Sweden	fresh	food sample, Surveillance		single	25 Gram	3	0	0
		fresh, frozen	food sample, Surveillance		single	25 Gram	2	1	50
Slaughter batch							0	0	.
Batch							0	0	.
Single							6	2	33.33
Total Unspecified							6	2	33.33
Slaughter batch							497	380	76.46
Batch							63	14	22.22
Single							6,143	2,180	35.49
Total (MS)							6,703	2,574	38.4

Other foods

Many other foods of animal origin were also analysed for the presence of *Campylobacter*. Ten MS reported data on fresh turkey meat (Table 2014_CAMPTURKMEAT) and 18.5% of the 829 tested units (single and batch) were found to be *Campylobacter*-positive (varying by country from 0% to 33.3%).

The proportion of *Campylobacter*-positive samples (single or batch) of fresh pig or fresh bovine meat was generally low; however, three MS (Austria, Spain, and Poland) reported high *Campylobacter* prevalence in fresh pig meat at slaughterhouse or retail (36.8–50.0%).

Four MS (Belgium, Germany, Slovakia and Ireland) investigated a total of 119 sample units of ready to eat pork products of which 114 samples were reported by Ireland. Three MS (Belgium, Germany and Ireland) reported a total of 40 sample units of bovine products. None of the tested pig or bovine meat products was positive (Tables 2014_CAMPBOVMEAT and 2014_CAMPPIGMEAT).

Campylobacter was detected in up to 16.7% of the tested units (single or batch) of raw cow's milk intended for direct human consumption or manufacture of raw or minimal heat-treated products. The proportion of *Campylobacter*-positive units of milk from other animals or of unspecified origin was very low (Table 2014_CAMPMILK).

Human *Campylobacter* cases rarely require hospitalisation, however one strong evidence outbreak relating to a farm in Germany where raw milk was the vehicle caused 28 cases of illness, who were all hospitalised.

Detailed information on the data reported and on the occurrence of *Campylobacter* in the different food categories have been included in specific tables referenced in the Appendix.

Animals

Twenty MS and three non-MS reported data on *Campylobacter* in animals, primarily in broiler flocks, but also in turkeys, pigs, cattle, goats, sheep, horses, cats, dogs and a range of wild animals.

Broilers

In 2014, *Campylobacter* was found in 30.7% of the 13,603 units tested in MS; 31.8% of the tested broiler slaughter batches, 30.3% of the tested flocks (Table 2014_CAMPBROILERS). This prevalence estimate is markedly higher than in 2013, when 19.9% of sample units were found to be positive, but the reporting MS differed compared to 2013. Fourteen MS reported data in 2014 compared to 15 MS in 2013, however only 10 MS reported during both years. Three of the four MS reporting only in 2014 contributed 1,322 samples and extremely high prevalence, which markedly impacted the overall prevalence.

The largest investigations were carried out in the Nordic countries. Samples obtained in Denmark, Finland and Sweden constituted 57.8% of the reported samples in the EU. Greece, Portugal and the United Kingdom reported investigations with very high proportions of positive samples (from 76.5% to 91.7%).

Other animals

Four MS and one non-MS reported data on *Campylobacter* in turkeys in 2014 (Table 2014_CAMPTURKEYS). The proportion of positive samples, reported by MS, was high to extremely high (45.4% to 92.6%).

Only three MS reported data for *Campylobacter* in pigs (animal and herd); one large Dutch investigation accounted for 80.1% of sample units. No *Campylobacter* positives were detected in 3,216 samples in the Netherlands, while Germany reported 7.7% positives for animal samples (n=675) and 23.1% positives for sampled herds (n=121). Four MS reported prevalence data for cattle ranging from 0% to 16.5% (animal and herd samples) (Table 2014_CAMPCATTLE).

Eight MS and two non-MS reported data on *Campylobacter* in cats and dogs; 69.8% of the samples were reported by Germany. Samples included both monitoring and clinical samples. The proportion of *Campylobacter*-positive samples varied greatly between MS from 0 to 100% (Table 2014_CAMPCATDOG). The overall prevalence in pet cats was 7.1% and it was 17.8% in pet dogs. All investigations including more than 25 samples detected *Campylobacter* in one or more of the samples. Germany reported species information for the investigation of 779 cats; and the primary species found were *C. upsaliensis* and *C. jejuni*. Species information for *Campylobacter* in dogs was provided by Germany and the United Kingdom, reporting the majority of isolates as *C. jejuni* and *C. upsaliensis* respectively.

A wide range of investigations of *Campylobacter* in other animals was reported by three MS (Germany, the Netherlands and Italy). Italian surveys of 23 different animal groups accounted for 50.0% of 3,614 samples. No positive samples were reported from solipeds (domestic horses), and the prevalence was low in sheep and goats.

Details on the data reported and on the occurrence of *Campylobacter* in the various animal species have been included in tables referenced in the Appendix.

3.2.3. Discussion

Campylobacteriosis has been the most commonly reported zoonosis in humans in the EU since 2005. The EU notification rate increased by 10% in 2014, compared with the previous year, and a statistically significant increasing trend was observed in the 7-year period 2008–2014. Most countries reported increasing numbers of cases in 2014, compared to the previous year, with almost half of the MS reporting statistically significant increasing trends. Part of the increase could be explained by improvements in surveillance systems and improved diagnostics for campylobacteriosis in several MS during recent years. Countries with reported improvements had a statistically significant increasing trend over the 7-year period from 2008 to 2014. Lower increases also seen in other MS could suggest a real increase in human campylobacteriosis cases rather than that the trend is purely a consequence of improved ascertainment and/or reporting for which such data were reported. Campylobacteriosis was predominantly a domestically-acquired infection and only two Nordic countries (Finland and Sweden) reported a higher proportion of travel-associated cases.

The case-fatality rate of campylobacteriosis decreased in 2014 compared to the period 2009–2013. The reason for this reduction is unknown. The proportion of hospitalised campylobacteriosis cases was larger than expected in view of the relatively mild or moderate symptoms in the majority of cases. An explanation for this could be that in some countries the surveillance is focused mainly on severe cases. In addition, the country with the most campylobacteriosis cases only reported hospitalisation status for a fraction of these cases, and the majority were hospitalised. This fraction most likely represents cases ascertained through by hospital reporting systems, 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.

Broiler meat is considered to be the main source of human campylobacteriosis. 35.1% of the samples of fresh broiler meat (single or batch) at every sampling stage were found to be *Campylobacter*-positive, which was comparable to that in 2013. While the variation between MS was large however, it should be noted that data are not comparable as some MS do not report an overall annual prevalence because they collect more samples during the high-prevalence summer period. Furthermore, the overall prevalence is not directly comparable between years, as not all MS report data every year and the number of samples reported by each MS varies, influencing the estimate differently. Only few MS reported *Campylobacter* data for other animals.

Campylobacter was detected in up to 16.7% of the tested units (single or batch) of raw cow's milk intended for direct human consumption or manufacture of raw or minorly heat-treated products.

The nature of the food and animal monitoring data collected does not allow generation of hypotheses explaining the increase observed in the human notification rate.

As in previous years, broiler meat was the most commonly identified source of *Campylobacter* outbreaks in the EU. Though, one outbreak, involving 28 people, caused by raw milk from a farm resulted in hospitalisation of all patients which is very rare for human campylobacteriosis.

In 2014, an EU project (CamCon) that aimed to improve the control of *Campylobacter* in primary poultry production in various parts of Europe and thereby enable the production of 'low-risk broilers' was finalised. The project ran under the seventh framework with a consortium consisting of partners from six MS (Denmark, the Netherlands, Poland, Portugal, Spain and the United Kingdom) and one non-MS (Norway) representing various parts of Europe. The project results showed that biosecurity initiatives helped reducing the *Campylobacter* prevalence in Nordic countries and as well in countries in southern Europe. The project provided an E-learning programme (currently available in English and Spanish) and a Best Practice Manual for poultry producers which are freely available online.[26] Very recently, the United Kingdom Food Standards Agency welcomed signs of progress with the reduction of *Campylobacter* on fresh shop-bought chickens.[27] The data showed 15% of chickens tested positive for the highest level of contamination (more than 1,000 colony-forming units per gram (CFU/g)), down from 22% in July to September 2014. In the United Kingdom, these most heavily contaminated birds are the focus of the current target agreed by industry, which is equivalent to no more than 7% of chickens at retail having the highest levels of contamination. Research has shown that reducing the proportion of birds in this category will have the biggest positive impact on public health.

The prevalence of *Campylobacter* in pet cats and dogs varied between MS, from 0 to 100%. Animal contact is considered to be a risk factor for human illness and pet animals could be a source of human infection. However, speciation tests suggest that a large fraction of the cats and dogs positive for *Campylobacter* are colonised by *Campylobacter* species that are not commonly associated with human illness.

3.3. *Listeria*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans, food and animals. It also includes hyperlinks to *Listeria* summary tables and figures that were not included in this section because they did not trigger any marked observations. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.3.1. Listeriosis in humans

In 2014, 27 MS reported 2,161 confirmed human cases of listeriosis (Table 12). The EU notification rate was 0.52 cases per 100,000 population which represents a 30 % increase compared with 2013 (0.40 cases per 100,000 population). The exclusion of one large country with a relatively low notification rate in previous years (Italy, provisional data reported for 2014) from the notification rate calculations explains 9.1% of the overall increase in the EU notification rate in 2014 (Table 12).

The highest notification rates were observed in Denmark, Sweden, Finland and Spain (1.64, 1.30, 1.19 and 1.15 cases per 100,000 population respectively). There were several small *Listeria* outbreaks and one large outbreak with 41 cases reported in Denmark in 2014. Sweden had two larger outbreaks in 2013 and 2014 involving 50 and 27 cases respectively.

The vast majority (> 98%) of listeriosis cases were reported to be domestically acquired.

Table 12: Reported human cases of listeriosis and notification rates per 100,000 in the EU/EEA, by country and year, 2010–2014

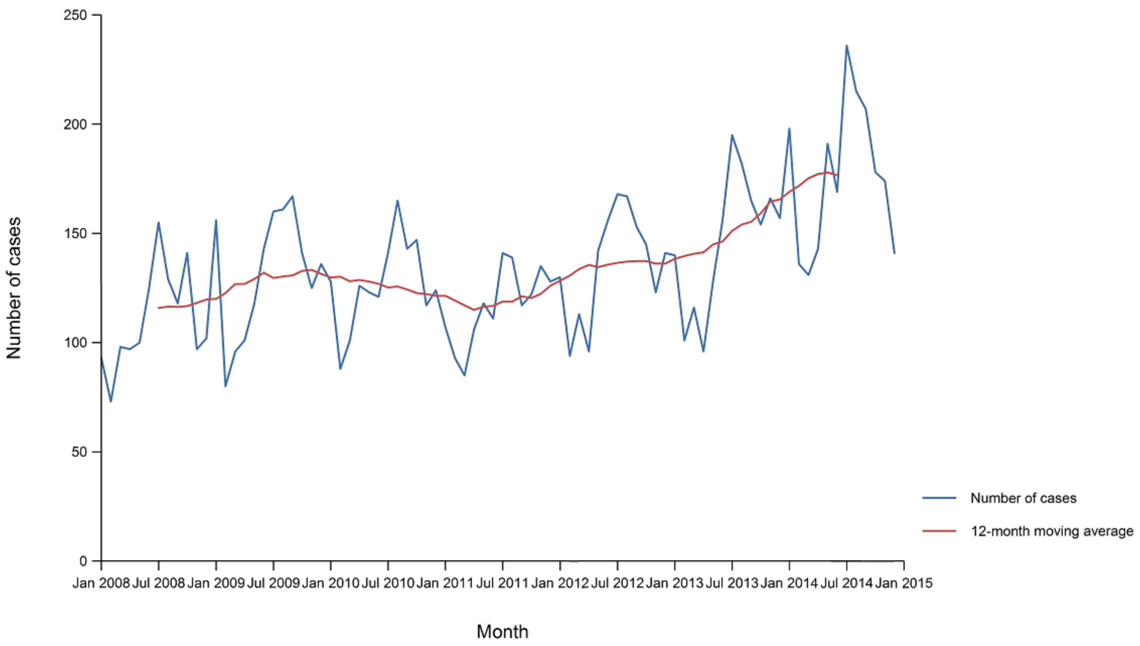
Country	2014					2013		2012		2011		2010	
	National coverage[(a)]	Data format[(a)]	Total cases	Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	49	49	0.58	36	0.43	36	0.43	26	0.31	34	0.41
Belgium	Y	C	84	84	0.75	66	0.59	83	0.75	70	–	40	0.37
Bulgaria	Y	A	10	10	0.14	3	0.04	10	0.14	4	0.05	4	0.05
Croatia	Y	A	5	4	0.09	0	0.00	0	0.00	–	–	–	–
Cyprus	Y	C	0	0	0.00	1	0.12	1	0.12	2	0.24	1	0.12
Czech Republic	Y	C	38	38	0.36	36	0.34	32	0.31	35	0.33	26	0.25
Denmark	Y	C	92	92	1.64	51	0.91	50	0.90	49	0.88	62	1.12
Estonia	Y	C	1	1	0.08	2	0.15	3	0.23	3	0.23	5	0.38
Finland	Y	C	65	65	1.19	61	1.12	61	1.13	43	0.80	71	1.33
France	Y	C	374	374	0.57	369	0.56	348	0.53	282	0.43	312	0.48
Germany	Y	C	609	597	0.74	463	0.57	414	0.51	331	0.41	377	0.46
Greece	Y	C	10	10	0.09	10	0.09	11	0.10	10	0.09	10	0.09
Hungary	Y	C	39	39	0.40	24	0.24	13	0.13	11	0.11	20	0.20
Ireland	Y	C	15	15	0.33	8	0.17	11	0.24	7	0.15	10	0.22

[26] Available online: http://www.camcon-eu.net
[27] https://www.food.gov.uk/news-updates/news/2015/14701/campylobacter-survey

Country	2014					2013		2012		2011		2010	
	National coverage[a]	Data format[a]	Total cases	Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Italy[b]	–	–	52	52	–	128	0.21	112	0.19	129	0.22	157	0.27
Latvia	Y	C	3	3	0.15	5	0.25	6	0.29	7	0.34	7	0.33
Lithuania	Y	C	7	7	0.24	6	0.20	8	0.27	6	0.20	5	0.16
Luxembourg	Y	C	5	5	0.91	2	0.37	2	0.38	2	0.39	0	0.00
Malta	Y	C	1	1	0.24	1	0.24	1	0.24	2	0.48	1	0.24
Netherlands	Y	C	90	90	0.54	72	0.43	73	0.44	87	0.52	72	0.43
Poland	Y	C	86	86	0.23	58	0.15	54	0.14	62	0.16	59	0.16
Portugal[c]	–	–	–	–	–	–	–	–	–	–	–	–	–
Romania	Y	C	5	5	0.03	9	0.05	11	0.06	1	0.01	6	0.03
Slovakia	Y	C	29	29	0.54	16	0.30	11	0.20	31	0.58	5	0.09
Slovenia	Y	C	18	18	0.87	16	0.78	7	0.34	5	0.24	11	0.54
Spain[d]	N	C	161	161	1.15	140	1.00	109	0.93	91	0.78	129	1.11
Sweden	Y	C	125	125	1.30	93	0.97	72	0.76	56	0.60	63	0.67
United Kingdom	Y	C	201	201	0.31	192	0.30	183	0.29	164	0.26	176	0.28
EU Total	–	–	2,174	2,161	0.52	1,868	0.40	1,722	0.38	1,516	0.34	1,663	0.37
Iceland	Y	C	4	4	1.23	1	0.31	4	1.25	2	0.63	1	0.32
Norway	Y	C	29	29	0.57	21	0.42	30	0.60	21	0.43	22	0.45
Switzerland[e]	Y	C	98	98	1.20	64	0.80	39	0.49	47	0.60	67	0.86

(a): Y: yes; N: no; A: aggregated data; C: case-based data; –: no report.
(b): Provisional data for 2014.
(c): No surveillance system.
(d): Sentinel system; notification rates calculated with an estimated population coverage of 30% in 2013–2014 and 25% in 2009–2012.
(e): Switzerland provided data directly to EFSA. The human data for Switzerland also include the ones from Liechtenstein.

A seasonal pattern was observed in the listeriosis cases reported in the EU/EEA in the period 2008-2014, with large summer peaks and smaller winter peaks (Figure 18). There was a significant increasing trend ($p < 0.01$) of listeriosis in the EU/EEA over this period. Six MS (France, Germany, Hungary, the Netherlands, Poland and Sweden) had significant increasing trends from 2008 to 2014. Twenty MS, Iceland and Norway reported increased notification rates in 2014 compared with 2013.



Source: Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. Bulgaria, Croatia, Italy and Luxembourg did not report data to the level of detail required for the analysis. Portugal has no surveillance system for listeriosis.

Figure 18: Trend in reported confirmed human cases of listeriosis in the EU/EEA, by month of reporting, 2008–2014

Sixteen MS provided information on hospitalisation for all or the majority of their cases (which represented 38.0% of all confirmed cases reported in the EU) in 2014. Croatia, the Czech Republic and Spain reported hospitalisation status for the first time in 2014. Among the cases with known hospitalisation, 98.9% were hospitalised. This is the highest proportion of hospitalised cases of all zoonoses under EU surveillance and reflects the susceptibility of the risk groups for listeriosis to develop severe disease, as well as the focus of the EU surveillance on severe, invasive listeriosis infections.

Seventeen MS reported 210 deaths due to listeriosis in 2014. This was the highest number of deaths observed between 2009 and 2014 (annual average: 163). The EU case fatality among the 1,401 confirmed cases with known outcome (64.8%) was 15.0%. France reported the highest number of fatal cases (51).

Listeriosis infections were most commonly reported in the elderly population (> 65 years old) who represented 62.3% of reported cases in 2014. Case fatality increased with age peaking at 17.8% (160 deaths) in the age group over 65 years.

3.3.2. *Listeria* in food and animals

Comparability of data

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. The total in the summary tables might, therefore, not be representative of the EU, because results are highly influenced by the reporting MS and the sample sizes in their investigations, both of which vary between years.

Only results for the most important food products and animals that might serve as a source for human infection in the EU are presented.

Food

In 2014, 26 MS and three non-MS reported data on investigations of *Listeria monocytogenes* in food. The number of samples tested within each food category ranged from one unit tested to several thousand. The data presented in this section focus on RTE foods, in which *L. monocytogenes* was detected in either qualitative investigations (absence or presence, using detection methods) and/or quantitative investigations (counts of colony-forming units per gram (CFU/g) or per mL (CFU/mL) using enumeration methods).

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. The data reported reflect the obligations of MS under this Regulation and the investigations have, therefore, focused on testing RTE foods for compliance with the legal microbiological criteria for food safety.

Microbiological criteria

A wide range of different foodstuffs can be contaminated with *L. monocytogenes*. For a healthy human population, foods where 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. These data not take in account measurement uncertainty.

The reported results of *L. monocytogenes* testing in RTE food samples were evaluated in accordance with the *L. monocytogenes* 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 25g of sample.
- *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* must not be present in 25g of sample 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.

For many of the reported data, it was not evident whether the RTE food tested was able to support the growth of *L. monocytogenes* or not. For the non-compliance analysis of samples collected at processing, the criterion of absence in 25g was applied, except for samples from hard cheeses and fermented sausages (assumed to be unable to support the growth of *L. monocytogenes*), where the limit ≤ 100 CFU/g was applied. For samples collected at retail, the limit ≤ 100 CFU/g was applied, except for RTE products intended for infants and for special medical purposes, where the presence of *L. monocytogenes* must not be detected in 25g of sample.

The results from qualitative examinations using the detection method have been used to analyse the compliance with the criterion of absence in 25g of sample, and the results from quantitative analyses using the enumeration method have been used to analyse compliance with the criterion ≤ 100 CFU/g.

Non-compliance in ready-to-eat products

In total, 20 MS reported data which were included in the evaluation for compliance with microbiological criteria. Compliance with the *L. monocytogenes* criteria in food categories in 2014 is presented in Figure 19 as well as in Table 2014_LISTERIACOMPL.

For RTE products on the market, very low percentages (< 1%) were generally found to not comply with the criterion of ≤ 100 CFU/g. However, higher levels of non-compliance (primarily presence in 25 g) were reported in samples of RTE products at the processing stage, ranging from 0% to 4.7% of single samples.

As in previous years, all samples of RTE food intended for infants and for medical purposes were compliant with the *L. monocytogenes* criteria both at processing (three MS) and at retail (six MS). All RTE milk samples collected at either processing (11 MS) or retail (10 MS) were also compliant, except for three batch samples of pasteurised cow's milk at processing (0.46% of non-compliance).

As observed in previous years, the food category with the highest level of non-compliance at processing was RTE fishery products (4.7% of single samples and 10.8% of batches), mainly in smoked fish. Most of the tested units of RTE fishery products originated from Poland, although five MS reported results for non-compliance. At retail, the levels of non-compliance (0.2% of single samples and 0.6% of batches) were much lower than those observed at processing plants.

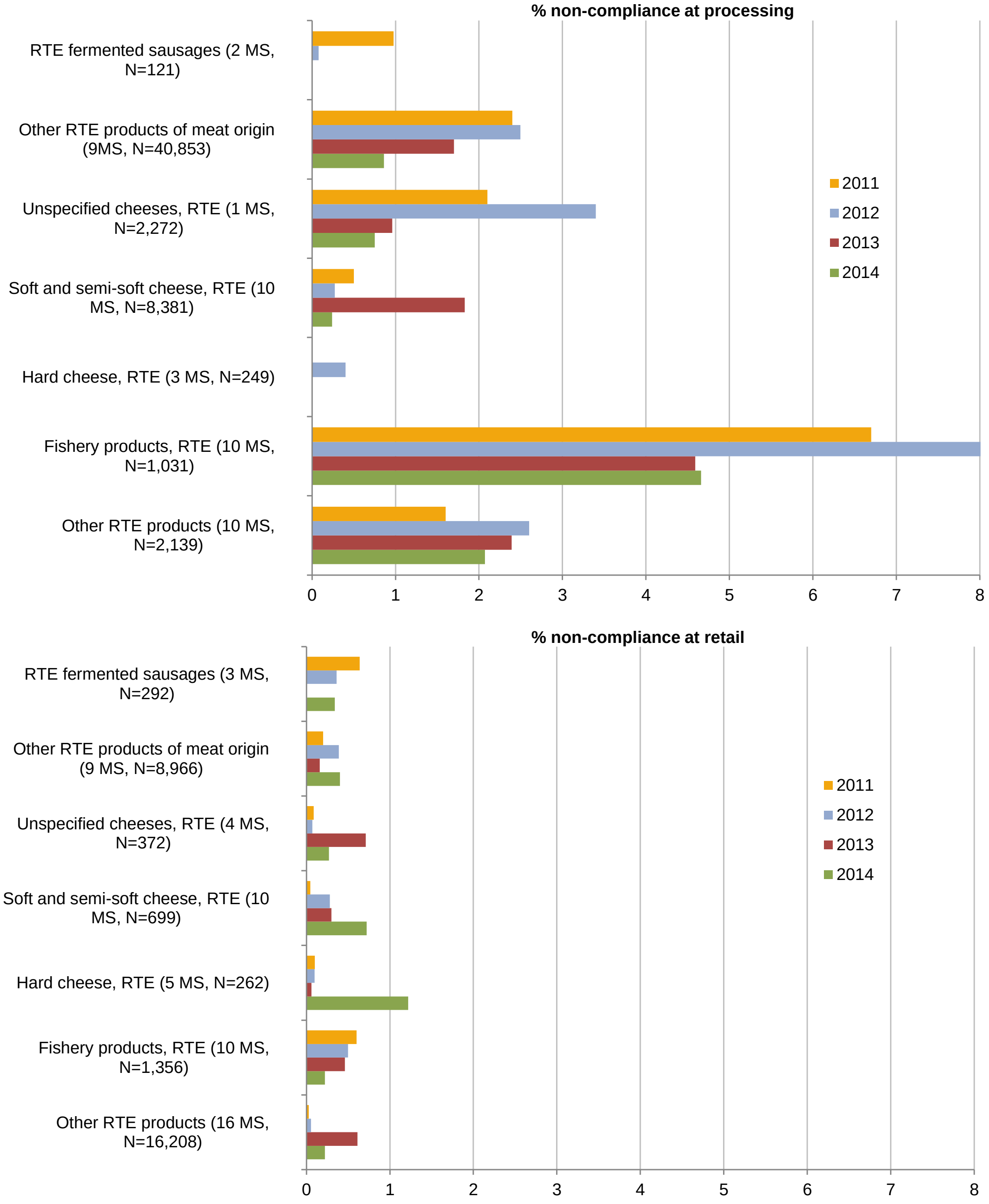
Among samples from RTE products of meat origin, other than fermented sausages, low levels of non-compliance were observed at processing (0.9% of single samples and 3.1% of batches), where non-compliance was reported from 11 MS out of the 13 MS reporting data. Poland reported the majority of units tested at processing (88.8%). At retail, very low levels of non-compliance were reported (0.4% of single samples and 0.15% of batches).

Fermented sausages are assumed not to support growth of *L. monocytogenes,* and all tested products were found to meet the criterion (no levels exceeding 100 CFU/g) at both processing and retail except for one single sample at retail.

Hard cheeses are also assumed not to support the growth of *L. monocytogenes*. All tested units complied with the criterion ≤ 100 CFU/g at processing and at retail, except for three non-compliant single samples of hard sheep cheese from raw of low-heat treated milk reported by one MS. This reporting of non-compliant single units from one MS strongly influenced the overall findings at retail, where hard cheese appeared to be the RTE food category with the highest level of non compliance (1.2 %) in 2014.

For soft and semi-soft cheeses, very low levels of non-compliance were observed in investigations at processing (0.2% of single samples and 0.7% of batches). Thirteen MS provided data from processing and seven MS reported results not compliant with the microbiological criterion (absence in 25g). Non-compliance primarily related to soft and semi-soft cheeses made from cow's milk. At retail, the levels of non-compliance were also very low (0.8% of single samples and 0.3% of batches), and the few non-compliant products were reported from 4 MS out of the 14 MS reporting data.

Among samples of unspecified cheeses, low to very low levels of non-compliance were observed at processing (0.8% of single samples and 2.1% of batches) and at retail (0.3% of single samples); data were mainly reported by Italy.



RTE: ready-to-eat. In parentheses, the total number of included samples (N) and MS in 2014.
This graph includes data where sampling stage at retail (also catering, hospitals and care homes) and at processing (also cutting plants) have been specified for the relevant food types.

Figure 19: Proportion of single samples at processing and retail non-compliant with EU *L. monocytogenes* criteria, 2011–2014

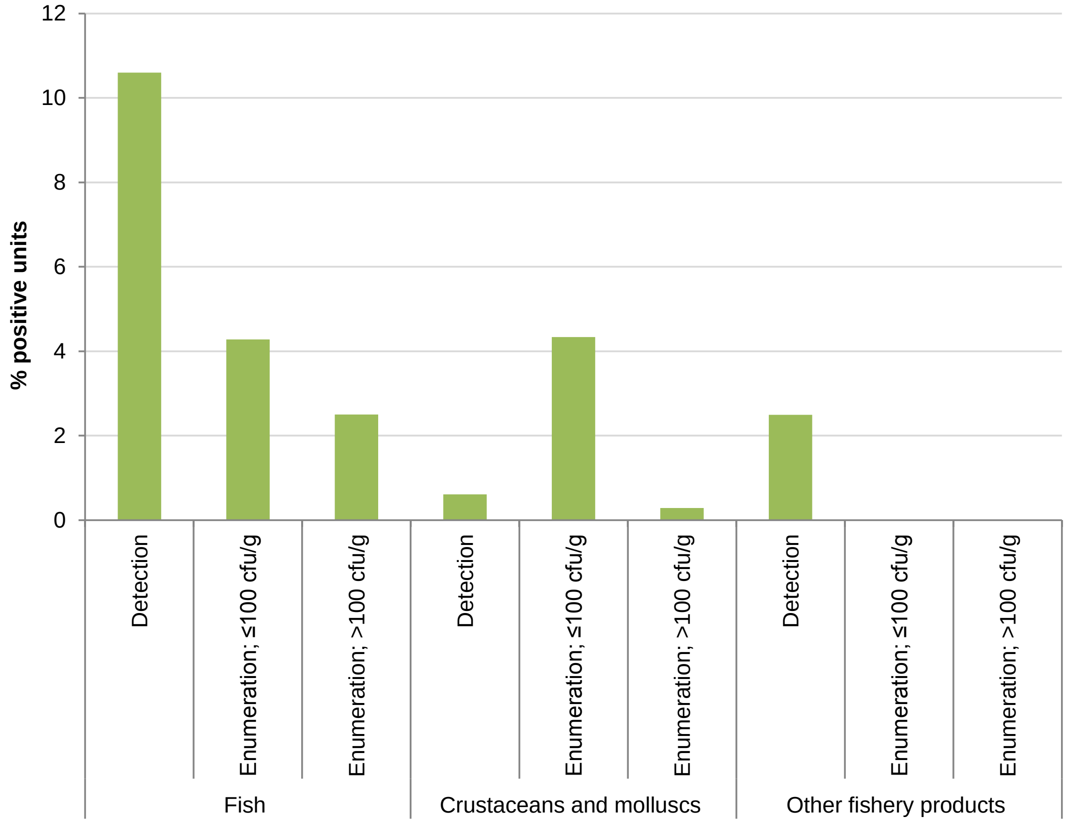
Ready-to-eat fish and fishery products

In 2014, 14 MS and one non-MS reported data on *L. monocytogenes* in RTE fish (Table 2014_LISTERIAFISH). Most of the tested units were from smoked fish and the majority were sampled at processing plant level. The presence of *L. monocytogenes* was detected in 10.6% of the

11,324 tested fish 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. This is less than what was reported in 2013, where 15.2% of the units tested qualitatively were positive. In addition, in 2014, 3,483 units of fish were tested by enumeration and 2.5% had counts of *L. monocytogenes* above 100 CFU/g (Table 2014_LISTERIAFISH), which is more than what was reported in 2013, where 1.6% of units tested quantitatively had counts above 100 CFU/g. However, it should be noted that differences between years are mainly due to the results of a single large investigation in Poland.

In 2014, 15 MS reported data on *L. monocytogenes* in RTE fishery products (Table 2014_LISTERIAFISHPR). The presence of *L. monocytogenes* was detected in 1.5% of the 895 units tested using qualitative methods, mostly in samples from cooked or smoked fishery products. In addition, 1,229 units of fishery products were tested by enumeration and one batch of shelled, shucked and cooked crustaceans had counts of *L. monocytogenes* above 100 CFU/g, corresponding to 0.1% of the total units tested (Table 2014_LISTERIAFISHPR).

A summary of the proportion of *L. monocytogenes*-positive units in different types of fishery products is presented in Figure 20. As in previous years, *L. monocytogenes* was most often detected in RTE fish (mainly smoked fish), in which the highest percentage of units with *L. monocytogenes* counts of more than 100 CFU/g was also detected. Generally, findings were comparable with results in 2013.



Test results obtained by detection and enumeration methods are presented separately. Data pooled for all sampling units (single and batch), for all sampling stages and for all reporting MS. As data were mostly reported by few MS, the findings presented in this figure should not be considered representative of the EU.

Fish includes data from Austria, Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Hungary, Ireland, Italy, Poland, Slovakia, Spain and the United Kingdom (detection: 14 MS; enumeration: 12 MS).

Crustacean and molluscs include data from Austria, Bulgaria, Greece, Ireland, Poland, Portugal, Spain and Sweden (detection: 8 MS; enumeration: 5 MS).

Other fishery products (including unspecified fishery products and surimi) include data from Austria, Belgium, Bulgaria, Czech Republic, Estonia, Ireland, Italy, Portugal, Romania, Slovakia, Slovenia and Sweden (detection: 12 MS; enumeration: 8 MS).

Figure 20: Proportion of *Listeria monocytogenes*-positive units in ready-to-eat fishery products categories in the reporting EU Member States, 2014

Ready-to-eat meat products, meat preparations and minced meat

In 2014, 16 MS and one non-MS reported data from investigations on *L. monocytogenes* in RTE meat products, meat preparations and minced meat.

A summary of the proportions of units positive for *L. monocytogenes* in RTE products of meat origin is presented in Figure 21. In 2014, findings were lower than in 2013 for both detection and enumeration methods for all types of meat except for RTE bovine meat where one investigation from the United Kingdom increased the proportion of positive units. As in 2013, the highest proportions of positive units were reported from pig meat where 2.3% of 45,475 units tested using the detection method was positive and 0.4% of 15,901 units tested had more than 100 CFU/g. A very large proportion of the data from RTE products of meat origin came from Poland and, therefore, these results should not be considered representative of the EU.

Poultry meat

In 2014, 15 MS reported data on *L. monocytogenes* in RTE broiler meat (Table 2014_LISTERIARTEBROIL), and nine MS reported on RTE products of turkey meat (Table 2014_LISTERIARTETURK). The presence of *L. monocytogenes* was identified in 1.3% of 6,166 units of RTE meat products from broilers tested by detection at retail and in 0.9% of the 6,013 units sampled at processing plant. However, these overall results should not be considered representative of the EU as the data were mostly reported by two MS: Poland who reported most of the units sampled at processing, and the United Kingdom who reported the majority of units sampled at retail. In addition, a total of 5,538 units were tested by enumeration and *L. monocytogenes* was reported at levels above > 100 CFU/g in four investigations of cooked broiler meat products reported by Poland, Estonia, Ireland and the United Kingdom (Table 2014_LISTERIARTEBROIL).

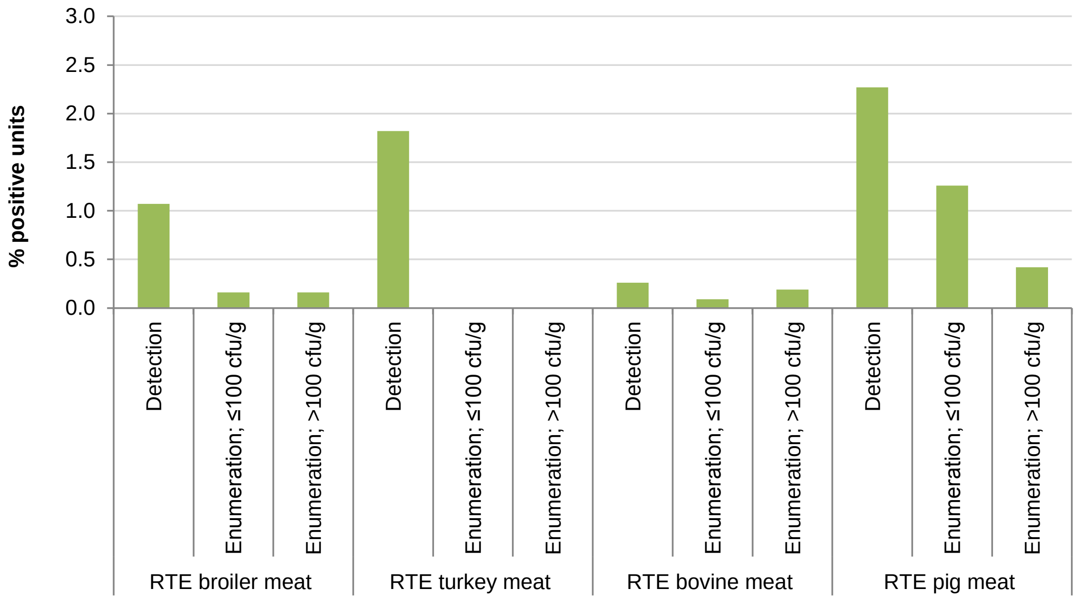
In turkey meat, the presence of *L. monocytogenes* was only detected in two investigations from processing plants reported by Hungary and Poland, corresponding to 1.82% of the total 165 units tested using detection method. No positive findings were reported out of the 203 units of turkey meat tested by enumeration (2014_LISTERIARTETURK).

Bovine meat

In 2014, test results for RTE bovine meat products were reported by 14 MS and one non-MS and are summarised in Table 2014_LISTERIARTEBOVINE. The presence of *L. monocytogenes* was found in 2.5% of 327 units sampled at retail that were tested by detection method and in 0.2% of 7,790 tested units sampled at processing. In addition, 10 MS provided quantitative data on *L. monocytogenes* and counts above 100 CFU/g were found in two investigations of cooked bovine meat products reported by Ireland and the United Kingdom, corresponding to 0.2% of the 1,056 units tested using the enumeration method (Table 2014_LISTERIARTEBOVINE).

Pig meat

In 2014, 17 MS and one non-MS reported data on *L. monocytogenes* in RTE pig meat products. The presence of *L. monocytogenes* was detected in 5.7% of 3,264 units sampled at retail and in 2% of 42,082 units sampled at processing. Overall, 16 MS reported positive results for detection. In addition, 15 MS reported data using the enumeration method and counts of *L. monocytogenes* above 100 CFU/g were found in eight investigations from six MS corresponding to 0.4% of 15,901 units tested (Table 2014_LISTERIARTEPIG). The majority of RTE meat products from pigs were sampled at processing plants in Poland.



Test results obtained by detection and enumeration methods are presented separately. Data pooled for all sampling units (single and batch), for all sampling stages and for all reporting MS. Since data were mostly reported by few MS, the findings presented in this figure should not be considered representative of the EU.
RTE broiler meat includes data from Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Hungary, Ireland, Italy, Poland, Portugal, Romania, Slovakia, Spain, Sweden and the United Kingdom (detection: 13 MS; enumeration: 11 MS).
RTE turkey meat includes data from Austria, Cyprus, Czech Republic, Estonia, Hungary, Ireland, Italy, Poland and Portugal (detection: 8 MS; enumeration: 6 MS).
RTE bovine meat includes data from Austria, Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Ireland, Italy, Poland, Romania, Slovakia, Spain, Sweden and the United Kingdom (detection: 13 MS; enumeration: 10 MS).
RTE pig meat includes data from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Hungary, Ireland, Italy, Poland, Portugal, Romania, Slovakia, Sweden and the United Kingdom (detection: 16 MS; enumeration: 15 MS).

Figure 21: Proportion of *Listeria monocytogenes*-positive units in ready-to-eat meat categories in the reporting EU Member States, 2014

Ready-to-eat cheeses

In 2014, 16 MS and one non-MS reported data from investigations on *L. monocytogenes* in cheese, mainly cheese made from cow's milk.

A summary of the proportion of units positive for cheeses is presented in Figure 22. *L. monocytogenes* was more often detected in soft and semi-soft cheeses made from raw or low heat-treated milk than in hard cheeses or cheeses made from pasteurised milk. This is comparable with findings in 2013. It is important to note that, as the majority of the units tested were reported by Poland, the results are not representative.

Soft and semi-soft cheeses

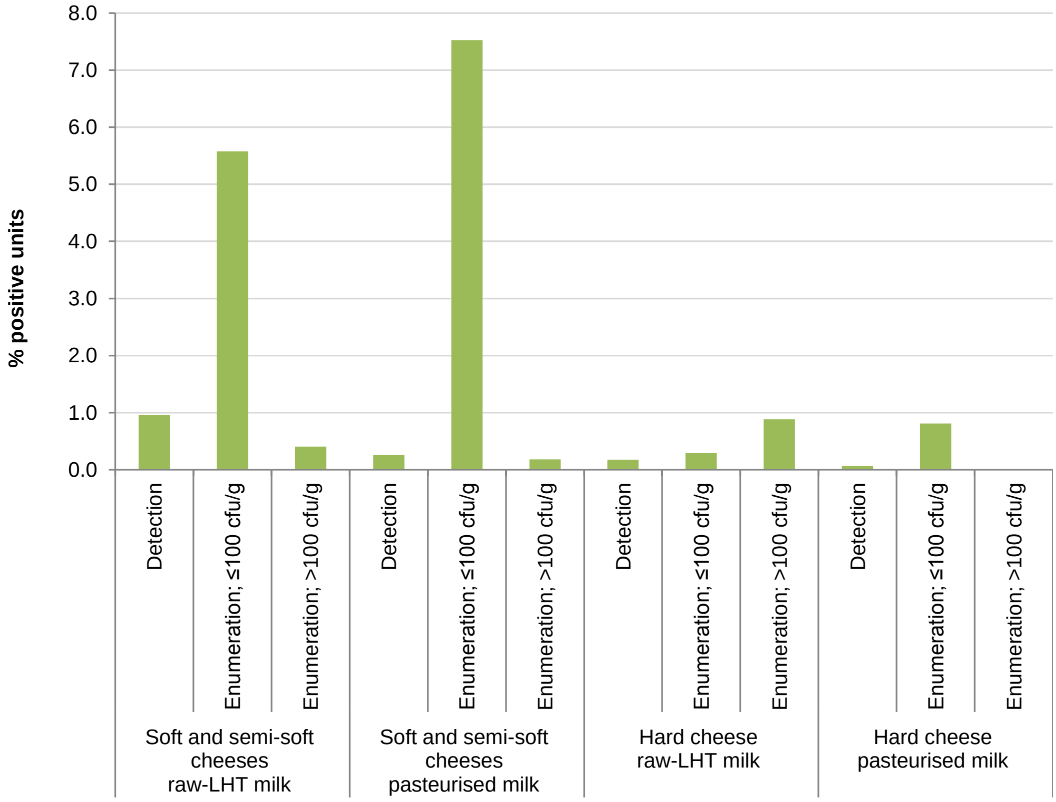
Overall, in 2014, 12,157 units of soft and semi-soft cheeses were tested using detection methods, and 2,633 units were tested by enumeration methods, in the reporting EU MS. Detailed results are presented in specific tables referenced in the Appendix for each type of soft and semi-soft cheese (made from raw or low heat-treated milk and from pasteurised milk originating from cows, sheep and/or goats).

In 2014, the presence of *L. monocytogenes* was higher in soft and semi-soft cheeses made from raw or low heat-treated milk (1.0% of the 2,505 units tested by detection) than in soft and semi-soft cheeses made from pasteurised milk (0.3% out of 9,652 units tested by detection). When using the enumeration method, counts of *L. monocytogenes* were reported above 100 CFU/g in four investigations of soft and semi-soft cheese from raw milk (0.4% of 986 units tested) and in two investigations of soft and semi-soft cheese from pasteurised milk (0.2% of 1,647 units tested). *L. monocytogenes* was not found in any of the tested samples of cheeses made from pasteurised goat's milk, sheep's milk and mixed, unspecified or other milk.

Hard cheeses

Overall, in 2014, 14,831 units of hard cheeses were reported as tested using detection methods and 2,263 units were reported as tested by enumeration methods in the reporting EU MS. Detailed results are presented in specific tables referenced in the Appendix for each type of hard cheese (made from raw or low heat-treated milk and from pasteurised milk originating from cows, sheep and/or goats).

In 2014, *L. monocytogenes* was found in 0.2% of the 10,074 units of hard cheeses made from raw or low heat-treated milk tested for detection and 0.1% of the 4,757 units of hard cheeses made from pasteurised milk. Positive results were only reported by Poland from two qualitative investigations from hard cheeses made from raw or low heat-treated milk from cows and from sheep. When using the enumeration method, counts of *L. monocytogenes* above 100 CFU/g were only detected in one investigation from hard cheeses made from raw or low heat-treated milk from sheep sampled at retail reported by Spain (corresponding to 1.52% of the 198 units tested by enumeration). No hard cheeses from pasteurised milk had levels of *L. monocytogenes* above 100 CFU/g. It is important to note that, as the majority of the units tested were reported by Poland, the results are not representative.



Test results obtained by detection and enumeration methods are presented separately. LHT: low heat-treated milk.
Data pooled for all sampling units (single and batch), for all sampling stages and for all reporting MS. Since data were mostly reported by few MS, the findings presented in this figure should not be considered representative of the EU. Data pooled for all sampling stages for all reporting MSs (single and batch).
Soft and semi-soft cheeses, made from raw-LHT milk include data from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Estonia, Ireland, Netherlands, Poland, Portugal, Romania and Slovakia (detection: 11 MS; enumeration: 10 MS).
Soft and semi-soft cheeses, made from pasteurised milk include data from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Hungary, Ireland, Poland, Portugal, Romania, Slovakia and Spain (detection: 14 MS; enumeration: 10 MS).
Hard cheese, made from raw-LHT milk includes Austria, Bulgaria, Estonia, Ireland, Poland, Portugal, Romani, and Spain (detection: 8 MS; enumeration: 6 MS).
Hard cheese, made from pasteurised milk includes data from Austria, Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Ireland, Poland, Portugal, Romania and Slovakia (detection: 11 MS; enumeration: 9 MS).

Figure 22: Proportion of *Listeria monocytogenes*-positive units in soft and semi-soft cheeses, and hard cheeses made from raw or low heat-treated milk and pasturised milk in reporting EU Member States, 2014

Detailed information on the data reported and the occurrence of *L. monocytogenes* in the different cheese categories has been presented in specific tables referenced in the Appendix.

Other ready-to-eat products

Results from a considerable number of investigations on *L. monocytogenes* in other RTE products, such as bakery products, fruits and vegetables, prepared dishes and salads were reported.

In 2014, 15 MS provided data on 3.272 units of RTE fruit and vegetables tested for detection and 2.8% was positive with *L. monocytogenes*. Italy reported 32.6% of all units tested by qualitative methods, followed by Poland (26.7%) and the Netherlands (12%). In addition, 15 MS reported data on 3,485 units tested using enumeration and 0.1% had findings above 100 CFU/g, corresponding to two investigations (one from Spain and the other from the United Kingdom) from retail. Most data were from retail and based on single samples (Table 2014_LISTERIAFRUITVEG).

Overall, 11 MS reported on 1,530 units of bakery products tested using the detection method and 1.0% was positive for *L. monocytogenes*. *L. monocytogenes* findings above 100 CFU/g were not reported in any of the 2,887 units analysed using the enumeration method. Most data were from retail and based on single samples (Table 2014_LISTERIABAKERY).

Eleven MS reported data on 1,134 units tested using the detection method and 1.2% was positive. Ten MS provided information on 2,730 units tested using the enumeration method and 0.04% had counts of *L. monocytogenes* above 100 CFU/g (Table 2014_LISTERIASALAD).

In sauces and dressings, four MS reported information on 246 units tested using the detection method and *L. monocytogenes* was only detected in one unspecified unit. *L. monocytogenes* was also reported at levels above 100 CFU/g in one unit of unspecified 'sauce and dressing' out of the 463 tested by enumeration (Table 2014_LISTERIASAUCE). In spices, three MS reported information on 330 units tested using detection method and only one MS reported positive findings (5.5%). None of the investigations detected *L. monocytogenes* in spices using the enumeration method (Table 2014_LISTERIASPICES. In other processed food products and prepared dishes, *L. monocytogenes* was detected in 5.0% (all sandwiches) of 2,030 units tested for detection and 0.6% of the units tested for enumeration had counts of *L. monocytogenes* above 100 CFU/g (Table 2014_LISTERIAPREPDISH).

In 2014, 14 MS reported data on *L. monocytogenes* in milk. The presence of *L. monocytogenes* was found in 0.4% of the 3,977 milk units tested for detection. Most of the units were sampled by Poland at farm level. Out of the 512 units tested using enumeration method, no findings of units with counts above 100 CFU/g were reported. (Table 2014_LISTERIAMILK).

L. monocytogenes was not found in any of the reported investigations of confectionery products and pastes (Table 2014_LISTERIACONF) and egg products (Table 2014_LISTERIAEGGPR).

Animals

In 2014, 14 MS and one non-MS reported qualitative data on animals tested for *Listeria.* In total, 38,729 units were tested for *Listeria* and 2.1% was positive. Data were mainly from animal level (91.8%). However, the size of the investigations and the proportion of positive samples varied considerably.

Overall, 71.3% of the positive findings (799 units) were reported as *L. monocytogenes,* followed by *Listeria* spp. (16.0%), *L. ivanovii* (1.6%) and *L. innocua* (0.3%). The remaining isolates were reported without reference to the species.

Findings of *Listeria* were most often reported in cattle, sheep, goats, pigs and solipeds, but *Listeria* was also detected in broilers, cats, dogs, hunted wild boar, foxes, and other wild and zoo animals.

Further details on the findings of *Listeria* in animals are included in Table 2014_LISTERIAANIMALS.

3.3.3. Discussion

There has been a steady and significant increasing trend in listeriosis in the EU/EEA since 2008. The EU notification rate in 2014 was 30% higher than the notification rate in 2013. Part of the increase could be explained by the exclusion of one large MS with a relatively low notification rate in previous years from the notification rate calculation in 2014 due to incomplete reporting. However, increased numbers of reports from most of the MS also indicate a real rise in human listeriosis. Two thirds of the MS reported an increase in notification rates of listeriosis in 2014 compared to 2013 and six MS had an increasing trend from 2008 to 2014. The number of reported listeria outbreaks doubled from 2011 to 2014. Almost all cases are domestically acquired.

While still being relatively rare, human listeriosis is one of the most serious foodborne disease under EU surveillance. It causes high morbidity, hospitalisation and mortality rates in vulnerable populations, such as pregnant women, infants and the elderly. Almost all (98.9%) reported listeriosis cases were hospitalised in 2014, with 210 cases being fatal. This reflects the focus of listeriosis surveillance on severe systemic infections but also highlights listeriosis as a serious emerging health problem in the EU. The increase of *Listeria* infections in humans may be partially explained by the aging population and thus the increase in the main population at risk of listeriosis in the EU.

L. monocytogenes is widespread in the environment and can colonise processing equipment as biofilms, therefore, a wide range of different foodstuffs can be contaminated. For a healthy human population, foods not exceeding the level of 100 CFU/g are considered to pose a negligible risk. Therefore, the EU microbiological criterion for *L. monocytogenes* in RTE food is set at ≤ 100 CFU/g for RTE products on the market.

In 2014, the non-compliance for different RTE food categories was generally at a level comparable to previous years. The proportion of non-compliant units at retail was lower than at processing for almost all categories and cannot explain the increase observed in number of human cases.

As in previous years and consistent with the results of the EU baseline survey on the prevalence of *L. monocytogenes* in certain RTE foods at retail (EFSA, 2013a), the proportion of positive samples at retail was highest in fish products (mainly smoked fish).

Several MS reported findings of *Listeria* in animals. Most of the tested samples were from cattle, and to a lesser degree from goats and sheep. Findings of *Listeria* were most often reported in these three animal species, but *Listeria* was also reported in broilers, cats, dogs, hunted wild boar, foxes, and other wild and zoo animals. *Listeria* is widespread in the environment; therefore, isolation from animals is to be expected and increased exposure may lead to clinical disease in some animals.

3.4. Verocytotoxigenic *Escherichia coli*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans, food, animals and food-borne outbreaks. It also includes hyperlinks to VTEC summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.4.1. Verocytotoxigenic *Escherichia coli* in humans

In 2014, 6,013 cases of VTEC[28] infections, of which 5,955 confirmed, were reported in the EU (Table 13). This is a slight decrease compared with 2013. Twenty-four MS reported at least one confirmed case and three MS reported zero cases. The EU notification rate was 1.56 cases per 100,000 population, 1.9% lower than the notification rate in 2013. The highest country-specific notification rates were observed in Ireland, the Netherlands, Denmark and Sweden (12.42, 5.46, 4.96 and 4.89 cases per 100,000 population, respectively). Nine countries (Bulgaria, Croatia, Cyprus, Greece, Latvia, Lithuania, Poland, Romania and Slovakia) reported < 0.1 cases per 100,000 population).

Most of the VTEC cases reported in the EU were infected within their own country (62.7% domestic cases, 11.9% travel-associated and 25.4% of unknown origin). Finland reported the same proportion (48.4%) of travel-associated cases as domestic cases. Among travel-associated cases, Turkey, Spain and Egypt were considered the most probable countries of infection (168, 48 and 47 cases respectively).

[28] Also known as verotoxigenic, verocytotoxigenic, verotoxin-producing, verocytotoxin-producing *E. coli* (VTEC) or Shiga toxin-producing *E. coli* (STEC).

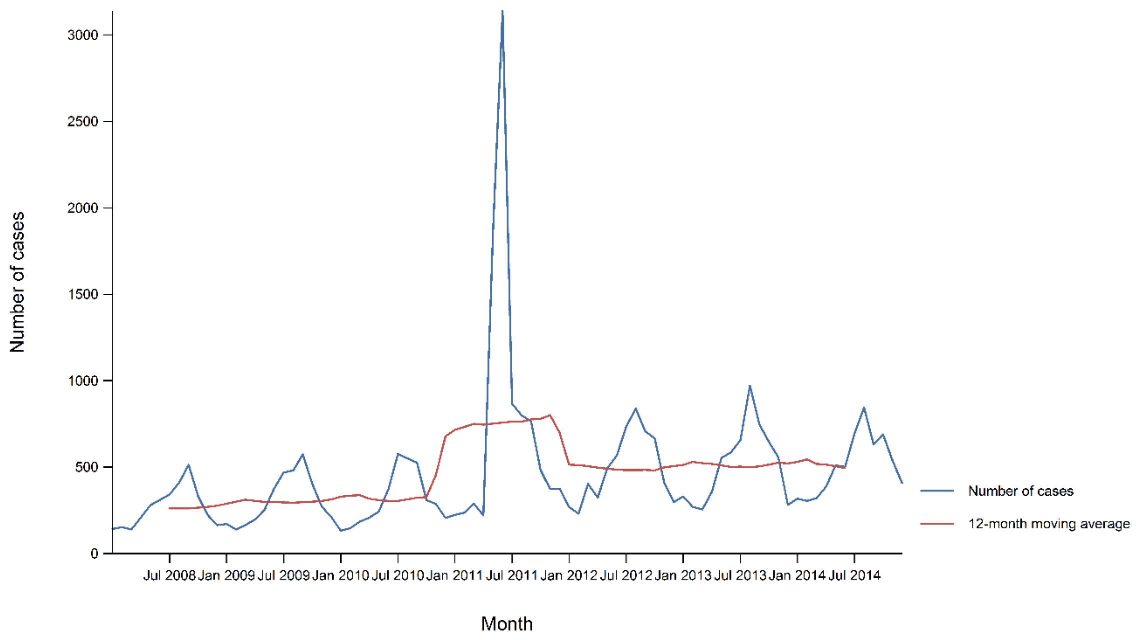
Table 13: Reported human cases of VTEC infections and notification rates per 100,000 population in the EU/EEA, by country and year, 2010–2014

Country	2014					2013		2012		2011		2010	
	National coverage[(a)]	Data format[(a)]	Total cases	Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases &rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	131	131	1.54	130	1.54	130	1.55	120	1.43	88	1.05
Belgium[(b)]	N	C	85	85	–	117	–	105	–	100	–	84	–
Bulgaria	Y	A	0	0	0.00	1	0.01	0	0.00	1	0.01	0	0.00
Croatia	Y	A	4	4	0.09	–	–	–	–	–	–	–	–
Cyprus	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic[(c)]	Y	C	29	29	0.28	17	0.16	9	0.09	7	0.07	1	0.00
Denmark	Y	C	280	29	4.96	191	3.41	199	3.57	215	3.87	178	3.22
Estonia	Y	C	6	6	0.46	8	0.61	3	0.23	4	0.30	5	0.38
Finland	Y	C	64	64	1.17	98	1.81	32	0.59	27	0.50	20	0.37
France[(d)]	N	C	221	221	–	218	–	208	–	221	–	103	–
Germany	Y	C	1,704	1,663	2.06	1,639	2.00	1,573	1.93	5,558	6.82	955	1.17
Greece	Y	C	1	1	0.01	2	0.02	0	0.00	1	0.01	1	0.01
Hungary	Y	C	18	18	0.18	13	0.13	3	0.03	11	0.11	7	0.07
Ireland	Y	C	576	572	12.42	564	12.29	412	8.99	275	6.02	197	4.33
Italy[(b)]	N	C	77	68	–	65	–	50	–	51	–	33	–
Latvia	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Lithuania	Y	C	1	1	0.03	6	0.20	2	0.07	0	0.00	1	0.03
Luxembourg	Y	C	3	3	0.55	10	1.86	21	4.00	14	2.74	7	1.39
Malta	Y	C	5	5	1.18	2	0.48	1	0.24	2	0.48	1	0.24
Netherlands	Y	C	919	919	5.46	1,184	7.06	1,049	6.27	845	5.07	478	2.88
Poland	Y	C	8	5	0.01	5	0.01	3	0.01	5	0.01	4	0.01
Portugal[(e)]	–	–	–	–	–	–	–	–	–	–	–	–	–
Romania	Y	C	2	2	0.01	6	0.03	1	0.01	2	0.01	2	0.01
Slovakia	Y	C	2	2	0.04	7	0.13	9	0.17	5	0.09	10	0.19
Slovenia	Y	C	29	29	1.41	17	0.83	29	1.41	25	1.22	20	0.98
Spain	Y	C	50	50	0.11	28	0.06	32	0.07	20	0.04	18	0.04
Sweden	Y	C	472	472	4.89	551	5.77	472	4.98	477	5.07	334	3.58
United Kingdom	Y	C	1,326	1,326	2.06	1,164	1.82	1,337	2.11	1,501	2.40	1,110	1.79
EU Total	–	–	6,013	5,955	1.56	6,043	1.59	5,680	1.50	9,487	2.58	3,657	1.00
Iceland	Y	C	3	3	0.92	3	0.93	1	0.31	2	0.63	2	0.63
Norway	Y	C	151	151	2.96	103	2.04	75	1.50	47	0.96	52	1.07
Switzerland[(f)]	Y	C	122	122	1.50	81	1.00	65	0.80	76	0.95	34	0.43

(a): Y: Yes; N: No; A: Aggregated data; C: Case-based data; –: No report.
(b): Sentinel surveillance; no information on estimated coverage, thus notification rate cannot be estimated.
(c): Mandatory notification of VTEC in 2008 and reported to ECDC from 2011.
(d): Sentinel surveillance; only cases with HUS are notified.
(e): No surveillance system.
(f): Switzerland provided data directly to EFSA. The human data for Switzerland also include the ones from Liechtenstein.

There was a clear seasonal trend in confirmed VTEC cases reported in the EU/EEA between 2008 and 2014, with more cases reported during the summer months (Figure 23). A dominant peak in the summer of 2011 was due to the large enteroaggregative Shiga toxin-producing *E. coli* (STEC) O104:H4 outbreak associated with the consumption of contaminated raw sprouted seeds affecting more than 3,800 persons in Germany, with linked cases in an additional 15 countries (EFSA and ECDC, 2013).

There was an increasing trend observed over the 7-year-period, 2008-2014, in the EU/EEA (Figure 23) statistical test for trend not suitable due to the outbreak peak in 2011) and a significant ($p < 0.05$) increasing trend in 10 countries (Austria, Denmark, Finland, France, Ireland, Italy, the Netherlands, Norway, Slovenia and Sweden). A significant decreasing trend was observed in Slovakia.



Source: Austria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Slovakia, Slovenia, Sweden and the United Kingdom. The Czech Republic, Croatia, Iceland, Romania and Spain did not report data to the level of detail required for the analysis. Portugal does not have any surveillance system for this disease.

Figure 23: Trend in reported confirmed cases of human VTEC infections in the EU/EEA, by month of reporting, 2008–2014

Data on VTEC serogroups (based on O antigens) were reported by 22 MS, Iceland and Norway in 2014. As in previous years, the most commonly reported serogroup was O157 (46.3% of cases with known serogroup) although its proportion declined (Table 14). Serogroup O157 was followed by serogroups O26, O103, O145, O91, O146 and O111. Three new serogroups entered the top 20 list in 2014: O55, O8 and O80. Among these, O55 was reported by 11 countries in 2014 compared with six countries in the previous 2 years. The proportion of non-typable[29] VTEC strains continued to increase in 2014, as did the proportion of O-rough[30] strains. No cases of O104:H4 were reported in 2014 and only four cases of O104 with unknown H-group were reported by three countries (Germany, Norway and the United Kingdom), two of which were acquired outside the EU/EEA, and none had a fatal outcome.

Table 14: Distribution of reported confirmed cases of human VTEC infections in 2014 in the EU/EEA, 2012–2014, by the 20 most frequent serogroups

Serogroup	2014			2013			2012		
	Cases	MS	%	Cases	MS	%	Cases	MS	%
O157	1,694	23	46.3	1,799	23	48.1	1,981	19	54.9
O26	444	16	12.1	477	17	12.8	417	17	11.6
Non-typable	315	9	8.6	298	10	8.0	136	11	3.8
O103	193	12	5.3	160	12	4.3	231	13	6.4
O145	105	11	2.9	96	11	2.6	112	11	3.1
O91	105	11	2.9	94	11	2.5	131	8	3.6
O146	83	9	2.3	75	9	2.0	59	9	1.6

[29] Non-typable VTEC include those strains where the laboratory tried, but was not able to define the O-serogroup. This depends on how many sera/molecular tools are included in the typing panel.
[30] O-rough strains lack the O-chains in the lipopolysaccharide, leading to autoagglutination in the agglutination tests used to determine serogroup or serotype.

Serogroup	2014			2013			2012		
	Cases	MS	%	Cases	MS	%	Cases	MS	%
Orough	55	7	1.5	41	5	1.1	24	5	0.7
O111	54	11	1.5	78	13	2.1	66	10	1.8
O128	47	11	1.3	41	8	1.1	37	8	1.0
Non-O157	42	3	1.1	36	3	1.0	21	3	0.6
O55	37	11	1.0	11	6	0.3	25	6	0.7
O113	31	10	0.8	27	6	0.7	24	8	0.7
O121	31	6	0.8	23	7	0.6	27	4	0.7
O63	24	6	0.7	18	3	0.5	12	2	0.3
O117	21	8	0.6	24	8	0.6	22	6	0.6
O76	21	7	0.6	20	9	0.5	22	7	0.6
O5	16	7	0.4	15	5	0.4	7	4	0.2
O8	15	7	0.4	11	5	0.3	11	6	0.3
O80	15	3	0.4	8	3	0.2	4	1	0.1
Other	308	–	8.4	386	–	10.3	239	–	6.6
Total	3,656	24	100.0	3,738	24	100.0	3,608	22	100.0

Source: 22 MS and two non-MS: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

Sixteen MS provided information on hospitalisation, covering 39.9% of all confirmed VTEC cases in the EU in 2014. Of the cases with known hospitalisation status, 39.2% were hospitalised. The highest proportions of hospitalised cases (90–100%) were reported in Greece, Italy, Lithuania and Romania. Three hundred and sixty cases of HUS were reported, with the majority being in patients who were 0–4 years (228 cases) and 5–14 years old (69 cases). The most common serogroups among HUS cases were O157 (42.8%), O26 (18.6%), O111 (5.3%) and O145 (4.6%), while 8.0% were untypable.

In 2014, seven deaths due to VTEC infection were reported in the EU compared with 13 in 2013. Five MS reported one to two fatal cases each, and 13 MS reported no fatal cases. This resulted in an EU case fatality rate of 0.2% among the 3,491 confirmed cases for which this information was provided (58.6% of all reported confirmed cases). The serogroups associated with fatal cases were O157 (two cases), O76 (one case), O146 (one case) and O181 (one case). For two fatal cases, the serogroup was not specified.

3.4.2. Verocytotoxigenic *Escherichia coli* in food and animals

Comparability of data

Data on VTEC detected in food and animals are reported annually on a mandatory basis by EU MS to the EC and EFSA, based on Directive 2003/99/EC. 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 (EFSA, 2009a). Those 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 MS to monitor and report data on serogroups that were considered by the BIOHAZ Panel as an important indicator of human pathogenicity (EFSA BIOHAZ Panel, 2013a).

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. In 2014, two main categories of analytical methods were used by reporting countries:

a) Methods aiming at detecting any VTEC, regardless of the serotype. These methods are usually based on PCR screening of sample enrichment cultures and isolated colonies for the presence of *vtx* genes, followed by the characterisation of the isolated VTEC strains. This category includes the method ISO/TS 13136:2012 (ISO, 2012), other PCR-based methods, and also methods based on the detection of verocytotoxin production by immunoassays.

b) Methods designed to detect only VTEC O157, such as the method ISO 16654:2001 (ISO, 2001) and the equivalent NMKL 164:2005 (NMKL, 2005). VTEC O157 is the serotype most commonly reported in the EU as a cause of both outbreaks and sporadic cases in humans and has also been identified as the major cause of HUS in children (ECDC, 2013; EFSA BIOHAZ Panel, 2013a). The focus has therefore traditionally been on this serotype in many of the MS surveillance programmes.

The standard methods ISO/TS 13136:2012 (ISO, 2012), ISO 16654:2001 (ISO, 2001) and NMKL 164:2005 (NMKL, 2005) are intended for testing food and feed, but have been adapted to test animal samples by many reporting countries.

The proportion of food and animal samples reported by MS and non-MS and tested for VTEC by the different analytical methods is presented in Table 2014 VTECANMETH. As monitoring criteria and analytical methods are not yet fully harmonised across the different countries, the unequal distribution of sampled units per country may have introduced a selection bias in the calculation of VTEC prevalence or VTEC serogroup distribution when data were analysed at the EU level.

It is important to note that, for the estimation of the proportion of samples positive for VTEC in the different food and animal categories referenced in this section and in the Appendix, data from industry own-control programmes, HACCP, suspect sampling, selective sampling and outbreak or clinical investigations were excluded. The whole dataset was instead used for any other descriptive analysis on VTEC findings in food and animals, including the serogroups' frequency distribution.

Detailed information on the data reported and on the occurrence of VTEC in the different food and animal categories has been included in specific tables referenced in the Appendix.

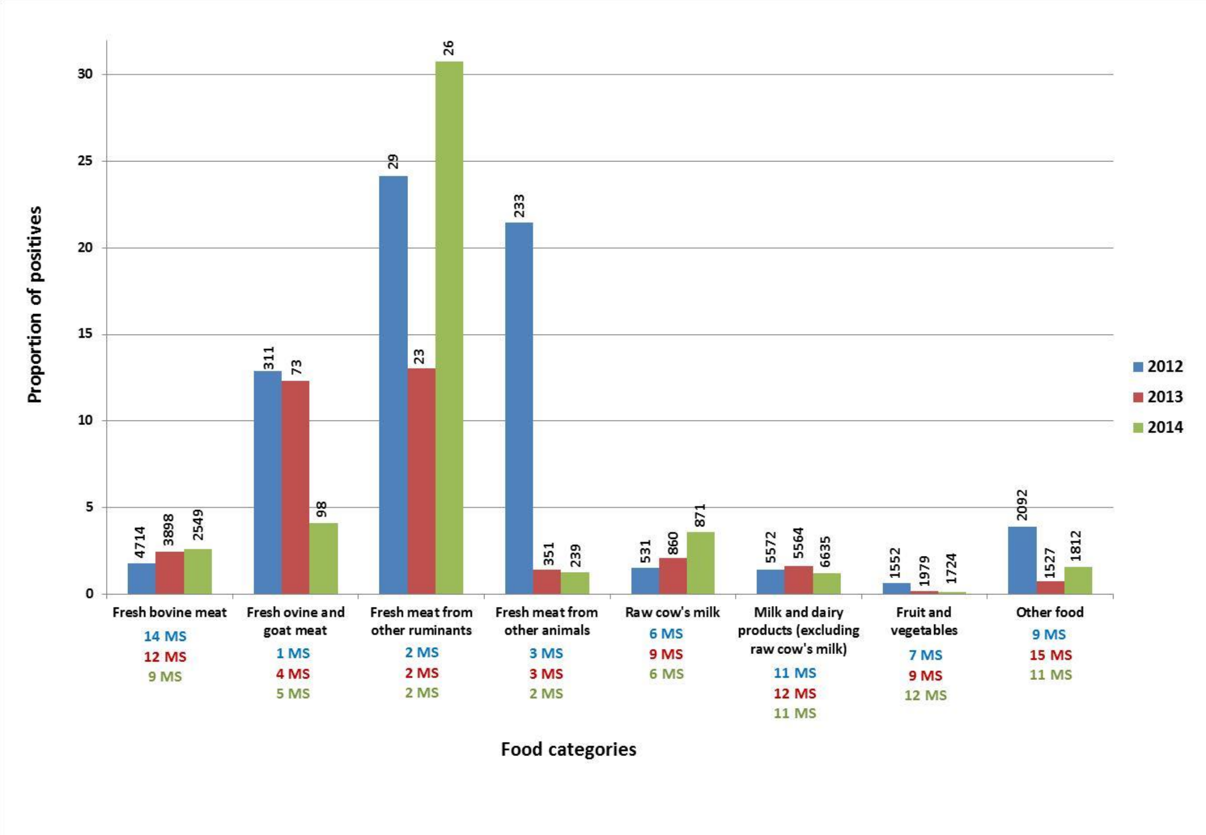
Verocytotoxigenic *Escherichia coli* in food

In 2014, data on VTEC in food were reported by 19 MS and Switzerland, for a total of 21,671 samples.

The EFSA technical specifications for the monitoring and reporting of VTEC (EFSA, 2009a) were followed by 15 MS and Switzerland. The use of the standard method for the detection of VTEC in food ISO/TS 13136:2012 or equivalent methods was reported by 13 MS and Switzerland, and accounted for 41.4% of the 21,671 units tested. The methods ISO16654:2001 or NMKL 164:2005, which detect only VTEC O157, were used by nine MS, and accounted for 6.4% of the samples tested. The use of other PCR-based methods was reported by four MS. Some MS reported the use of more than one type of method.

As a whole, 15 MS reported 355 positive samples, corresponding to 1.7% of the 21,420 food samples tested in the EU. All those MS provided information on VTEC O157. Overall, 58 samples positive for VTEC O157 (0.3% of total food samples examined by MS) were reported by six MS. In addition, Switzerland provided information on 251 food samples tested for VTEC/VTEC O157, but no positive findings were reported.

The proportion of VTEC-positive samples in the main food categories, regardless the analytical method employed, is shown in Figure 24, in comparison with the proportions reported in 2012 and 2013. The proportion of VTEC-positive units did not exceed 4% in the most frequently tested food categories (milk and dairy products, fresh bovine meat, fruits and vegetables and other foods). A high proportion of VTEC-positive samples (30.8%) was reported for fresh meat from 'other ruminants' (deer), but the figure refers to a limited number of samples (n=26) reported by two MS (Austria and Italy). The presence of VTEC was reported in fresh ovine and goat meat (4.1% of 98 samples, reported by five MS), followed by raw cow's milk (3.6% of 871 samples, reported by six MS), and fresh bovine meat (2.6% of 2,549 samples, reported by nine MS). No VTEC-positive samples were reported for sprouted seeds (761 samples tested, as reported by 11 MS).



Data from industry own-control programmes, Hazard Analysis and Critical Control Point (HACCP), suspect sampling, selective sampling and outbreak or clinical investigations are not included in this graph. 'Fresh meat from other ruminants' includes meat from deer. 'Fresh meat from other animals' includes meat from horse, donkey, rabbit, wild boar, red meat (from bovine, pigs, goats, sheep, horses, donkeys, bison and water buffalo), meat from poultry, meat from other poultry, meat from other animal species or not specified. Fresh ovine and goat meat: no data on fresh goat meat were reported in 2012. Sprouted seeds are not included as no positive units were detected, except for 1 positive unit out of 297 units tested in 2012. Pig meat (not included in the figure): 0.57% in 2012, 0% in 2013, and 0.73% in 2014).
Source 2012: 17 reporting MS (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Romania, Slovenia, Spain and Sweden);
Source 2013: 14 reporting MS (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Netherlands, Poland, Slovakia and Spain);
Source 2014: 19 reporting MS (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, France, Germany, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom).

Figure 24: Proportion of VTEC-positive samples in food categories in the reporting Member States, 2012–2014

Results for the most important food categories that might serve as a source for human infection in the EU are presented below.

Bovine meat

Contaminated bovine meat is considered to be a major source of food-borne VTEC infections in humans. In 2014, nine MS provided data from 2,549 units of fresh bovine meat (945 batches and 1,604 single samples) tested for VTEC, and 2.6% was positive for VTEC (0.9% for VTEC O157). In total, data on 930 carcases collected at the slaughterhouse were reported by three MS: 23 were positive for VTEC and one of them was positive for VTEC O157 (Table 2014_VTECBOVINEMEAT). One MS reported 945 batch-based samples, all from slaughterhouses or processing plants, and they were all negative for VTEC. The remaining 674 single samples were collected at the slaughterhouse, processing plant and retail, and low proportions of positive samples were reported at all sampling stages. The proportion of positive samples was similar to that reported in 2013 (Figure 24).

In 2014, the serogroups most frequently reported in bovine meat (including all types of bovine meat) were O157 (25 isolates), O113 (8), O103 (6), O174 (6) and O26 (5).

Ovine and goat meat

Five MS reported on 82 units of fresh ovine meat tested for VTEC (two batches and 80 single samples) with 4.9% positive with VTEC (Table 2014_VTECOVINEMEAT), which is lower than in the previous years (Figure 24). No samples from ovine meat were positive for VTEC O157, but serogroups O146 and O103, both frequently reported in human infections (EFSA BIOHAZ Panel, 2013a), were reported.

In 2014, only one MS reported on fresh goat meat and found no positive carcases out of 16 analysed (Table 2014_VTECGOATMEAT).

Meat from other ruminants

In 2014, two MS provided information on fresh deer meat with 30.8% positive samples out of the 26 tested. All tested and positive samples were reported by Austria, except one negative sample reported by Italy (Table 2014_VTECOTHERMEAT). High proportions of VTEC-positive samples from fresh deer meat were also reported in 2012 and 2013, although lower than the proportion reported in 2014 (Figure 24).

Meat from other animal species

Five MS provided information from 274 single samples of pig meat tested, with 78.1% of the samples being carcases at the slaughterhouse. Two non- O157 VTEC-positive samples were reported from carcases (Table 2014_VTECPIGSMEAT).

Information on meat from other animal species (broilers, turkey, wild boar, rabbit or unspecified meat) was provided by two MS, from 239 single samples tested. VTEC was detected in one single sample of unspecified meat (see Table 2014_VTECOTHERMEAT). The findings are similar to that reported in 2013 (Figure 24).

Milk and dairy products

In 2014, six MS reported data on VTEC in samples of raw cow's milk (59 batches and 812 single samples), with 3.6% positive samples out of 871 tested. The proportion of VTEC-positive samples from raw cow's milk has increased in 2014 compared with the previous years (Figure 24 and Table 2014_VTECRAWCOWMILK).

Two MS provided information on eight units of raw milk from goats and one MS reported two samples of raw milk from sheep and VTEC was not detected (Tables 2014_VTECRAWGOATSMILK and 2014_VTECRAWSHEEPMILK).

Eleven MS reported 6,635 samples of milk (not raw milk) and dairy products, and 1.2% was positive for VTEC (Table 2014_VTECDAIRY). The samples were mainly collected from cheese (58.0%) and milk (37.7%), followed by other types of dairy products (4.3%). The proportion of positive units was higher for milk samples (1.6%) than for cheese samples (1.1%). No positive units were reported in the other dairy products. There were no reports of VTEC O157.

Sprouted and dry seeds

The year 2014 was the first full year of application of Regulation (EU) 209/2013[31] which establishes microbiological criteria for VTEC in sprouted seeds. In 2014, the number of samples tested increased from 616, reported in 2013 by eight MS, to 761 samples of sprouted seeds, reported by eight MS (Table 2014_VTECSEED). In addition, in 2014 two MS reported 13 samples of dry seeds intended for sprouting. No positive findings were reported in 2014, as in 2013.

Vegetables and fruits

In 2014, 12 MS reported data from 1,544 vegetable units tested for VTEC (23 batches and 1,521 single samples). Two MS reported very low levels (0.13%) of VTEC-positive samples in

[31] Commission Regulation (EU) No 209/2013 of 11 March 2013 amending Regulation (EC) No 2073/2005 as regards microbiological criteria for sprouts and the sampling rules for poultry carcases and fresh poultry meat. OJ L 68, 12.3.2013, p. 19–23.

unspecified non-pre-cut and RTE pre-cut vegetables (Figure 24). There was no reporting of VTEC O157 (Table 2014_VTECVEGETABLE).

Five MS reported VTEC-negative data from 180 units of fruit (one batch and 179 single samples) (Table 2014_VTECFRUITS). More MS reported data on vegetables and fruits compared to the last 2 years (Figure 24).

Analysis of VTEC serogroups in food

An estimation of the proportion of food samples positive for the VTEC serogroups most commonly reported in the EU (ECDC, 2013; EFSA BIOHAZ Panel, 2013a) as a cause of HUS in children (O157, O26, O103, O111, and O145, the so called 'top five' serogroups), was obtained by considering only the analysis carried out by the method ISO/TS 13136:2012. This standard method is able to detect any VTEC, and is particularly focused on the detection of strains belonging to the 'top 5' serogroups. Therefore, this subset of data, representing 41.4% of the total food samples tested, can be considered homogeneous and may facilitate a more comparable estimation of the level of contamination with the main VTEC serogropups in the different food categories.

Among the 8,968 food samples tested by 13 MS and Switzerland using ISO/TS 13136:2012, 141 (1.6%) were positive for VTEC (Table 15), a proportion similar to that obtained for food samples tested by any analytical method (1.7%).

Interestingly, the VTEC serogroups O26 and O103 were reported more frequently than O157, mainly in bovine meat, in milk and dairy products, and in raw milk.

Table 15: Proportion of positive samples for any VTEC and VTEC belonging to the 'top-5' serogroups in food categories in Member States and non-Member States, 2014[(a)]

Food category	Samples tested by ISO/TS 13136: 2012[(a)]	Samples positive for											
		any VTEC		O157		O26		O145		O103		O111	
	N	N pos	% pos	N pos	% pos	N pos	% pos	N pos	% pos	N pos	% pos	N pos	% pos
Bovine meat[(b)]	2,522	75	3.0	3	0.1	5	0.2	3	0.1	5	0.2		
Ovine and goat meat[(b)]	21	3	14.3							1	4.8		
Other ruminants meat[(b),(c)]	40	13	32.5										
Pig meat[(b)]	841	10	1.2	1	0.1								
Other meat[(b)(d)]	786	13	1.7			1	0.1						
Milk and dairy products[(e)]	2,182	13	0.6			4	0.2			3	0.1		
Raw milk[(f)]	410	13	3.2	1	0.2	4	1.0	2	0.5	2	0.5	1	0.2
Fruit and vegetable	1,150	1	0.1										
Seeds[(g)]	799												
Other food	217												
Total	8,968	141	1.6	5	0.1	14	0.2	5	0.1	11	0.1	1	0.0

N: number of samples; pos: positive; VTEC: verocytotoxigenic *Escherichia coli*.
(a): Only samples tested by the ISO/TS 13136 method or other Real Time PCR-based methods employing similar reagents and protocols were considered.
(b): The different meat categories presented in this table include all type of meat (not only fresh);
(c): Includes meat from deer.
(d): Includes meat from other animals (other than ruminants);
(e): Includes any type of dairy product, cheese and milk other than raw milk;
(f): Includes raw milk from different species, but the majority of the tested and all the positive samples were from cows;
(g): The majority of samples were sprouted seeds, but dry seeds are also included in this category.

The data on the VTEC serogroups reported for food samples by applying any analytical method were used to estimate the relative frequency of each serogroup in the different food categories. In total, 12 MS provided information on the serogroups of 226 VTEC isolates obtained from food samples. For 53 isolates, only the information that they did not belong to O157 serogroup was reported, while the VTEC serogroup was determined for the other 173 isolates. Overall, the most frequently reported serogroup was VTEC O157 with 58 isolates (25.7% of the 226 VTEC isolates; 33.5% of the 173 strains with an identified serogroup). However, the frequency might have been influenced by MS-specific results, as most of the VTEC-O157 positive samples were reported by Spain and Portugal. VTEC O157 was reported in bovine meat (25 isolates), other meat (8), pig meat (3) and raw milk (2). Twenty isolates derived from a single investigation conducted in Spain on 'other foods' but no details on the type of samples were provided.

After O157, the second most reported serogroup was VTEC O26 (8.7% of the 173 strains with an identified serogroup), followed by O103 (6.9%), O145 (2.9%), O113 (6.4%), O146 (4.6%), O174 (4.6%), and O91 (4.0%). It is interesting to note that all these serogroups, with the possible exception of O174, are among those most commonly reported in human infections in the EU in 2014, as well as in the preceding years (ECDC, 2013).

The relative frequency distribution of the non-O157 VTEC serogroups in the different food categories is shown in Table 16. VTEC O26 was particularly common among the isolates from milk and dairy products while VTEC O113, O146, O174 and O91 occurred frequently among isolates from meat products. Serogroups O103 and O145 were reported in both meat and milk and dairy products. Other reported serogroups were: VTEC O8, O21, O22, O43, O55, O74, O88, O130, O139, O142, O15O, O153, O176, O182, and O183.

Table 16: Frequency distribution of non-O157 VTEC serogroups in food categories in Member States, 2014

Food category	No of VTEC isolates with serogroup reported	Non-O157 VTEC serogroups[a] % of VTEC isolates with serogroup, reported in the specific food category														
		O26	O103	O145	O111	O146	O91	O76	O113	O5	O174	O87	O116	O6	Other serogroups (list)	
Bovine meat[b]	44	11.4	13.6	6.8		2.3	4.5		18.2	2.3	13.6		4.5		22.7	(O8, O22, O55, O130, O183)
Ovine and goat meat[b]	7		14.3			28.6					14.3	14.3		14.3	14.3	(O176)
Other ruminants meat[b],[c]	15					26.7	13.3								60.0	(O74, O88, O139, O142)
Pig meat[b]	3								33.3						66.7	(O74, O182)
Other meat [b][d]	17	5.9					17.6	17.6			5.9				52.9	(O8, O15, O21, O43, O88)
Milk and dairy products[e]	15	33.3	20.0					13.3	13.3						20.0	(O153)
Raw milk[f]	13	30.8	15.4	15.4	7.7										30.8	(O55)
Fruit and vegetable	1					100.0										
Totals	115	14.8	11.9	4.9	1.0	7.9	6.9	4.9	10.9	1.0	7.9	1.0	2.0	1.0	33.0	(O8, O15, O21, O22, O43, O55, O74, O88, O130, O139, O142, O153, O176, O182, O183)

Note: data originating from any analytical method are included.
(a): Non-O157 VTEC serogroups are listed according to their public health relevance as a cause of human infections in the EU (EFSA BIOHAZ Panel, 2013a).
(b): The different meat categories presented in this table include all type of meat (not only fresh).
(c): Includes meat from deer.
(d): Includes meat animals other than non-ruminant species.
(e): Includes any type of dairy product, cheese and milk other than raw milk.
(f): Includes raw milk from different species, but the majority of tested samples and all the positive samples were from cows.

Trends in the reporting of VTEC serogroups in food

The proportion of food samples positive for the VTEC serogroups most frequently reported by MS and non-MS between 2011 and 2014 was analysed and is reported in Figure 25. More details on the serogroup reporting trends are provided in Table 2014_VTECGROUPTRENDFOOD. Due to the low number of positive samples for each food category, data were presented aggregated for the total of all food samples tested. An increasing trend of reporting in food was observed for VTEC O26 and VTEC O103, two serogroups strongly associated with severe human infections in the EU.

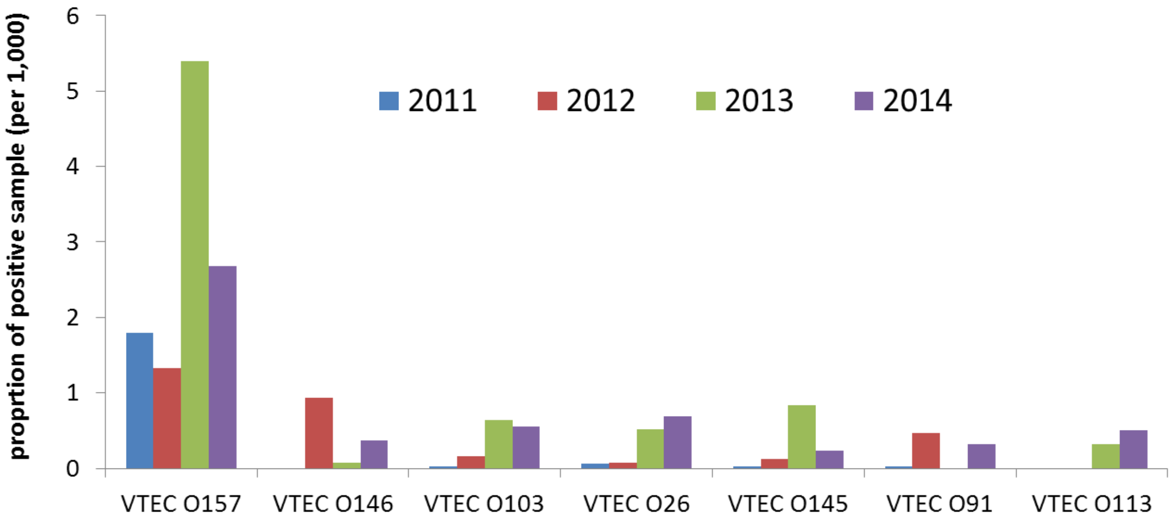


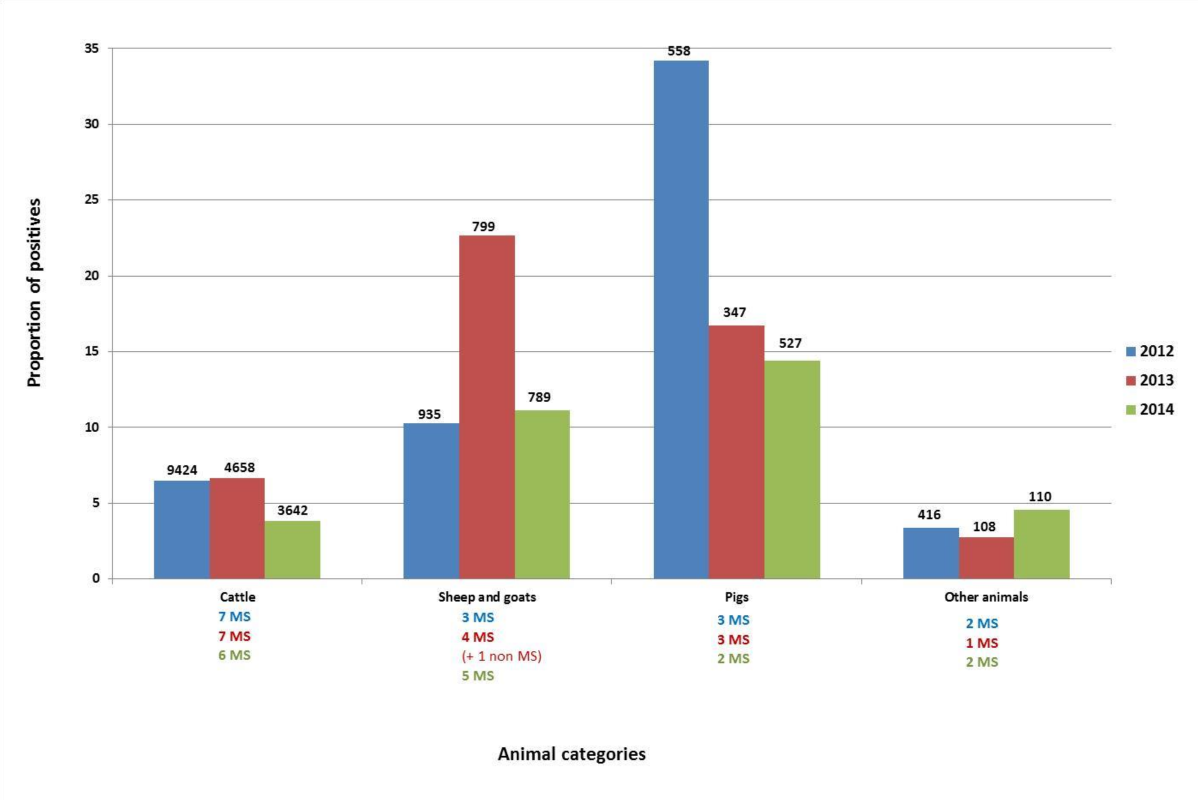
Figure 25: Proportion of food samples positive for the most frequent VTEC serogroups (per 1,000 samples tested), reported by Member States and non-Member States, 2011–2014

Verocytotoxigenic *Escherichia coli* in animals

Overall, data on VTEC in animals were provided by 10 MS (5,526 samples tested in total), five of which followed the EFSA technical specifications for the monitoring and reporting of VTEC (EFSA, 2009a) and adapted the standard methods ISO/TS 13136:2012, ISO 16654:2001 and NMKL 164:2005 to test animal samples (Table 2014_VTECANMETH). A total of 1,884 samples (34.1%) were tested by these methods, while the use of unspecified microbiological tests was reported for 10.9% of the samples. For 46.5% of samples, the method was not reported and remained not classified.

Detailed information on the data reported and on the occurrence of VTEC in the different animal categories has been included in specific tables referenced in Appendix.

The proportion of VTEC-positive samples in the main animal species, regardless the analytical method employed, is shown in Figure 26, in comparison with the proportions reported in 2012 and 2013.



Data from suspect sampling, selective sampling, and clinical investigations were not included in this graph. Other animals include: cats, dogs, horses, donkeys, turkeys and other animals.
Source 2012: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Poland, Romania, Slovenia, Spain and Sweden.
Source 2013: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, the Netherlands, Poland, Slovakia, Spain and Norway.
Source 2014: Austria, Denmark, Estonia, Finland, Germany, Italy, Netherlands and the United Kingdom.

Figure 26: Proportion of VTEC-positive samples in animal categories in Member States and non-Member States, 2012–2014

As in the previous 2 years, the reported proportion of VTEC-positive samples in 2014 was higher for pigs (14.4% of 527 tested units) and sheep and goats (11.2% of 789 tested units) than for cattle (3.8% of 3,642 tested units). However, the testing results were influenced by MS-specific results, as most data on pigs were reported by a single MS (Germany) and no details were provided on the method used and on the serogroups and virulence genes (*vtx1*, *vtx2*, *eae*) of most of the VTEC strains isolated.

As for the VTEC serogroups, all MS reporting VTEC in animals in 2014 provided information on serogroup O157, and 130 VTEC O157-positive samples (2.4%) were reported by nine MS. The highest proportion of VTEC O157-positive samples was reported for cattle (3.0%).

Results for the most important animal categories are presented below.

Cattle

Six MS reported 3,642 units of cattle tested for VTEC (2,517 animals, 1,132 herds and 2 holdings) and five MS reported positive findings. In total, 3.8% of the samples were positive for VTEC and 1.2% was positive for VTEC O157 (Figure 26 and Table 2014_VTECCATTLE). The overall proportion of VTEC-positive units found in cattle was lower than in 2013 (Figure 26). Finland reported positive results for 2.6% of 1,545 units specifically tested for VTEC O157. Germany reported positive results for 2.6% of 1,513 units tested for VTEC, with only two isolates reported as VTEC O157 (0.1%). The highest proportion of positive samples was reported by Austria, who found 31.9% of the 135 cattle sampled at slaughter positive for VTEC, with two of them (1.5%) being VTEC O157. Of the 21 serogroups reported from cattle, the most frequent was O157 (112 isolates), followed by O26 (14), O113 (6), O174 (5) and O103 (4).

Sheep and goats

In 2014, five MS reported 789 units of sheep and goats tested for VTEC (748 animals and 41 herds), and 11.2% was positive. There were no findings of VTEC O157 (Figure 26, Table 2014_VTECOVINEGOAT). In sheep, 86 out of 586 tested units (14.7%) were positive, compared with 2 out of 203 tested units in goats (1.0%). The highest proportion of positive samples was reported by Austria in sheep sampled at the farm using recto-anal swabs as the sampling method (60.2% positive out of 133 animals tested).

In 2014, a monitoring programme on the trends of VTEC prevalence in cattle at slaughter and sheep at the farm was carried out in Austria throughout 2014. The high prevalence of isolated VTEC from cattle (31.9%) and sheep (60.2%) could be due to the type of sample (testing recto-anal swabs could be more sensitive than faecal culture), the PCR-based analytical procedure, and the improvement in the VTEC isolation techniques, obtained by using enterohemolysin-agar.

[Source: complementary information provided by Austria to EFSA in the context of the 2014 data reporting on zoonoses and food-borne outbreaks]

Pigs

Pigs were tested for VTEC in Germany and Italy, which reported data on 527 units (187 herds and 340 animals) (Figure 26). In particular, Germany found 13.5% of 340 animals and 17.7% of 170 herds positive for VTEC, out of which 0.9% and 1.2% were positive for VTEC O157, respectively (Table 2014_VTECPIGS). All the 17 herds tested in Italy were negative for any VTEC. The non-O157 VTEC serogroups detected included O103 (3 samples), O26 (1), O111 (1), and the 'pig host adapted' serogroups O139 (2) and O141 (3). However, no information on serogroup was reported for most VTEC-positive samples.

Other animal species

Two MS reported data on 110 units of cats, dogs and solipeds (horses and donkeys) tested for VTEC. Positive findings were reported by Germany in dogs (1 positive out of 43 tested) and horses (2 positive animals out of 23 tested, and two positive herds out of 17 tested herds). The overall proportion of VTEC-positive units in cats, dogs and solipeds was 4.6% and VTEC O157 was not reported in these positive units (Figure 26 and Table 2014_VTECOTHERANIMAL).

However, when the whole set of submitted data was used for serogroup analyses, VTEC O157 (n=2) and O26 (n=1) were reported in dogs sampled in Germany and Slovakia, and VTEC O26 (n=2) and VTEC O103 (n=2) in horses in Germany. Moreover, VTEC strains belonging to serogroups O103 (n=3), O157 (n=1), O26 (n=1), O111 (n=1) and O145 (n=1) were reported in wild deer in Italy.

VTEC serogroups in animals

In total, nine MS provided information on the serogroups of 303 VTEC isolates obtained from animal samples. Most isolates where from cattle (n=172) and goats and sheep (n=102), where multiple isolates were obtained from several samples.

Overall, the most frequently reported serogroup was VTEC O157 with 130 isolates (42.9%). Table 17 describes the non-O157 VTEC serogroups detected by four MS in the different animal categories.

Table 17: Frequency distribution of non-O157 VTEC serogroups in animals in Member States, 2014

Animal species	No of VTEC isolates with serogroup reported	VTEC serogroups[(a)] % of total VTEC isolates with serogroup reported in the specific animal category																
		O26	O103	O145	O111	O146	O91	O76	O128	O113	O121	O5	O174	O166	O87	O116	O6	Other serogroups (list)	
Cattle	60	23.3	6.7	1.7			5.0			10.0	1.7	3.3	8.3			5.0	1.7	33.3	(O18, O22, O79, O109, O177, O178, O179, O181, O183)
Goat and sheep	92	3.3				14.1	3.3	7.6	2.2	5.4		17.4	3.3	10.9	8.7		3.3	20.7	(O75, O81, O82, O104, O112, O148, O149, O176)
Other ruminants[(b)]	6	16.7	50.0	16.7	16.7														
Pigs[(c)]	10	10.0	30.0		10.0													50.0	(O139, O141)
Other animals[(d)]	5	60.0	40.0																
Totals	173	12.7	6.9	1.2	1.2	7.5	3.5	4.0	1.2	6.4	0.6	10.4	4.6	5.8	4.6	1.7	2.3	25.4	(O22, O75, O79, O81, O82, O104, O109, O112, O139, O141, O148, O149, O176, O177, O178, O179, O181, O183, O185)

Note: data originating from any analytical method are included.
(a): Non-O157 VTEC serogroups are listed according to their public health relevance as a cause of human infections in the EU (EFSA BIOHAZ Panel, 2013a);
(b): Includes only deer;
(c): Includes also wild boar;
(d): Includes birds, cats, dogs, fowl, solipeds and turkeys.

After VTEC O157, the second most reported serogroup was VTEC O26 (7.3% of the 303 strains with an identified serogroup), which was mainly detected in cattle but was present in all the animal species. Other VTEC serogroups that are among those most commonly found as a cause of human infections in the EU/EEA in 2014 and in the preceding years (ECDC, 2013) were O146 (4.3% of the strains with an identified serogroup), only detected in sheep and goats, O103 (3.9%), isolated from all the species except sheep and goats, and O113 (3.6%) and O91 (2.0%), found in cattle as well as in sheep and goats. A few isolates belonging to the 'top 5' serogroups O111 (0.7%), and O145 (0.7%) were obtained from cattle, other ruminants, and pigs.

Other reported serogroups were VTEC O5 (5.9%), frequently found in sheep and goats, VTEC O6, O22, O63, O75, O76, O79, O81, O82, O104, O109, O111, O112, O116, O121, O125, O128, O139, O141, O145, O148, O149, O176, O177, O178, O179, O181, O183, and O185. It is important to note that the O104 strain reported by Austria in sheep was not of serotype O104:H4 but was typed as O104:H7 (with genotype *vtx1*+, *vtx2*-, *eae*-).

Trends in the reporting of VTEC serogroups in animals

The proportion of animal samples positive for the VTEC serogroups most frequently reported by MS and non-MS between 2011 and 2014 was analysed and is reported in Figure 27. More details on the serogroup reporting trends are provided in Table 2014_VTECGROUPTRENDANIM. Due to the low number of positive samples for each animal category, data were presented aggregated for the total animal samples tested. Similar to the food data, an increasing trend of reporting was observed for VTEC O26 in animals.

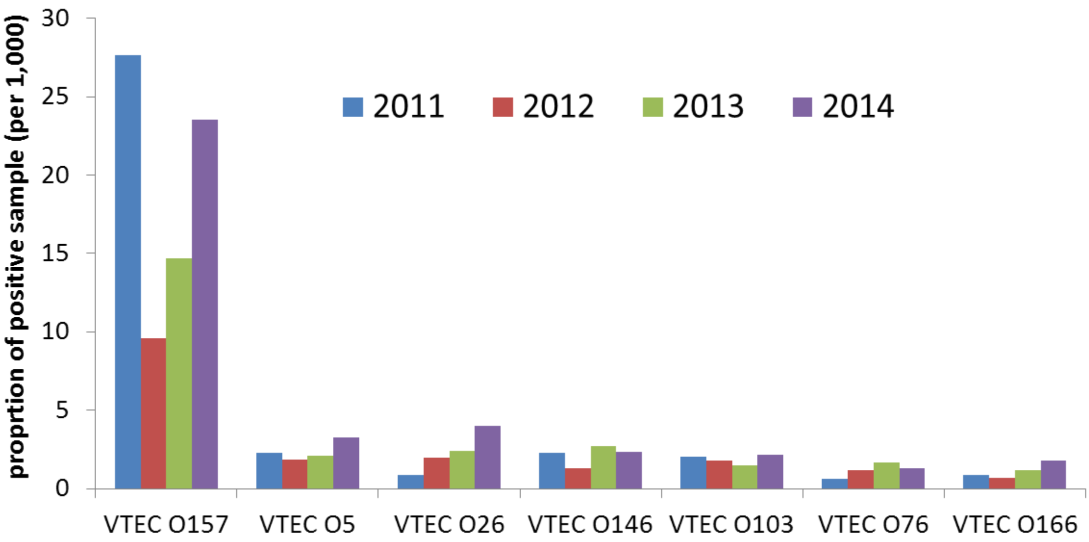
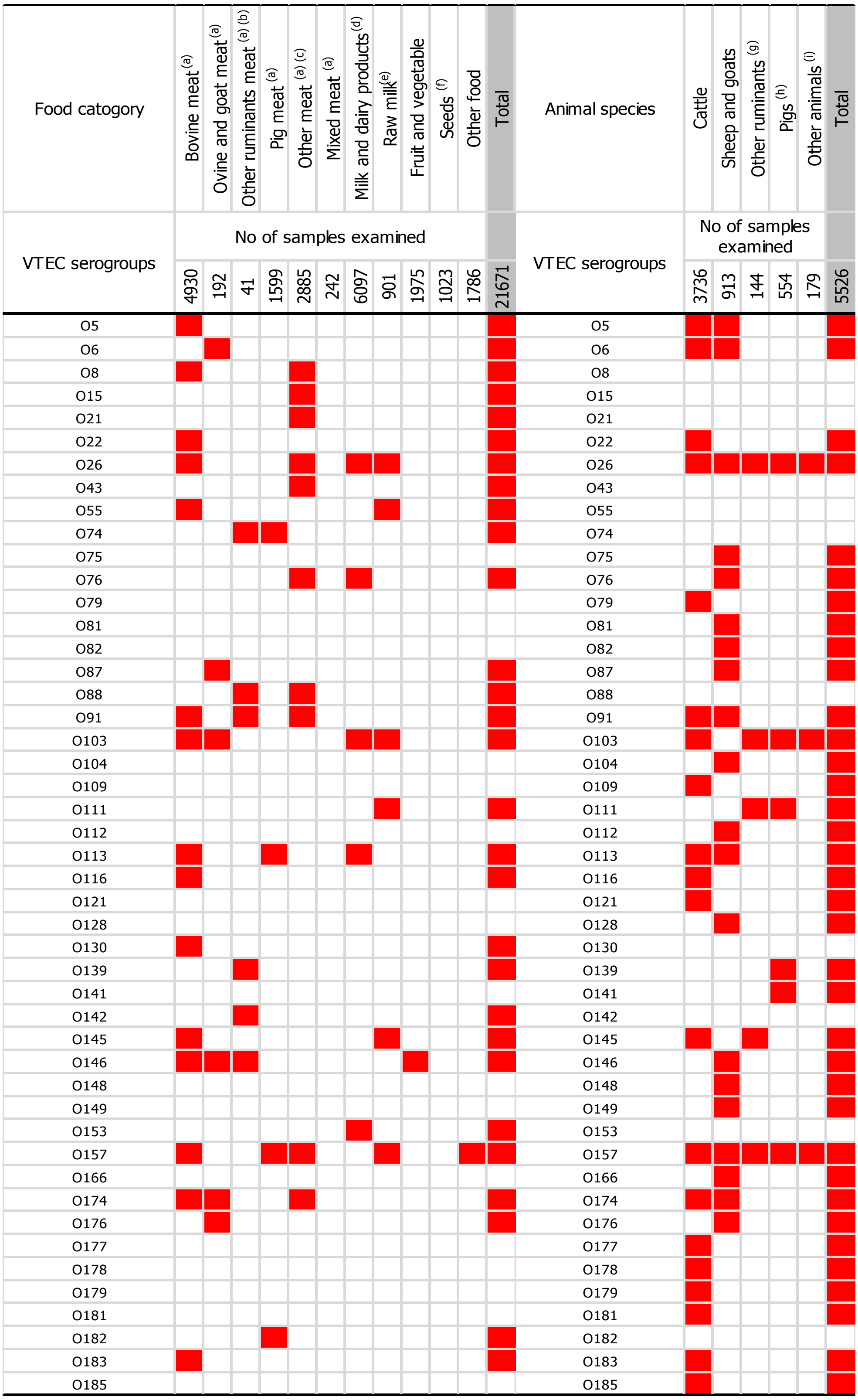


Figure 27: Proportion of animal samples positive for the most frequent VTEC serogroups (per 1,000 samples tested), reported by Member States and non-Member States, 2011–2014

Atlas of the VTEC serogroups reported in food and animals in the EU in 2014

The data on the VTEC serogroups provided by MS in 2014 were used to generate an 'atlas' of the presence/absence of the VTEC serogroups in the different food and animal categories in the EU (Figure 27) and in the different EU MS (Figure VTECATLASGROUPCOUNTRY). However the differences in the sampling strategies and analytical methods applied by reporting countries do not allow confirmation of the existence of specific trends in the geographical distribution of VTEC serogroups.

The trends in the reporting of the different VTEC serogroups in food and animals samples in the EU between 2011 and 2014 are reported in Figure 2014_VTECGROUPATLASTREND.



Presence (red) and absence (white) of VTEC serogroups in foods (on the left) and animals (on the right); (a): the different meat categories presented in this table include all type of meat (not only fresh); (b): includes meat from deer; (c): includes meat from other animals other than ruminants); (d): includes any type of dairy product, cheese and milk other than raw milk; (e): includes raw milk from different species, but the majority of tested samples and all the positive samples were from cows; (f): the majority of samples were sprouted seeds, but it also includes dry seeds; (g): includes only deer; (h): includes also wild boar; (i): includes birds, cats, dogs, fowl, solipeds and turkeys.

Figure 28: Presence (red boxes) and absence of VTEC serogroups in foods (left) and animals (right), sampled in the EU in 2014

3.4.3. Discussion

The EU notification rate for human VTEC infections has increased significantly over the last 7-year period. Part of the increase may be explained by increased general awareness of VTEC following the largest ever reported VTEC outbreak in 2011. Other contributing factors are probably the increasing number of laboratories testing for serogroups other than O157 and the shift in diagnostic methods with PCR being more commonly used for detection of VTEC in stool samples.

Of the VTEC cases with known hospitalisation status, more than one-third were hospitalised. Some countries reported very high proportions of hospitalised cases, but had notification rates that were among the lowest, indicating that the surveillance systems in these countries primarily capture the most severe cases. As in previous years, the most commonly reported serogroup was O157, followed by O26, and, less commonly, O103, O145, O91, O146 and O111. In addition, a high proportion of non-typable VTEC and VTEC strains that lack the O-chains in the lipopolysaccharide (O-rough) were reported. Serogroups O157 and O26 were also the most common among HUS cases.

In 2014, data on the presence of VTEC in food and animals were reported by 21 MS and one non-MS. The lack of data from seven MS represents a critical point, as VTEC are considered among the pathogens with the highest priority, as laid down in Directive (EC) 99/2003/EC. Most reporting countries (15 MS and one non-MS) provided data obtained by applying the analytical methods indicated by the EFSA technical specifications for the monitoring and reporting of VTEC (EFSA, 2009a). However, for 14% of the food samples and 46.5% of the animal samples tested the method used was not reported and so remained not classified. The number of samples tested by the reporting countries for each food and animal category was highly variable, and such an unequal distribution may have introduced selection bias in the estimates of VTEC prevalence or VTEC serogroup distribution.

Overall, the presence of VTEC was reported in 1.6% of the food samples and in 6.2% of the animal samples tested. The highest proportion of VTEC-positive samples was reported for meat from wild ruminants, but the figure referred to a limited number of samples reported by two MS. Positive samples were also reported for ovine and goat meat, milk and fresh bovine meat. VTEC were reported in about 1% of cheese samples, in particular those made from sheep and goat's milk, while contamination was rare in RTE food of vegetal origin. In particular, no VTEC-positive samples were reported for spices and herbs nor for sprouted seeds, the sole food category for which microbiological criteria for VTEC have been established in the EU.

Among animals, the reported proportion of VTEC-positive samples was higher for pigs (14%) and sheep and goats (11%) than for cattle (4%). However the testing results were influenced by MS-specific results, as most data on pigs were reported by a single MS, and no details were provided on the method used and the characteristics of the VTEC strains isolated. The highest proportion of VTEC O157-positive samples was reported for cattle.

A wide range of VTEC serogroups was reported, with VTEC O157 being the most frequent in both food and animal samples. However, it should be noted that many of the MS's surveillance and monitoring programmes are traditionally focused on this serotype and this may have introduced a bias in the estimates of the frequency of VTEC serogroups. In this respect, it is interesting to note that serogroups O26 and O103 were reported more frequently than O157 in the food samples that were tested using the ISO/TS 13136:2012 standard method, which is able to detect any VTEC regardless of its serotype.

Similar to the data referring to human infections, the VTEC serogroup O26 was the second most reported serogroup in both food and animal samples, with an increasing trend between 2011 and 2014. It is also interesting to note that the VTEC serogroups most frequently found in food samples (O157, O26, O103, O113, O146, O91, O145) are those most commonly reported in human infections in the EU/EEA in 2014 and also in the preceding years (ECDC, 2013; EFSA BIOHAZ Panel, 2013a).

3.5. *Yersinia*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans, food, animals and food-borne outbreaks. It also includes hyperlinks to *Yersinia* summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.5.1. Yersiniosis in humans

A total of 6,625 confirmed cases of yersiniosis were reported in the EU in 2014 by 25 MS (Table 18). The EU notification rate was 1.92 cases per 100,000 population, which was comparable with 2013. The highest country-specific notification rates were observed in Finland and Denmark (10.62 and 7.71 cases per 100,000 population, respectively).

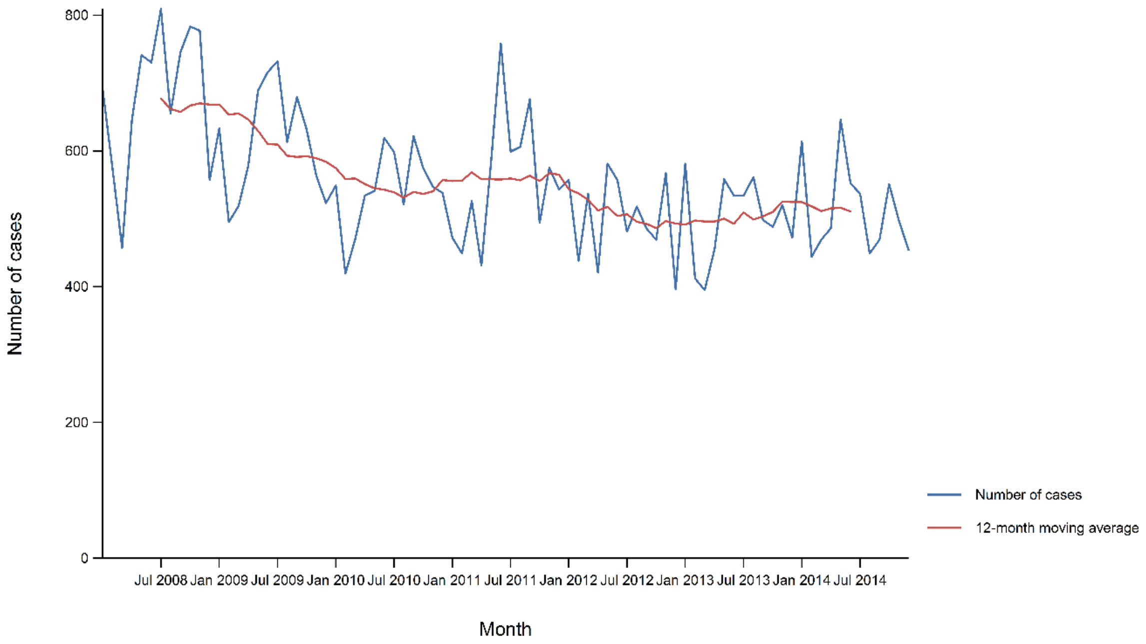
Most of the yersiniosis cases reported in the EU were infected within their own country (64.3% domestic cases, 4.3% travel-associated and 31.4% of unknown origin). Sweden reported the highest proportion of travel-associated cases; 23.4% – but 76.6% were of unknown origin. Among the Swedish- travel associated cases, Spain and Italy were the most common probable countries of infection; representing 16.4% and 7.3% of the cases respectively.

Table 18: Reported human cases of yersiniosis and notification rates in the EU/EEA, by country and year, 2008–2014

Country	2014					2013		2012		2011		2010	
	National coverage[a]	Data format[a]	Total cases	Confirmed cases &rates		Confirmed cases &rates		Confirmed cases &rates		Confirmed cases &rates		Confirmed cases &rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	107	107	1.26	158	1.87	130	1.55	119	1.42	84	1.00
Belgium[b]	N	C	309	309	–	350	–	256	–	214	–	216	–
Bulgaria	Y	A	20	20	0.28	22	0.30	11	0.15	4	0.05	5	0.07
Croatia	Y	A	20	20	0.47	–	–	–	–	–	–	–	–
Cyprus	Y	C	0	0	0.00	1	0.12	0	0.00	0	0.00	0	0.00
Czech Republic	Y	C	557	557	5.30	526	5.00	611	5.82	460	4.39	447	4.27
Denmark	Y	C	434	434	7.71	345	6.16	291	5.22	225	4.05	193	3.49
Estonia	Y	C	62	62	4.71	72	5.45	47	3.55	69	5.19	58	4.35
Finland	Y	C	579	579	10.62	549	10.12	565	10.46	554	10.31	522	9.75
France[b]	N	A	574	574	–	430	–	314	–	294	–	238	–
Germany	Y	C	2,485	2,470	3.06	2,579	3.15	2,690	3.29	3,381	4.15	3,346	4.10
Greece[c]	–	–	–	–	–	–	–	–	–	–	–	–	–
Hungary	Y	C	43	43	0.44	62	0.63	53	0.54	93	0.95	87	0.88
Ireland	Y	C	5	5	0.11	4	0.09	2	0.04	6	0.13	3	0.07
Italy[b]	N	C	18	18	–	25	–	14	–	15	–	15	–
Latvia	Y	C	28	28	1.40	25	1.24	28	1.37	28	1.35	23	1.09
Lithuania	Y	C	197	197	6.69	262	8.82	276	9.19	370	12.12	428	13.62
Luxembourg	Y	C	19	19	3.46	15	2.79	–	–	–	–	–	–
Malta	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	1	0.24
Netherlands[c]	–	–	–	–	–	–	–	–	–	–	–	–	–
Poland	Y	C	215	215	0.57	199	0.52	201	0.52	235	0.61	205	0.54
Portugal[c]	–	–	–	–	–	–	–	–	–	–	–	–	–
Romania	Y	C	32	32	0.16	43	0.22	26	0.13	47	0.24	27	0.14
Slovakia	Y	C	172	172	3.18	164	3.03	181	3.35	166	3.08	166	3.08
Slovenia	Y	C	19	19	0.92	26	1.26	22	1.07	16	0.78	16	0.78
Spain[d]	N	C	436	436	3.13	243	1.75	221	1.91	264	2.28	325	2.81
Sweden	Y	C	248	248	2.57	313	3.28	303	3.20	350	3.72	281	3.01
United Kingdom	Y	C	61	61	0.10	59	0.09	54	0.09	59	0.09	55	0.09
EU Total	–	–	6,640	6,625	1.92	6,472	1.92	6,339	1.96	6,969	2.22	6,741	2.16
Iceland	Y	C	3	3	0.92	0	0.00	–	–	–	–	–	–
Norway	Y	C	211	211	4.13	55	1.09	43	0.86	60	1.22	52	1.07

(a): Y: yes; N: no; A: aggregated data; C: case-based data; –: no report.
(b): Sentinel surveillance; no information on estimated coverage thus notification rate cannot be estimated.
(c): No surveillance system.
(d): Sentinel system; notification rates calculated with an estimated population coverage of 30% in 2013–2014 and 25% in 2009–2012.

There was no clear seasonality, but more cases were normally reported between May and September compared with other months. There was a statistically significant ($p < 0.01$) decreasing 7-year trend in 2008–2014 in the EU/EEA (Figure 29). All MS for which data was available for the whole period reported stable or declining trends from 2008 to 2014.



Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Latvia, Lithuania, Malta, Norway, Poland, Slovakia, Slovenia, Spain, Sweden and United Kingdom. Bulgaria, Croatia, France, Iceland, Italy, Luxembourg and Romania did not report data to the level of detail required for the analysis. Greece, the Netherlands and Portugal do not have any formal surveillance system for the disease.

Figure 29: Trend in reported confirmed human cases of yersiniosis in the EU/EEA, by month of reporting, 2008–2014

Species information was reported by 21 countries for 5,775 (87.2%) of the confirmed yersiniosis cases in the EU/EEA in 2014. *Y. enterocolitica* was the most common species reported in all countries, having been isolated from 97.7% of the confirmed cases at EU/EEA level. Information about the *Y. enterocolitica* serotypes was provided for 2,593 (39.1%) confirmed cases. The most common serotype was O:3 (83.2%), O:9 (14.0%) and O: 5,27 (1.7%). Biotype information was provided by only three countries (Austria, Lithuania and Poland) for 178 (2.7%) confirmed cases. The most commonly reported biotypes were biotype 4 (serotype O:3) and biotype 2 (serotype O:9), 87.6% and 8.4% respectively.

Y. enterocolitica was followed by *Y. pseudotuberculosis*, which represented 1.8% of isolates. Finland and the United Kingdom reported the highest proportion of *Y. pseudotuberculosis,* representing 13.0% and 23.2% of all confirmed yersiniosis cases, respectively. Finland reported 71.4% of all confirmed cases of *Y. pseudotuberculosis* at the EU/EEA in 2014; attributed to a *Y. pseudotuberculosis* O:1 outbreak in February-April which involved 55 confirmed cases (THL, 2015).

Twelve MS provided information on hospitalisation for some or all of their cases, accounting for only 15.2% of confirmed yersiniosis cases in the EU, which was similar to the previous year. Among these, almost half (44.0%) were hospitalised in 2014. The highest hospitalisation rates (60.0–85.7% of cases) were reported in Ireland, Latvia, Poland and Romania. These countries also reported among the lowest notification rates of yersiniosis, which indicates that the surveillance systems in these countries primarily capture the more severe cases. The EU case-fatality rate was 0.13%; five fatal cases all due to *Y. enterocolitica* were reported in 2014 among the 3,861 confirmed yersiniosis cases for which this information was reported (58.3% of all confirmed cases). As for most diseases, however, the case-fatality rate should be interpreted with caution, as the final outcome of cases is often unknown after the initial sampling.

3.5.2. *Yersinia* in food and animals

Comparability of data

At present there is no harmonised surveillance of *Yersinia* in the EU and, when interpreting the data on *Yersinia* in foods and animals, it is important to note that data from different investigations are not necessarily directly comparable owing to differences in sampling strategies and testing methods. A scientific report of EFSA suggested technical specifications for the harmonised monitoring and reporting of *Y. enterocolitica* in slaughter pigs in the EU (EFSA, 2009b). No MS provided detailed information on the microbiological test used; Germany reported using microbiological standard test. Only results for the most important foods and animal species that might serve as a source for human infection in the EU are presented.

Food

In 2014, four MS provided information on *Yersinia* from 45 investigations on food samples from meat (mainly pig meat), milk and other dairy products. In 16 investigations (35.6%) more than 10 samples were analysed. *Yersinia* was detected in 13 of these investigations ranging from 1.18% to 58.8% of samples, and in seven investigations *Y. enterocolitica* was reported. Additionally, MS provided data on vegetables and other types of food and prepared dishes (Table YERSOVERVIEW). In 2014, fewer MS reported data on *Yersinia* in foods than in 2013 (nine MS and one non-MS).

Four MS reported data from 24 investigations of pig meat and products thereof (nine including more than 10 samples). The majority of the investigations were reported by Italy and Germany (70.8%) (Table 2014_YERSPIGMEAT). Three MS reported findings of *Yersinia* in nine investigations ranging from 1.18% to 58.8% of samples; five of the investigations reported the positive findings as *Y. enterocolitica*. Sampling was mainly carried out as part of surveillance programmes or surveys.

Three MS reported results from nine investigations on *Yersinia* in bovine meat and products thereof (Table 2014_YERSBOVINEMEAT). Three investigations included more than 10 samples and two of these had 31.3% and 36.7% positive findings of *Yersinia.* There were no *Y. enterocolitica* positives. The investigations with < 10 samples had no positive findings.

Two MS reported data from 15 investigations *Yersinia* in milk and dairy products; 12 investigations had < 10 samples. One MS detected *Yersinia* (more specifically *Y. enterocolitica)* in two investigations (one positive sample in each) of raw cow's milk (Table 2014_YERSMILKDAIRY).

Only Spain reported data on ovine meat at retail in 2014 in one investigation and found five positives (all *Y. enterocolitica*) out of 16 samples tested. (Table 2014_YERSOVINEMEAT).

For 78 isolates from food, information about biotype and/or serotype was provided. Two biotypes were reported; biotype 1A that was the most common (68 isolates), and biotype 4 (2 isolates). The serogroup was only reported for a few isolates; serogroup O:3 and O:5 (four isolates each) and serogroup O:8 and O:9 (one isolate each).

Animals

In 2014, six MS provided data from 48 investigations in animals for *Yersinia*, which are fewer reporting MS compared to 2013 when 12 MS and one non-MS provided animal data for *Yersinia*. Fifteen investigations had < 10 samples. Germany and Italy reported 85% of all investigations. Data were mostly reported from domestic animals.

Three MS provided information from four investigations on *Yersinia* in pigs, and two MS reported positive findings of *Yersinia* in three investigations (1.6%, 2.0% and 30.5%). Most findings were reported as *Y. enterocolitica* (0.8%, 1.5% and 30.5%, respectively) (Table 2014_YERSPIGS).

Three MS reported data from 25 investigations in domestic animals other than pigs (cattle, *G. gallus*, goats, sheep, horses and turkeys). Germany reported 68.0% of the investigations. Six investigations had < 10 samples. Twelve investigations had positive findings of *Yersinia* ranging from 0.1% to 25.6%. Three MS reported on nine investigations of cattle and six investigations had positive findings ranging from 0.1% to 25.6%. In four investigations, *Y. enterocolitica* was detected, ranging from 0.6% to 25.6% (Table 2014_YERSDOMAN). Three MS reported information on *Yersinia* in sheep and goats from nine investigations, and six of these had positive findings of *Yersinia*, ranging from 0.3% to 6.7% of samples. In four investigations *Y. enterocolitica* were detected ranging from 0.8% to 4.3% of samples. The seven investigations in *G. gallus*, horses and turkeys did not have positive findings.

Four MSs reported data from 19 investigations in other animal species, eight having less than 10 samples. *Y. enterocolitica* was found in cats, dogs, deer, foxes, hares and wild boar.

For 217 isolates from animals, information about biotype and/or serotype was provided. Two biotypes were reported – biotype 1A was the most common reported (12 isolates from hunted wild boar). Biotype 1B was reported for three isolates from wild boar and deer. As in 2013, serotype O:9 was the most common reported, followed by serotype O:3. Serotypes O:9 and O:3 were mainly reported from cattle – for 112 out of 122 and 60 out of 71 isolates respectively. Serotype O:9 was also reported from goats, pigs, deer, foxes, and hunted wild boar and serotype O:3 was reported from dogs, goats, pigs, and foxes. Serotype O:8 was reported from deer, foxes and hunted wild boar and serotype O:5 from hunted wild boar, hares, foxes and deer.

3.5.3. Discussion

Yersiniosis was the third most commonly reported zoonosis in the EU in 2014, despite the significantly decreasing trend between 2008 and 2014. The highest notification rates were reported in MS in north-eastern Europe. *Y. enterocolitica* was the dominating species in sporadic infections, whereas most *Y. pseudotuberculosis* cases were linked to an outbreak. The most common serotypes in human cases were serotype O:3 and O:9. The proportion of hospitalisations among reported yersiniosis cases for which such data are provided was fairly high, almost half of the yersiniosis cases were hospitalised. An explanation for this could be that in some countries, the surveillance is focused on severe cases, especially as the countries with the highest hospitalisation rate reported the lowest notification rate for yersiniosis.

Only very few MS report data from surveillance of *Yersinia* in food and animals. In 2014, two MS reported positive findings for *Y. enterocolitica* in pig meat and products thereof, and two MS reported positive findings in pigs. Positive findings were also reported in other foods (bovine meat, ovine meat and raw cow's milk) and in other animals (cattle, goats, sheep, foxes, hunted wild boar, dogs, deer, hares, cats).

According to the Scientific Opinion published by the BIOHAZ Panel in 2007 (EFSA BIOHAZ Panel, 2007c), it is well-documented that pigs can harbour human pathogenic *Y. enterocolitica,* especially in the tonsils, with a very high prevalence, especially biotype 4 (serotype O:3). Reservoirs other than pigs may also play a role in the epidemiology of human yersiniosis. Evidence suggests that ruminants (e.g. cattle) may play a role as reservoirs for biotype 2 (serotype O:9). The opinion further concluded that the majority of human pathogenic *Y. enterocolitica* strains in Europe belong to biotype 4 (serotype O:3), followed by biotype 2 (serotype O:9). Biotypes 1B, 3 and 5 are also pathogenic in humans, whereas biotype 1A is considered to be largely non-pathogenic. Therefore, it is important that information is provided on the biotype of each *Y. enterocolitica* isolate in order to assess its public health significance. It is recommended that biotyping, and preferably also serotyping, is increased in the future. Only a small amount of information is provided on serotypes in the reporting system for *Yersinia*. Hopefully, an increased focus on the reported *Yersinia* data and more sensitive methods will improve the detailed information on *Yersinia* in the future.

3.6. Tuberculosis due to *Mycobacterium bovis*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans and animals. It also includes hyperlinks to *M. bovis* summary tables and figures that were not included in this section because they did not trigger any marked observations. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.6.1. *Mycobacterium bovis* in humans

In 2014, 145 confirmed cases of tuberculosis due to *M. bovis* in humans were reported in nine EU MS (Table 19). The EU notification rate was 0.03 cases per 100,000 population and this did not change compared with 2013. Most cases were reported in Germany, the United Kingdom and Spain, while the highest notification rate (0.09 cases per 100,000 population) was observed in Belgium.

Table 19: Reported human cases of tuberculosis due to *M. bovis* and notification rates per 100,000 population in the EU/EEA, by country and year, 2010–2014

Country	2014				2013		2012		2011		2010	
	National coverage[a]	Data format[a]	Confirmed cases &rates		Confirmed cases &rates		Confirmed cases &rates		Confirmed cases &rates		Confirmed cases & rates	
			Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria (OTF[b])	Y	C	1	0.01	1	0.01	1	0.01	0	0.00	4	0.05
Belgium (OTF)	Y	C	10	0.09	10	0.09	4	0.04	5	0.05	9	0.08
Bulgaria	Y	C	0	0.00	0	0.00	0	0.00	2	0.03	0	0.00
Croatia	Y	C	0	0.00	0	0.00	–	–	–	–	–	–
Cyprus	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic (OTF)	Y	C	0	0.00	0	0.00	0	0.00	4	0.04	0	0.00
Denmark (OTF)	Y	C	1	0.02	0	0.00	0	0.00	1	0.02	2	0.04
Estonia (OTF)	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Finland (OTF)	Y	C	0	0.00	1	0.02	0	0.00	0	0.00	0	0.00
France (OTF)[c]	Y	C	–	–	–	–	–	–	–	–	–	–
Germany (OTF)	Y	C	47	0.06	48	0.06	50	0.06	47	0.06	48	0.06
Greece	Y	C	–	–	–	–	–	–	–	–	–	–
Hungary (OTF)	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Ireland	Y	C	3	0.07	6	0.13	4	0.09	6	0.13	12	0.26
Italy[d],[e]	–	–	–	–	6	0.01	9	0.02	15	0.03	15	0.03
Latvia (OTF)	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Lithuania	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Luxembourg (OTF)	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Malta	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Netherlands (OTF)	Y	C	6	0.04	9	0.05	8	0.05	11	0.07	13	0.08
Poland (OTF)	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Portugal	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Romania	Y	C	0	0.00	0	0.00	0	0.00	1	0.00	0	0.00
Slovakia (OTF)	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Slovenia (OTF)	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Spain	Y	C	34	0.07	30	0.06	14	0.03	23	0.05	34	0.07
Sweden (OTF)	Y	C	4	0.04	0	0.00	5	0.05	2	0.02	2	0.02
United Kingdom[f]	Y	C	39	0.06	30	0.05	41	0.06	40	0.06	37	0.06
EU Total	–	–	145	0.03	141	0.03	136	0.03	157	0.03	176	0.04
Iceland[g]	Y	C	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Norway (OTF)	Y	C	4	0.08	0	0.00	2	0.04	2	0.04	2	0.04
Switzerland (OTF)[h]	Y	C	2	0.02	2	0.02	5	0.06	13	0.17	6	0.08

(a): Y: yes; N: no; A: aggregated data; C: case-based data; –: no report.
(b): OTF: officially tuberculosis free.
(c): Not reporting species of the *M. tuberculosis* –complex.
(d): In Italy, six regions and 15 provinces are OTF.
(e): 36 cases, 80% of all reported human *M. bovis* cases from Italy to TESSy in 2010–2013 were without laboratory results but were still included in the table since reported as *M. bovis.*
(f): In the United Kingdom, Scotland is OTF.
(g): In Iceland, that has no special agreement concerning animal health (status) with the EU, the last outbreak of bovine tuberculosis was in 1959.
(h): Switzerland provided data directly to EFSA. The human data for Switzerland also include the ones from Liechtenstein (OTF).

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 individuals with the disease 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 based on nationality of the cases. On average, 58.6% of the cases reported in 2014 were native to the reporting country, 37.9% were foreign and 3.4% were of unknown origin. Among cases with known origin, there was a larger proportion (68.9%) of native cases in countries not free of bovine tuberculosis than in countries that were officially tuberculosis-free (51.5%).

3.6.2. Tuberculosis due to *Mycobacterium bovis* in cattle

The officially tuberculosis free status (OTF) in 2014 is presented in Figure 30 and in Figure 31. In 2014, Hungary acquired OTF status, therefore was added to the list of OTF countries composed in 2014 by Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, five regions and 17 provinces in Italy, Latvia, Luxembourg, the Netherlands, all administrative regions within the superior administrative unit of the Algarve in Portugal, Poland, Slovakia, Slovenia, Sweden, Scotland in the United Kingdom, Norway and Switzerland, in accordance with EU legislation (Decision 2014/91/EU[32]). 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.

Bulgaria, Croatia, Cyprus, Greece, Ireland, Italy, Lithuania, Malta, Portugal, Romania, Spain and the United Kingdom have not yet achieved the country-level OTF status in 2014.

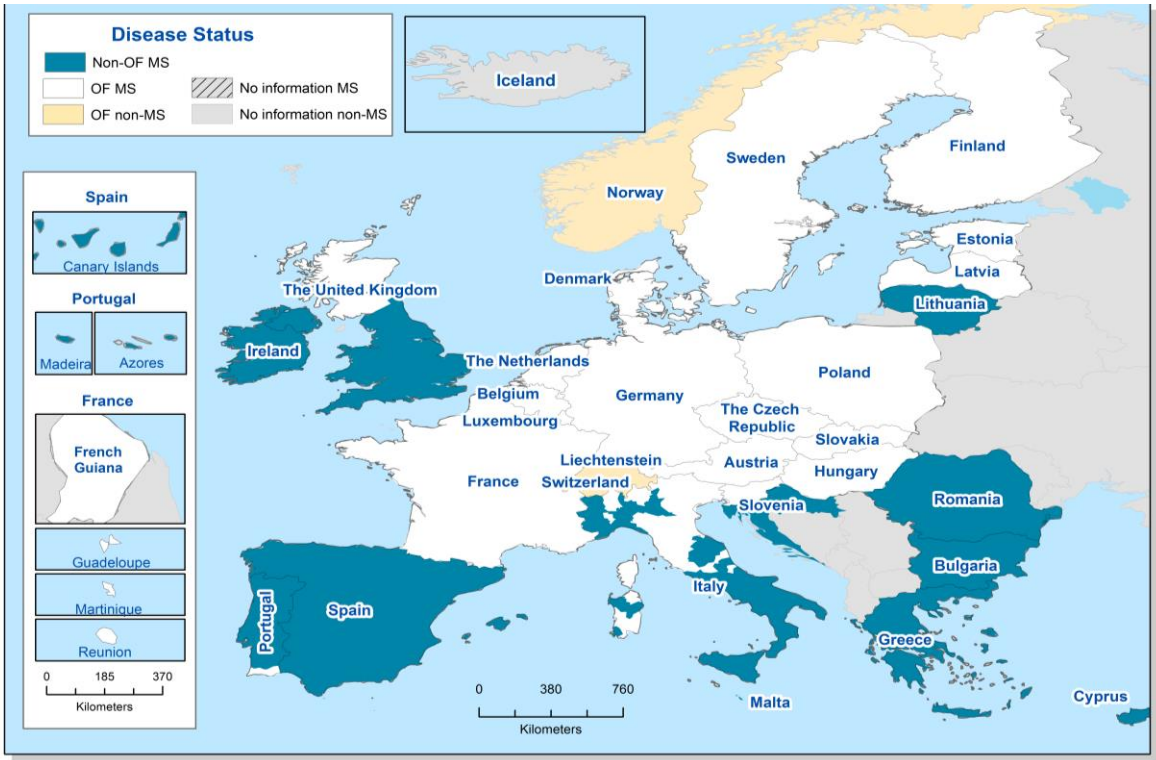
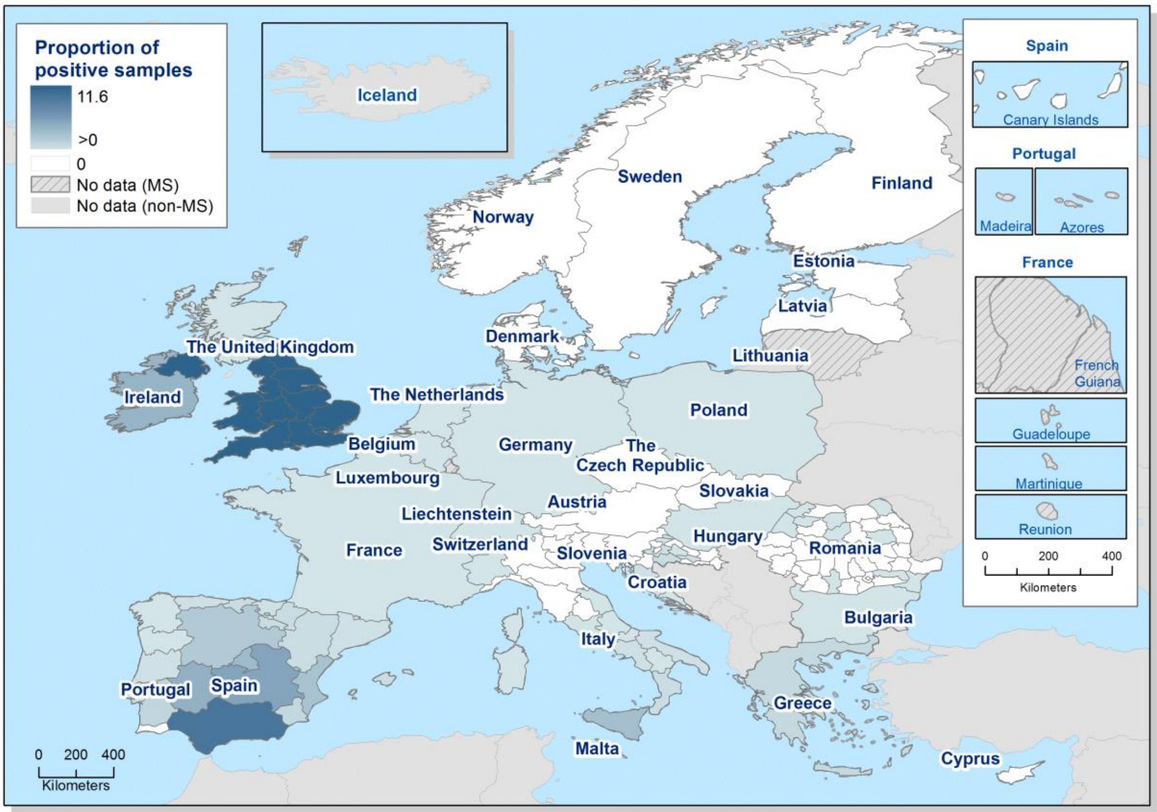


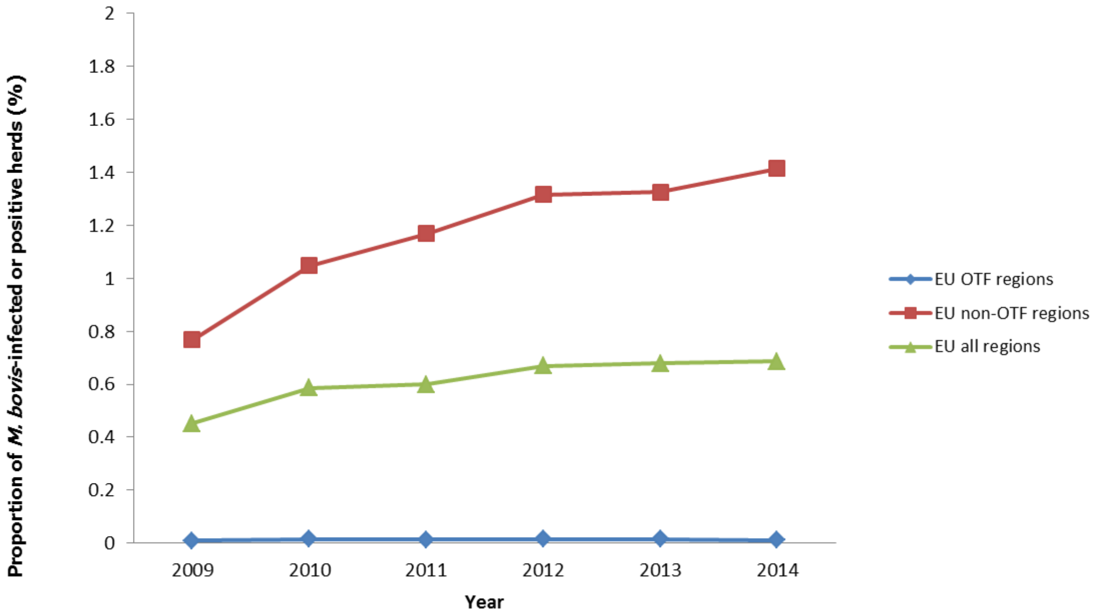
Figure 30: Status of countries regarding bovine tuberculosis due to *M. bovis*, 2014

[32] Commission implementing Decision 2014/91/EU of 14 February 2014 amending Annex II to Decision 93/52/EEC as regards the recognition of certain regions of Italy and Spain as officially free of brucellosis (*B. melitensis*) and amending Annexes I, II and III to Decision 2003/467/EC as regards the declaration of Hungary as officially tuberculosis-free, Romania and certain regions of Italy as officially brucellosis-free, and certain regions of Italy as officially enzootic-bovine-leukosis-free. OJ 46, 18.2.2014, pp. 12–17.



Proportions of *M. bovis*-positive cattle herds are displayed only if they are above the legal threshold of 0.1%. Proportions relate to the non-OTF regions.

Figure 31: Proportion of existing cattle herds infected with or positive for *M. bovis*, 2014



Data reported by countries that are MS during the current year are included. The classification of the OTF and non-OTF status of a region is based on Figure 30.

Figure 32: Proportion of existing cattle herds infected with or positive for *M. bovis*, 2009–2014

In the 16 OTF MS and in the OTF regions of non-OTF MS, annual surveillance programmes are carried out to confirm freedom from bovine tuberculosis. Luxembourg did not report any data for 2014. Bovine tuberculosis due to *M. bovis* was not detected in cattle herds in 10 of the OTF MS, nor in Iceland, Norway or Switzerland. However, in total, out of the 1,307,553 existing cattle herds in all OTF regions of the EU, 129 herds were infected with *M. bovis* in 2014: France (107 herds), Germany (3 herds), Hungary (newly declared OTF; 3 herds out of 16,419), Italy (1), the Netherlands (4 herds), Poland (9 herds) and Scotland in the United Kingdom (2). In the EU OTF regions, the proportion of herds infected with *M. bovis* was 0.011% in 2014, which was less than in 2013 (0.015%).

All 13 MS containing a non-OTF region have a national eradication programme for bovine tuberculosis in place. In 2013, the six MS Croatia, Ireland, Italy, Portugal, Spain and the United Kingdom received EU co-financing for their eradication programme and they reported the number of positive herds (Table 2014_DSTUBCOF), whereas MS not receiving EU co-financing reported the number of infected herds (Table 2014_DSTUBNONCOF).

Of the non-cofinanced MS, Cyprus and Malta did not report any infected herds, whereas infected herds were reported by; Bulgaria (10 herds) Greece (203 herds) and Romania (36 herds). Lithuania did not report any data. In the co-financed MS, positive herds were reported by Croatia (53 herds), Ireland (4,293 herds), Italy (380 herds), Portugal (108 herds), Spain (1,867 herds) and the United Kingdom (10,172 herds). In total, out of the 1,210,192 existing cattle herds in the EU non-OTF regions, 17,122 herds (1.4%) were infected with or positive for *M. bovis* in 2014, compared to 1.3% in 2013. Overall, in the EU OTF and non-OTF regions ('EU all regions' in Figure 32), the proportion of herds infected with *M. bovis* was 0.69% in 2014, compared to 0.68% in 2013.

In 2014, 14 MS and two non-MS investigated animal species other than cattle for *M. bovis*. *M. bovis* was reported in 816 animals other than cattle: alpacas (34), badgers (218), bison (3), cat (24), deer (106), dog (1), goat (29), guinea pig (1), lamas (3), pet animal (1), pig (153), sheep (1), wild boar (219), wild animal (1) and zoo animal (2) (Table 2014_TUBOVERVIEW). Seventeen MS and two non-MS investigated animals for *Mycobacterium* species other than *M. bovis*. *M. tuberculosis* was reported in two pigs and 38 cattle and *M. caprae* was reported in 126 animals by four MS (Austria, Germany, Hungary and Spain): cattle (68), deer (10), goats (6), sheep (1) and wild boar (41) (Table 2014_TUBALL).

3.6.3. Discussion

Tuberculosis due to *M. bovis* is a rare infection in humans in the EU, with 145 confirmed human cases reported in 2014. The EU notification rate has been stable between 2011 and 2014. There was no clear association between a country's status as OTF and notification rates in humans. This could be due to many of the cases in both OTF and non-OTF countries having immigrated to the country, thus the infection might have been acquired in the country of origin. Cases native to the country could also have been infected before the disease was eradicated from the animal population, as it may take years before disease symptoms develop.

The overall proportion of cattle herds infected with, or positive for, *M. bovis* remained very low in the EU (0.69% of the existing herds in the EU), although there is a heterogeneous distribution of *M. bovis* in Europe. The prevalence ranges from absence of infected/positive animals in many OTF regions to a prevalence of 11.6% in the non-OTF regions of the United Kingdom (England, Northern-Ireland and Wales).

In the EU OTF regions, the proportion of herds infected with *M. bovis* decreased further to 0.011% in 2014. This can be partly explained by the inclusion of Hungary, in 2014, in the list of OTF MS. Hungary had 16,419 cattle herds and reported 3 infected ones in 2014. Also, in OTF countries, the number of herds infected with *M. bovis* reported was on average lower than in 2013.

In the non-OTF regions, in 2013, the reported number of herds positive for *M. bovis* was, for most MS, similar or lower than in 2014. However, an increase was reported by Spain (1,526 in 2013 and 1,867 in 2014), while Ireland and the United Kingdom reported a decrease respectively from 4,640 in 2013 to 4,293 in 2014 and from 10,956 in 2013 to 10,172 in 2014. Overall, the reported proportion of herds positive for *M. bovis* in the non-OTF regions has slowly increased during the last years. In part this is due to regions and MS obtaining the OTF status over these years thus lowering the number of herds remaining in non-OTF regions and MS.

3.7. *Brucella*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans, food, animals and food-borne outbreaks. It also includes hyperlinks to *Brucella* summary tables and figures that were not included in this section because they did not trigger any marked observations. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.7.1. Brucellosis in humans

In 2014, 27 MS, Iceland and Norway provided information on brucellosis in humans. In total, 365 cases, of which 347 confirmed, were reported in the EU in 2014 with a notification rate of 0.08 cases per 100,000 population (Table 20). This was 20% lower than the notification rate in 2013, and the reported number and rate of confirmed cases was the lowest since 2010 (Table 20). Ten MS (Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Slovakia and Slovenia) and Iceland reported no human cases.

Table 20: Reported human cases of brucellosis and notification rates per 100,000 in the EU/EEA, by country and year, 2010–2014

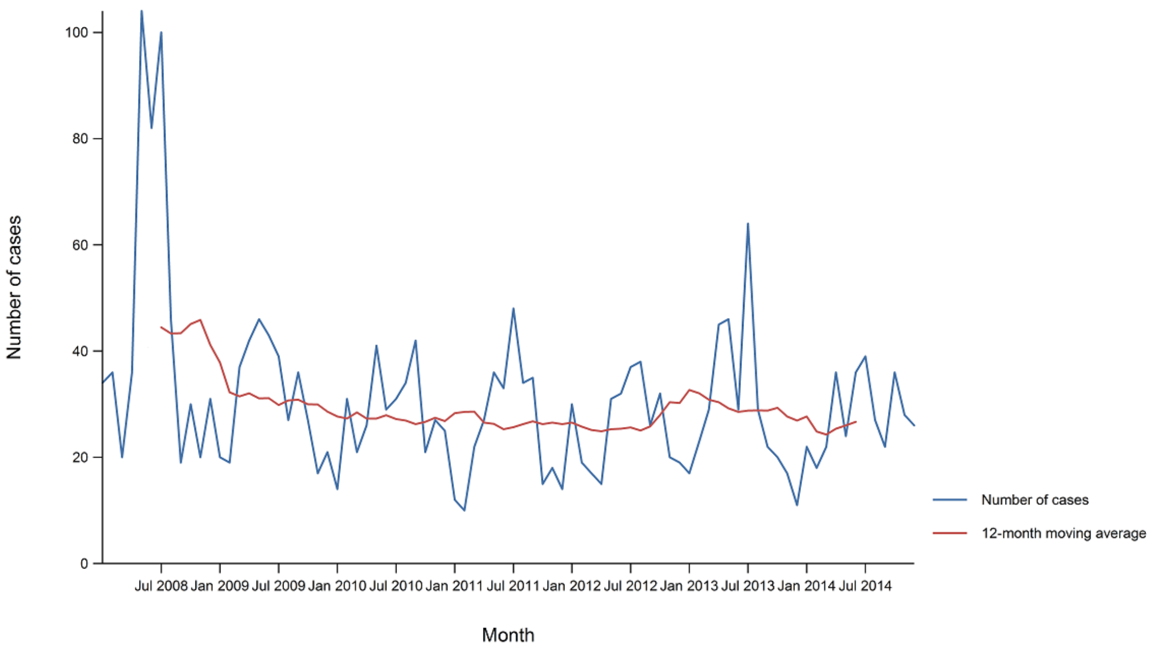
Country	2014					2013		2012		2011		2010	
	National coverage[(b)]	Data format[(b)]	Total cases	Confirmed cases & rates		Confirmed cases &rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria (OBF/ObmF)	Y	C	1	1	0.01	7	0.08	2	0.02	5	0.06	3	0.04
Belgium (OBF/ObmF)	Y	A	1	1	0.01	0	0.00	4	0.04	5	0.05	0	0.00
Bulgaria	Y	A	2	2	0.03	0	0.00	1	0.01	2	0.03	2	0.03
Cyprus	Y	C	1	1	0.02	0	0.00	0	0.00	–	–	–	–
Croatia	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic (OBF/ObmF)	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	1	0.01
Denmark[(c)] (OBF/ObmF)	–	–	–	–	–	–	–	–	–	–	–	–	–
Estonia (OBF/ObmF)	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Finland (OBF/ObmF)	Y	C	1	1	0.02	0	0.00	1	0.02	0	0.00	0	0.00
France[(d)](OBF)	Y	C	16	14	0.02	19	0.03	28	0.04	21	0.03	20	0.03
Germany (OBF/ObmF)	Y	C	47	45	0.06	26	0.03	28	0.03	24	0.03	22	0.03
Greece	Y	C	135	135	1.24	159	1.44	123	1.11	98	0.88	97	0.87
Hungary (ObmF)	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Ireland (OBF/ObmF)	Y	C	3	3	0.07	1	0.02	2	0.04	1	0.02	1	0.02
Italy[(e)]	–	–	8	8	–	137	0.23	184	0.31	166	0.28	171	0.29
Latvia (OBF/ObmF)	Y	C	0	0	0.00	1	0.05	0	0.00	0	0.00	0	0.00
Lithuania (OBF/ObmF)	Y	C	0	0	0.00	2	0.07	0	0.00	0	0.00	0	0.00
Luxembourg (OBF/ObmF)	Y	C	0	0	0.00	0	0.00	0	0.00	1	0.20	1	0.20
Malta	Y	C	0	0	0.00	1	0.24	0	0.00	0	0.00	0	0.00
Netherlands (OBF/ObmF)	Y	C	1	1	0.01	5	0.03	3	0.02	1	0.01	6	0.04
Poland (OBF/ObmF)	Y	C	1	1	0.00	1	0.00	0	0.00	0	0.00	0	0.00
Portugal[(f)]	Y	C	49	45	0.43	22	0.21	37	0.35	76	0.73	88	0.85
Romania (OBF/ObmF)	Y	C	2	2	0.01	0	0.00	0	0.00	1	0.01	2	0.01
Slovakia (OBF/ObmF)	Y	C	0	0	0.00	1	0.02	1	0.02	0	0.00	1	0.02
Slovenia (OBF/ObmF)	Y	C	0	0	0.00	0	0.00	0	0.00	1	0.05	0	0.00

Country	2014					2013		2012		2011		2010	
	National coverage(b)	Data format(b)	Total cases	Confirmed cases & rates		Confirmed cases &rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Spain(g)	Y	C	70	60	0.13	87	0.19	62	0.13	43	0.09	78	0.17
Sweden (OBF/ObmF)	Y	C	16	16	0.17	10	0.11	13	0.14	11	0.12	12	0.13
United Kingdom(h) (OBF/ObmF)	Y	C	11	11	0.02	15	0.02	14	0.02	25	0.04	12	0.02
EU Total	–	–	365	347	0.08	494	0.10	503	0.10	481	0.10	517	0.11
Iceland(i)	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Norway (OBF/ObmF)	Y	C	2	2	0.04	2	0.04	4	0.08	2	0.04	2	0.04
Switzerland (OBF/ObmF)(j)	Y	C	3	3	0.04	4	0.05	3	0.04	8	0.10	5	0.06

(a): OBF/ObmF: officially brucellosis free/officially *B. melitensis* free in cattle or sheep/goat population.
(b): Y: yes; N: no; A: aggregated data; C: case-based data; –: no report.
(c): No surveillance system.
(d): In France, 64 departments are ObmF and no cases of brucellosis have been reported in small ruminants since 2003.
(e): In Italy, 12 regions are OBF and also 13 regions are ObmF.
(f): In Portugal, six islands of the Azores and the superior administrative unit of Algarve are OBF whereas all nine Azores islands are ObmF.
(g): In Spain, two provinces of the Canary Islands, the Balearic Islands, Basque Country, Murcia and La Rioja are OBF; and two provinces of the Canary Islands, Asturias, Cantabria, Castile and Leon, Galicia, Basque Country, Navarre and the Balearic Islands are ObmF.
(h): 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.
(i): In Iceland, that has no special agreement concerning animal health (status) with the EU, brucellosis (*B. abortus*, *B. melitensis*, *B. suis*) has never been reported.
(j): Switzerland provided data directly to EFSA. The human data for Switzerland also include the ones from Liechtenstein (OBF/ObmF).

As in previous years, the lowest notification rates were observed in MS with the status 'officially free of bovine brucellosis' (OBF, Figure 34) and/or officially free of ovine and caprine brucellosis caused by *B. melitensis* (ObmF, Figure 37). The majority of brucellosis cases in these countries were reported to have been imported or travel-associated. Sweden, which has the status OBF/ObmF and had a relatively high notification rate (0.17 cases per 100,000 population), reported all confirmed brucellosis cases as travel-related. The highest notification rates of domestic brucellosis were reported in three countries that were not officially brucellosis-free in cattle, sheep or goats: Greece (1.24 per 100,000 population), Portugal (0.43) and Spain (0.13), together accounting for 69.2% of all confirmed cases reported in 2014 (Table 20). Italy only reported provisional data on a low number of human brucellosis cases in 2014, but observed high notification rates in 2013 and previous years.

Some seasonality was observed in the number of confirmed brucellosis cases in the EU/EEA with more cases reported from April to September (Figure 33). There was no significant increasing or decreasing trend in 2008–2014. A dominant peak in 2008 was due to a large outbreak on the Greek island of Thassos in which 126 people were ill of brucellosis. Consumption of locally produced fresh cheese made from unpasteurised milk was identified as the most likely source of infection (Karagiannis et al., 2012).



Source: Austria, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. Belgium, Bulgaria, Croatia, Italy and Luxembourg did not report data to the level of detail required for the analysis. Denmark does not have a surveillance system for this disease.

Figure 33: Trend in reported confirmed human cases of brucellosis in the EU/EEA, by month of reporting, 2008–2014

Nine MS provided data on hospitalisation, accounting for 62.0% of confirmed cases in the EU. On average, 66.0% of the confirmed brucellosis cases with known status were hospitalised. Ten MS provided information on the outcome of the cases. No deaths due to brucellosis were reported in 2014 among the 144 confirmed cases for which this information was reported (41.5% of all confirmed cases).

Brucella species information was missing for 71.5% of the 347 confirmed cases reported in the EU. Of the 97 cases with known species, 85.6% were reported to be infected by *B. melitensis*, 2.1% by *B. abortus* and 12.4% by other *Brucella* species.

3.7.2. *Brucella* in food and animals

Food

In 2014, three MS (Italy, Portugal and Spain) provided results of testing for *Brucella* in the following categories: raw milk from cows and other animal species, milk from sheep and goats, cheese, other dairy products excluding cheeses, and sweets. A total of 1,042 samples sourced in processing plants, farms and at retail level were tested in these MS. In an investigation of 491 samples of 'milk from other animal species or unspecified', collected at processing level in Italy, nine samples (1.83%) were found positive for *Brucella* spp. (Table 2014_BRUCFOOD).

Cattle

The status regarding freedom from bovine brucellosis (OBF) and occurrence of the disease at region or national levels for MS and non-MS in 2014 are presented in Figure 34 and Figure 35, respectively. At the end of 2014, the following countries and regions were OBF (officially bovine brucellosis free): Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, 10 Italian regions and 11 Italian provinces, Ireland, Latvia, Luxembourg, the Netherlands, all administrative regions within the superior administrative unit of the Algarve as well as six of the nine islands of the Azores (Pico, Graciosa, Flores, Corvo, Faial and Santa Maria) in Portugal, Poland, Slovakia, Slovenia, Sweden, England, Scotland, Wales and the Isle of Man in the United Kingdom, the two provinces of the Canary Islands (Santa Cruz de Tenerife and Las Palmas), the Balearic Islands, Basque Country, Murcia and La Rioja in Spain. During 2014 also Lithuania, Romania and the region of Liguria in Italy were declared OBF.

The MS that did not yet gain country-level OBF status in 2014 were: Bulgaria, Croatia, Cyprus, Greece, Hungary, Italy, Malta, Portugal, Spain and the United Kingdom.

Norway and Switzerland were OBF in accordance with EU legislation and Liechtenstein had the same status (OBF) as Switzerland. Iceland, which has no special agreement on animal health (status) with the EU, has never reported brucellosis due to *B. abortus, B. melitensis* or *B. suis*.

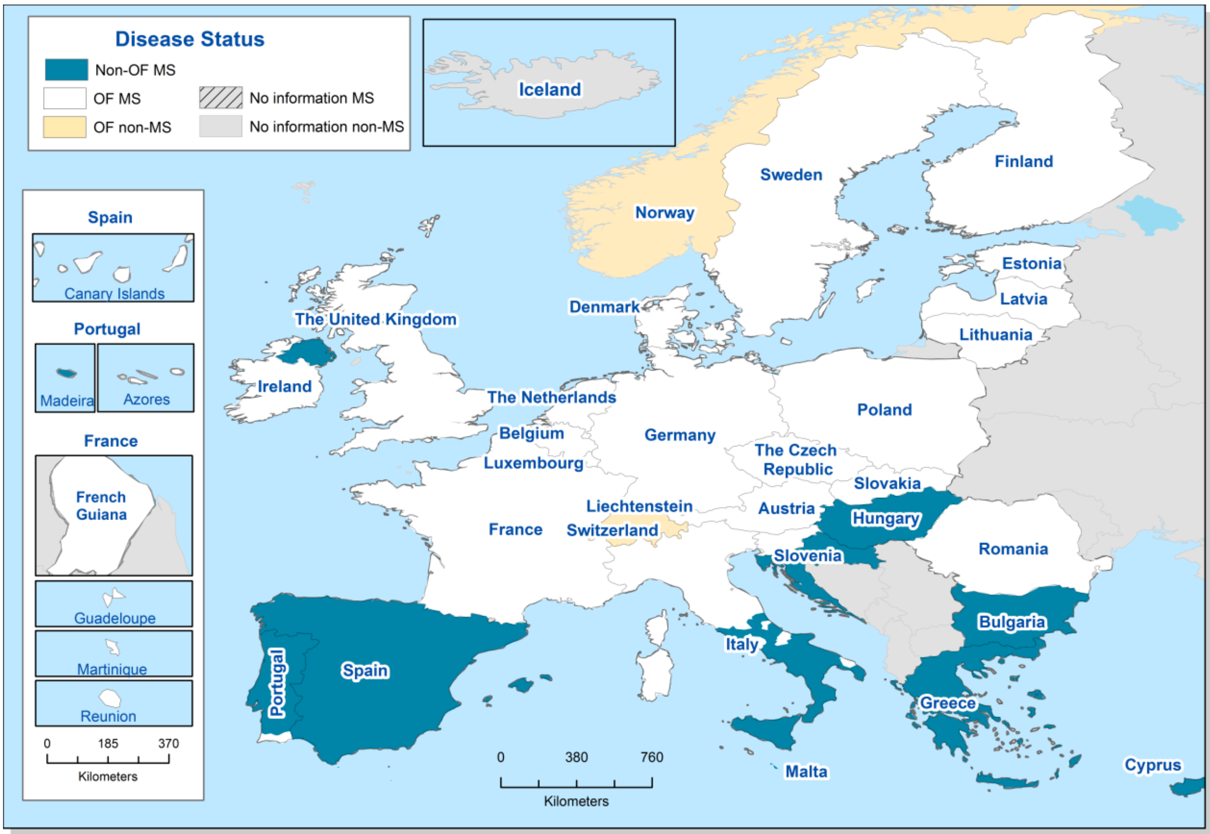


Figure 34: Status of countries regarding bovine brucellosis, 2014

Proportions of *Brucella*-positive cattle herds are displayed only if they are above the legal threshold of 0.1%. Proportions relate to the non-OBF regions.

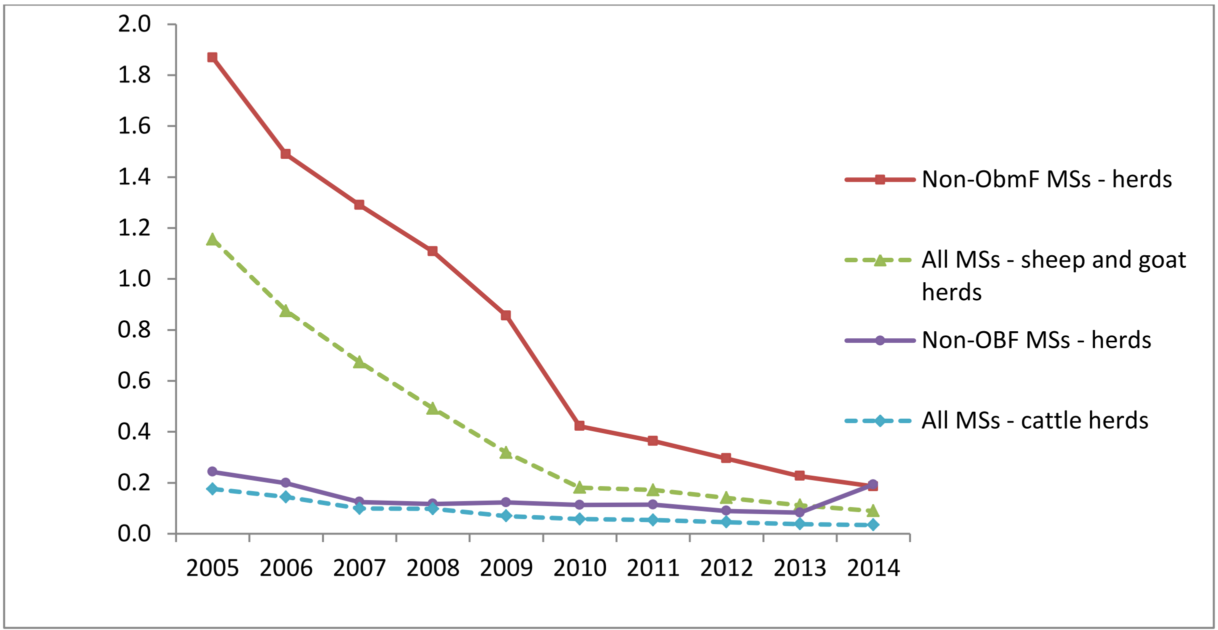
Figure 35: Proportion of existing cattle herds infected with or positive for *Brucella*, 2014

During the period 2005–2013, the overall proportion of brucellosis-infected/positive cattle herds in the EU decreased steadily to very low levels; and, since 2007, bovine brucellosis has been a rare event in the EU. The overall proportion of infected/positive herds in 2014 remained very low in all MS at 0.034% of infected/positive herds (Figure 36). The percentage of existing infected/positive herds in the 10 non-OBF MS in 2014, with a total of 455,879 bovine herds, was also low but increased from 0.08% in 2013 to 0.19% in 2014, mainly due to the reduction in the total number of cattle herds from 1,204,215 in 2013 to 455,879 in 2014. This was the result of the recognition of Romania as OBF MS, whose cattle population comprises 619,591 herds.

In the 18 OBF MS and the OBF regions of non-OBF MS (representing a total of 2,121,635 cattle herds), annual surveillance programmes are carried out to confirm the freedom from bovine brucellosis. During 2014, bovine brucellosis was only detected in one Belgian cattle herd and not in the other OBF MS. It was not detected either in the four non-MS: Iceland, Norway, Switzerland and Liechtenstein.

In five of the 10 non-OBF countries, namely, Croatia, Italy, Portugal, Spain and the United Kingdom, eradication programmes for bovine brucellosis approved for EU co-financing were carried out in 2014. All MS containing a non-OBF region have in place national eradication programmes for bovine brucellosis. In general, MS receiving EU co-financing for their eradication programme report the number of positive herds, whereas MS not receiving EU co-financing report the number of infected herds.

In the five non-OBF MS with an EU co-financed eradication programmes, the number of positive herds reported in 2014 was four in Croatia (one in 2013), 510 in Italy (531 in 2013), 88 in Portugal (88 in 2013), 58 in Spain (91 during 2013) and eight in the United Kingdom (Northern Ireland, 26 in 2013). For the United Kingdom, these eight positive herds concerned seropositive herds that were not confirmed by bacteriological culture (Table 2014 DSBRUCOFCAT). Four of the five non-OBF MS without EU co-financed eradication programmes, namely Bulgaria, Cyprus, Hungary and Malta did not report any cases of infected herds. Greece was the only one of the five non-OBF MS without EU co-financed eradication programmes with infected herds in 2014 (211, which was lower than in 2013 with 281 infected herds).



Bovine brucellosis: Missing data from one OBF MS (Germany (2008)) and non-OBF MS (Hungary (2005), Malta (2006) and Lithuania (2007)). Romania included data for the first time in 2007, Bulgaria in 2008 and Croatia in 2013.
Sheep and goat brucellosis: Missing data from Bulgaria (2005–2007), Germany (2005–2007, 2012, 2013), Hungary (2005), Lithuania (2005, 2007, 2010), Luxembourg (2005–2006, 2008–2009, 2011), Malta (2005–2006) and Romania (2005–2006, 2008). Romania reported data at the animal level in 2008.

Figure 36: Proportion of existing cattle, sheep and goat herds infected with or positive for *Brucella*, 2005–2014

Sheep and goats

The status regarding freedom from ovine and caprine brucellosis caused by *B. melitensis* (OBmF) and occurrence of the disease at regional or national levels for MS and non-MS in 2014 are presented in Figure 37 and Figure 38, respectively. In 2013, the following countries and regions were OBmF: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, 64 departments in France, Germany, Hungary, 11 regions and eight provinces in Italy, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, the Azores Islands in Portugal, Poland, Romania, Slovakia, Slovenia, the two provinces of the Canary Islands, Asturias, Cantabria, Castile and Leon, Galicia, Basque Country and the Balearic Islands in Spain, Sweden and the United Kingdom. In 2014, Navarre in Spain, the regions of Liguria and Lazio in Italy and 31 additional departments in France were also declared ObmF.

MS that in 2014 had not yet gained a country-level ObmF status are Bulgaria, Croatia, Cyprus, France, Greece, Italy, Malta, Portugal and Spain.

Norway and Switzerland were ObmF in accordance with EU legislation and Liechtenstein had the same status (ObmF) as Switzerland. Iceland, which has no special agreement concerning animal health (status) with the EU, has never reported brucellosis due to *B. abortus, B. melitensis* or *B. suis*.

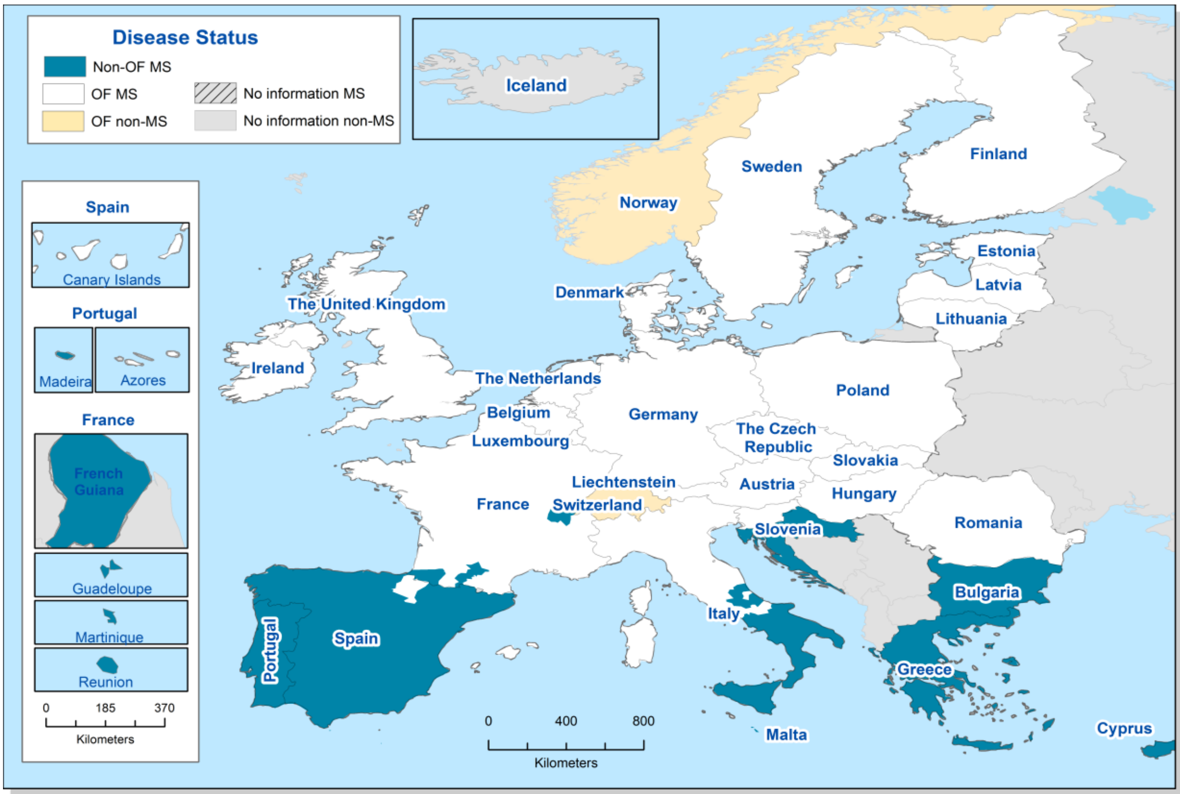


Figure 37: Status of countries and regions regarding ovine and caprine brucellosis, 2014

Proportions of *Brucella*-positive sheep and goat herds are displayed only if they are above the legal threshold of 0.1%.
Proportions relate to the non-ObmF regions.

Figure 38: Proportion of existing sheep and goat herds infected with or positive for *Brucella*, by country and region, 2014

During the period 2005–2013, the overall proportion of existing sheep and goat flocks infected with or positive to *B. melitensis* in the EU showed a decreasing trend. In 2014 the decline continued from 0.11% in 2013 to 0.09% in 2014, the lowest ever reported. The decline was also observed in the proportion of existing sheep and goat flocks infected with, or positive for *B. melitensis* in the nine non-OBmF MS that went from 0.23% in 2013 to 0.19% in 2014 (Figure 36).

In the 19 OBmF MS and in the OBmF regions of non-OBmF MS, annual surveillance programmes are carried out to confirm freedom from sheep and goat brucellosis. During 2014, brucellosis due to *B. melitensis* was not detected in any of the 612,465 sheep and goat flocks in the 19 OBmF MS. It was not detected either in the four non-MS: Iceland, Liechtenstein, Norway and Switzerland.

In six of the nine non-ObmF countries, namely Croatia, Cyprus, Greece, Italy, Portugal and Spain, eradication programmes for ovine and caprine brucellosis approved for EU co-financing were carried out in 2014. All MS containing a non-ObmF region have a national eradication programme for ovine and caprine brucellosis in place. In general, MS receiving EU co-financing for their eradication programme report the number of positive flocks, whereas MS not receiving EU co-financing report the number of infected flocks. From the six co-financed non-ObmF MS, Cyprus was the only MS that did not report any positive flocks. The remaining five MS reported, respectively, 25 positive herds in Croatia (one in 2013), 447 in Italy (597 in 2013), 529 in Portugal (672 in 2013), 22 in Greece (21 in 2013) and 113 in Spain (153 in 2013) (Table 2014_DSBRUCOFOV).

None of the three non-OBmF MS without EU co-financed eradication programmes, namely Bulgaria, France and Malta reported any positive case of infected flocks in 2014.

Other animals

In 2014, 17 MS and two non-MS sampled animal species other than cattle, sheep or goats. *Brucella*-positive tests were reported in 10 (0.39%) pig herds out of the 2,339 tested in three MS: France (*B. suis*, 6 out of 19), Germany (*B. suis* in 2 out of 850) and Italy (unspecified in 2 out of 1,470). Samples tested at herd level in farmed wild boar (9), solipeds (218) and water buffalo (2) were all negative. Of the 537,239 animals tested, 4,810 were found positive (0.9%) including the following species and countries: seals (1 in Finland), wild boar (1,393 in Germany, 252 in Italy, 156 in Spain), hares (16 in Germany), pet dogs (1 in Finland, 13 in Italy, 11 in Romania, 1 in Sweden), pigs (3 to *B. suis* in Croatia, 226 in Germany, 107 in Italy), zoo animals (4 in Germany), bears (1 in Italy), deer (4 in Italy), foxes (1 in Italy) and water buffalo (2,620 in Italy). One hare was found positive in Switzerland (Table 2014_BRUCOTHERAN).

3.7.3. Discussion

Brucellosis is a rare infection in humans in the EU. The highest notification rates and the majority of domestic cases were reported from three MS (Greece, Portugal and Spain) that are not officially brucellosis-free in cattle, sheep or goats. The majority of brucellosis cases in the officially brucellosis-free countries were reported to have been imported and travel-associated. Nearly 70% of the human brucellosis cases were hospitalised, but no fatal case was reported in 2014.

There was a *Brucella*-positive investigation in nine samples of milk (processing plant sampling) collected in Italy. The other two MS (Portugal and Spain) that reported surveillance results in food did not have any positive finding. However, the two reported weak evidence food-borne outbreaks in 2014 by one MS illustrate the health risk related to consumption of food contaminated with *Brucella*.

MS have national surveillance and/or eradication programmes in place. The decreasing trend in the prevalence of both bovine and small ruminant brucellosis within the EU has been consolidated. In 2014, bovine, ovine and caprine brucellosis remained a rare event in the EU. Both bovine and small ruminant brucellosis infected or positive herds have been reported by five Mediterranean MS: Croatia, Greece, Italy, Portugal and Spain. Bovine brucellosis was also reported in Belgium in one cattle herd. Most non-officially brucellosis-free MS and non-officially *B. melitensis* free MS reported fewer positive and/or infected herds than in 2013.

3.8. *Trichinella*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans, food, animals and food-borne outbreaks. It also includes hyperlinks to *Trichinella* summary tables and figures that were not included in this section because they did not trigger any marked observations. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.8.1. Trichinellosis in humans

In 2014, 383 cases of trichinellosis, of which 319 confirmed, were reported by 10 MS (Table 21). Fifteen MS reported zero cases in 2014. The EU notification rate in 2014 was 0.07 cases per 100,000 population which was an increase of 40% compared with 2013 and was the highest notification rate reported in the last 5 years. This was mainly due to an increased number of trichinellosis cases reported by two countries; Romania and Bulgaria. As in previous years, these two countries had the highest notification rates (1.11 and 0.83 cases per 100,000, respectively) in 2014. Together Romania and Bulgaria accounted for 88.1% of all confirmed cases reported at the EU level in 2014. In Romania, more than half of the cases (221 cases; 56.1%) were reported in January-February 2014. In Bulgaria, all 60 confirmed cases in 2014 were linked to five outbreaks. In Belgium, a substantial increase with 16 cases was reported in December 2014. Wild boar meat was a suspected source of the outbreak.

Only two cases of trichinellosis were reported as travel-associated and were related to travel to another EU country. The remaining cases were either reported as domestically-acquired or of unknown origin.

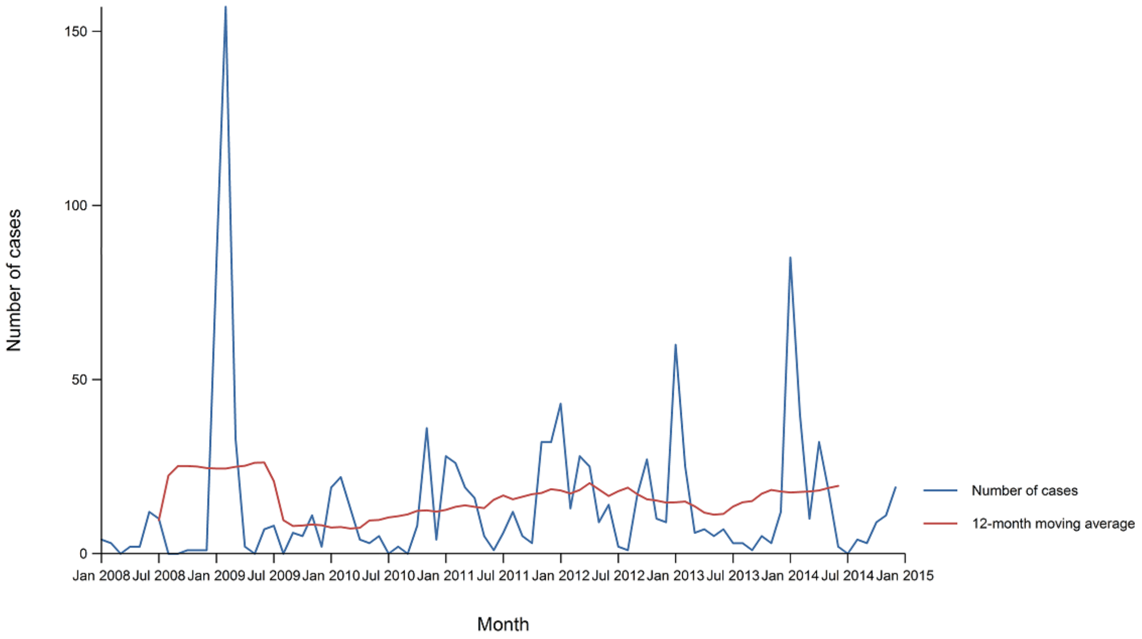
Table 21: Reported human cases of trichinellosis and notification rates per 100,000 population in the EU/EEA, by country and year, 2010–2014

Country	2014					2013		2012		2011		2010	
	National coverage[a]	Data format[a]	Total cases	Confirmed cases & rates		Confirmed cases&rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	0	0	0.00	0	0.00	0	0.00	1	0.01	5	0.06
Belgium[b]	N	C	16	16	–	1	–	0	–	0	–	3	–
Bulgaria	Y	A	81	60	0.83	36	0.49	30	0.41	27	0.37	14	0.19
Croatia	Y	A	3	3	0.07	–	–	–	–	–	–	–	–
Cyprus	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic	Y	C	2	0	0.00	0	0.00	1	0.01	0	0.00	0	0.00
Denmark[c]	–	–	–	–	–	–	–	–	–	–	–	–	–
Estonia	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Finland	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
France	Y	C	0	0	0.00	0	0.00	0	0.00	2	0.00	0	0.00
Germany	Y	C	1	1	0.00	14	0.02	2	0.00	3	0.00	3	0.00
Greece	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	4	0.04
Hungary	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Ireland	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Italy[d]	Y	C						33	0.06	6	0.01	0	0.00
Latvia	Y	C	5	5	0.25	11	0.54	41	2.01	50	2.41	9	0.42
Lithuania	Y	C	20	5	0.17	6	0.20	28	0.93	29	0.95	77	2.45
Luxembourg	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Malta	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Netherlands	Y	C	0	0	0.00	0	0.00	0	0.00	1	0.01	0	0.00
Poland	Y	C	32	6	0.02	4	0.01	1	0.00	10	0.03	14	0.04
Portugal	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Romania	Y	C	221	221	1.11	116	0.58	149	0.74	107	0.54	82	0.41
Slovakia	Y	C	0	0	0.00	5	0.09	5	0.09	13	0.24	2	0.04
Slovenia	Y	C	0	0	0.00	1	0.05	1	0.05	1	0.05	0	0.00
Spain	Y	C	1	1	0.00	23	0.05	10	0.02	18	0.04	10	0.02
Sweden	Y	C	1	1	0.01	0	0.00	0	0.00	0	0.00	0	0.00
United Kingdom	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EU Total	–	–	383	319	0.07	217	0.05	301	0.06	268	0.06	223	0.05
Iceland	Y	C	0	0	0.00	0	0.00	–	–	–	–	–	–

Country	2014					2013		2012		2011		2010	
	National coverage[(a)]	Data format[(a)]	Total cases	Confirmed cases & rates		Confirmed cases&rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Norway	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Switzerland[(e)]	Y	C	0	0	0.0	1	0.01	1	0.01	0	0.00	1	0.01

(a): Y: yes; N: no; A: aggregated data; C: case-based data; –: no report.
(b): Disease not under formal surveillance.
(c): No surveillance system.
(d): No report for 2013-2014
(e): Switzerland provided data directly to EFSA. The human data for Switzerland also include the ones from Liechtenstein.

The trend in reported and confirmed cases of trichinellosis was substantially influenced by a number of smaller and larger outbreaks often with peaks in January (Figure 39). The large peak at the beginning of 2009 was attributed to Romania, which reported 243 confirmed cases in January–March only.



Source: Austria, Cyprus, Czech Republic, Estonia, Finland, France, Greece, Hungary, Ireland, Latvia, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden and the United Kingdom. Bulgaria, Croatia, Germany, Iceland, Italy, Lithuania and Spain did not report data to the level of detail required for the analysis. Belgium and Denmark do not have any formal surveillance system for the disease.

Figure 39: Trend in reported confirmed human cases of trichinellosis in the EU/EEA, by month of reporting, 2008–2014

Of the 10 MS that reported confirmed cases in 2014, five provided information on hospitalisation for all of their cases (corresponding to 74.6% of all confirmed cases reported in the EU). On average, 63.0% of the cases were hospitalised. Six MS provided information on the outcome of the cases. Two deaths due to trichinellosis were reported in Romania in 2014. This gives an EU case-fatality rate of 0.84% among the 239 confirmed cases for which this information was reported (74.9% of all confirmed cases).

3.8.2. *Trichinella* in animals

Comparability of data

According to Commission Regulation (EC) No 2075/2005, carcases of domestic pigs, horses, wild boar and other farmed or wild animal species that are susceptible to *Trichinella* infestation should be systematically sampled at slaughter as part of the meat inspection process and are tested for *Trichinella*. Animals (both domestic and wild) slaughtered for own consumption are not included in the

Regulation, but are subject to national rules, which differ per MS, as each MS can decide how to control *Trichinella* in this population (e.g. test or not, freeze or not). Therefore, data from animals slaughtered for own consumption might not be comparable between MS.

From 1 June 2014 Commission Regulation (EU) No. 216/2014 amending Regulation (EC) No 2075/2005 came into force. The Regulation state that the reporting of data on domestic swine shall, at least, provide specific information related to number of animals raised under controlled housing conditions and number of breeding sows, boars and fattening pigs tested. Further, the Regulation states that a negligible risk status for a country or region is no longer recognised in an international context by the OIE. Instead, such recognition is linked to compartments of one or more holdings applying specific controlled housing conditions. Belgium and Denmark have had such a status since 2011, and holdings and compartments in those two MS which complied with the conditions for controlled housing at the date of entry into force of this Regulation, are allowed to apply for the status as negligible risk without additional prerequisites.

Only results for the most important animal species that might serve as a source for human infection in the EU are presented.

Detailed information on the data reported and on the occurrence of *Trichinella* in the different animal categories has been included in specific tables referenced in Appendix.

In 2014, 26 MS and three non-MS provided information on *Trichinella* in farm animals (pigs, farmed wild boar and horses) and 10 MS reported positive findings.

Nineteen MS reported data on 121,935,618 breeding or fattening pigs, or on unspecified pigs, raised under controlled housing conditions and no positive pigs were reported (Table 2014_TRICHPIGS). Sweden reported separate data for breeding animals (sows and boars).

Fourteen MS reported data on 69,466,211 tested breeding and fattening pigs that were not raised under controlled housing conditions and seven MS reported a total of 204 positive findings (Table 2014_TRICHPIGSNOT). In fattening pigs, six MS (Romania accounting for most reports (141) followed by Croatia (20), Spain (17), Poland (15), Bulgaria (3) and Latvia (1)) reported in total 197 positive pigs. Seven positive tested animals were breeding pigs reported by 3 MS (Italy, Poland, and Romania). Twenty-three positive fattening pigs (Croatia and Spain) were reported as pigs for own consumption (Figure 2014_TRICHMAPSPIGSNOT).

In total, 191,401,829 pigs (breeding pigs, fattening pigs and unspecified pigs kept under controlled and not under controlled housing conditions) tested for *Trichinella* were reported by the MS and 204 were positive (0.0001%). Most of the positive findings were reported by Romania (70.1% of the positive findings) followed by Croatia, Poland and Spain; 52.5% of the positive findings were *T. spiralis*, 36.3% were unspecified *Trichinella* and 11.3% were *T. britovi.*

Ten MS reported data on farmed wild boar (Table 2014_TRICHFARMEDWILDBOAR). In total, 41,244 animals were tested; Austria reported 63.6% of all data with two positives (one from Austria (*T. pseudospiralis*) and one imported from Poland (*T.spiralis*)) out of 26,218 samples tested (0.008%). Bulgaria and Romania also reported 0.73% and 1.53% positive findings respectively.

No positive findings were reported from 198,665 domestic solipeds (mainly horses, but also donkeys and mules) tested in the EU (Table 2014_TRICHHORSE).

Nineteen MS and one non-MS provided data on hunted wild boar (Table 2014_TRICHWILDWILDBOAR). Twelve MS reported 1,049 positive findings out of 884,369 animals tested, with an overall EU proportion of positive samples of 0.12% (Figure 40). Most of the positive animals were reported by eastern EU MS with Poland reporting 58.3% of the positive samples followed by Spain (19.8%), Estonia (7.2%) and Latvia (7.0%). Most of the findings were reported as *Trichinella* spp. (64.5%) followed by *T. spiralis* (25.6%) and *T. britovi* (8.8%). There were also a small number of findings of *T. nativa* and *T. pseudospiralis.*

Figure 40: Findings of *Trichinella* in hunted wild boar, 2014

Eighteen MS reported data on *Trichinella* in 27 different wildlife species other than hunted wild boar, and reported a total of 421 positive findings (14 different species) from 13,374 animals tested (3.1%). *Trichinella* is found in wildlife in large parts of Europe and 15 MS reported positive findings. Most of the reported positive findings were from eastern and north-eastern EU MS (Figure 41).

Figure 41: Findings of *Trichinella* in wildlife (excluding hunted wild boar), 2014

The proportion of positive samples in various wildlife species tested between 2005 and 2014 is presented in Figure 42. Over the years, the highest proportion of positive samples has been reported for raccoon dogs, followed by bears. The decrease observed in the proportion of positive samples for raccoon dogs between 2012 and 2013 is due to the reporting of data from Denmark that included no positive samples in these years. For all years, Finland has reported most of the positive samples even though they reported less than 1% of samples tested each year. In 2014, Finland reported 68.9% of all positive findings in wildlife other than hunted wild boar, mainly in raccoon dogs, lynx and fox. Switzerland also reported few positive cases in lynx. *Trichinella* was also reported from rats, wolves, wolverines, badgers, jackals, mink, beavers, martens, otters and owls.

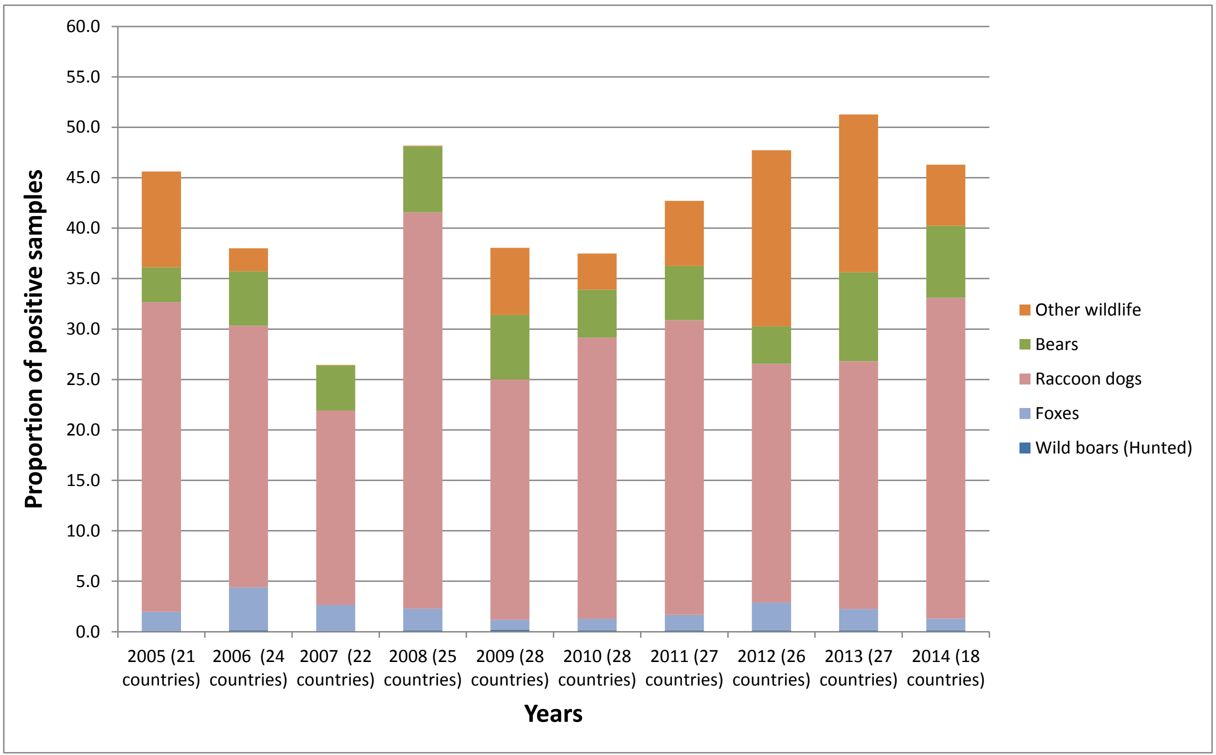


Figure 42: Proportion of *Trichinella*-positive samples in wildlife in Member States and non-Member States, 2005–2014

3.8.3. Discussion

Trichinellosis is a rare disease in the EU/EEA. The 7-year EU/EEA trend from 2008 to 2014 was greatly affected by the number and size of disease outbreaks each year. The EU notification rate increased in 2014 and was the highest reported for 5 years. This was mainly due to the two countries with the highest notification rates, Romania and Bulgaria, accounting for 88% of reported confirmed cases. Both countries reported an increase in cases in 2014 and the notification rates almost doubled compared with 2013. This increase was attributed to the several outbreaks in these two countries. On average, almost 80% of the confirmed human trichinellosis cases were hospitalised with two fatal cases reported in 2014.

Trichinella is found in large parts of Europe and 15 MS reported positive findings in 2014 in animals. In the EU, most pigs are subject to official meat inspection at slaughter in accordance with Regulation (EC) No 2075/2005; only pigs slaughtered for own consumption are not covered by the regulation.

Only seven MS reported *Trichinella* in pigs in 2014, with an EU prevalence of 0.0001%. All the positive findings were from pigs not raised under controlled housing conditions. Indeed, Romania accounted for 70% of the reported positive findings. EFSA has identified that non-controlled housing condition is the single main risk factor for *Trichinella* infections in domestic pigs, and the risk of *Trihinella* infection in pigs from well-managed officially recognised controlled housing conditions is considered negligible

(EFSA, 2011b). Most humans become infected when consuming undercooked meat from pigs or wild boar that have not been tested for *Trichinella* spp.

Ten MS reported data on farmed wild boar and only two MS reported positive findings. The prevalence in farmed wild boar is higher than in pigs, and controlled housing conditions are often not applied to this production. No positive findings were reported from solipeds in 2014.

In the EU Member States, Trichinellosis in wildlife is widespread and *Trichinella* is commonly reported in wildlife, especially by some eastern and north eastern European MS. The proportion of positive samples from wildlife, other than wild boar, was highest in raccoon dogs, followed by bears. *Trichinella* was also reported from rats, wolves, wolverines, badgers, jackals, mink, beavers, martens, otters and owls.

The increasing number of wild boar and red foxes and the spread of the raccoon dog from eastern to western Europe may increase the prevalence of *Trichinella* circulating among wild animals (Alban et al., 2011). Therefore, it is important to continue educating hunters and others eating wild game about the risk of eating undercooked game meat.

Seventeen food-borne outbreaks caused by *Trichinella* were reported in six MS. Pig meat was the food vehicle identified in 11 out of 15 strong-evidence outbreaks, and consumption of inadequately heat-treated meat or meat not controlled for *Trichinella* (e.g. meat from backyard pigs or wild bear) were reported as the main causes.

Generally, *Trichinella* is considered a medium risk for public heath related to the consumption of pig meat, and integrated preventative measures and controls on farms and at slaughterhouses can ensure effective control of *Trichinella* (EFSA BIOHAZ, CONTAM and AHAW Panels, 2011). 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 also occur as a result of the breakdown of the biosecurity barriers around the farm, allowing the ingress of infected rodents. Pigs raised outdoors are at risk of contact with potentially *Trichinella*-infected wildlife (EFSA, 2011b).

3.9. *Echinococcus*

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans and animals. It also includes hyperlinks to *Echinococcus* summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.9.1. Echinococcosis in humans

Although cystic echinococcosis (CE) and alveolar echinococcosis (AE) are two different diseases, caused by *E. granulosus* and *E. multilocularis*, respectively, they are reported jointly to ECDC as echinococcosis as the EU case definition does not differentiate between the two clinical forms of the disease. As the majority of cases is caused by *E. granulosus*, the total number of cases can be considered to approximately reflect the situation concerning *E. granulosus*. In 2014, 806 echinococcosis cases, of which 801 were laboratory-confirmed, were reported in the EU (Table 22). Twenty-one MS reported at least one confirmed case and five MS reported zero cases. The EU notification rate was 0.18 cases per 100,000 population, the same as in 2013. The highest notification rate was observed in Bulgaria with 4.17 cases per 100,000, followed by Lithuania, Latvia and Croatia with 0.75, 0.65, and 0.47 cases per 100,000 respectively.

Table 22: Reported human cases of echinococcosis and notification rates per 100,000 population in the EU/EEA, by country and year, 2010–2014

Country	2014					2013		2012		2011		2010	
	National coverage(a)	Data format(a)	Total cases	Confirmed cases &rates		Confirmed cases &rates		Confirmed cases &rates		Confirmed cases &rates		Confirmed cases &rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	14	14	0.17	11	0.13	3	0.04	7	0.08	21	0.25
Belgium	Y	A	15	15	0.13	15	0.13	6	0.05	1	0.01	1	0.01
Bulgaria	Y	A	302	302	4.17	278	3.82	320	4.37	307	4.17	291	3.92
Croatia	Y	A	20	20	0.47	–	–	–	–	–	–	–	–
Cyprus	Y	C	0	0	0.00	0	0.00	0	0.00	2	0.24	0	0.00
Czech Republic	Y	C	6	6	0.06	2	0.02	0	0.00	0	0.00	5	0.05
Denmark(c)	–	–	–	–	–	–	–	–	–	–	–	–	–
Estonia	Y	C	1	1	0.08	3	0.23	3	0.23	0	0.00	0	0.00
Finland(d)	Y	C	0	0	0.00	4	0.07	3	0.06	1	0.02	1	0.02
France	Y	C	32	32	0.05	34	0.05	49	0.08	45	0.07	33	0.05
Germany	Y	C	112	112	0.14	127	0.15	118	0.14	142	0.17	117	0.14
Greece	Y	C	13	13	0.12	10	0.09	21	0.19	17	0.15	11	0.10
Hungary	Y	C	2	2	0.02	5	0.05	6	0.06	11	0.11	9	0.09
Ireland(d)	Y	C	0	0	0.00	1	0.02	0	0.00	0	0.00	1	0.02
Italy(c)	–	–	–	–	–	–	–	–	–	(e)	–	(e)	–
Latvia	Y	C	13	13	0.65	7	0.35	8	0.39	10	0.48	14	0.66
Lithuania	Y	C	22	22	0.75	23	0.77	23	0.77	24	0.79	23	0.73
Luxembourg	Y	C	0	0	0.00	0	0.00	0	0.00	1	0.20	1	0.20
Malta(d)	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Netherlands	Y	A	30	30	0.18	33	0.20	50	0.30	49	0.29	35	0.21
Poland	Y	C	48	48	0.13	39	0.10	28	0.07	19	0.05	36	0.09
Portugal	Y	C	4	4	0.04	3	0.03	2	0.02	1	0.01	3	0.03
Romania	Y	C	36	31	0.16	55	0.28	96	0.48	53	0.27	55	0.27
Slovakia	Y	C	8	8	0.15	20	0.37	3	0.06	2	0.04	9	0.17
Slovenia	Y	C	5	5	0.24	6	0.29	6	0.29	8	0.39	8	0.39
Spain	Y	C	77	77	0.17	94	0.20	96	0.21	53	0.11	82	0.18
Sweden	Y	C	21	21	0.22	16	0.17	16	0.17	19	0.20	30	0.32
United Kingdom(d)	Y	C	25	25	0.04	14	0.02	7	0.01	9	0.01	7	0.01
EU Total	–	–	806	801	0.18	800	0.18	864	0.20	781	0.18	793	0.18
Iceland	Y	C	0	0	0.0	0	0.00	–	–	–	–	–	–
Norway(d)	Y	C	0	0	0.0	2	0.04	2	0.04	3	0.06	1	0.02

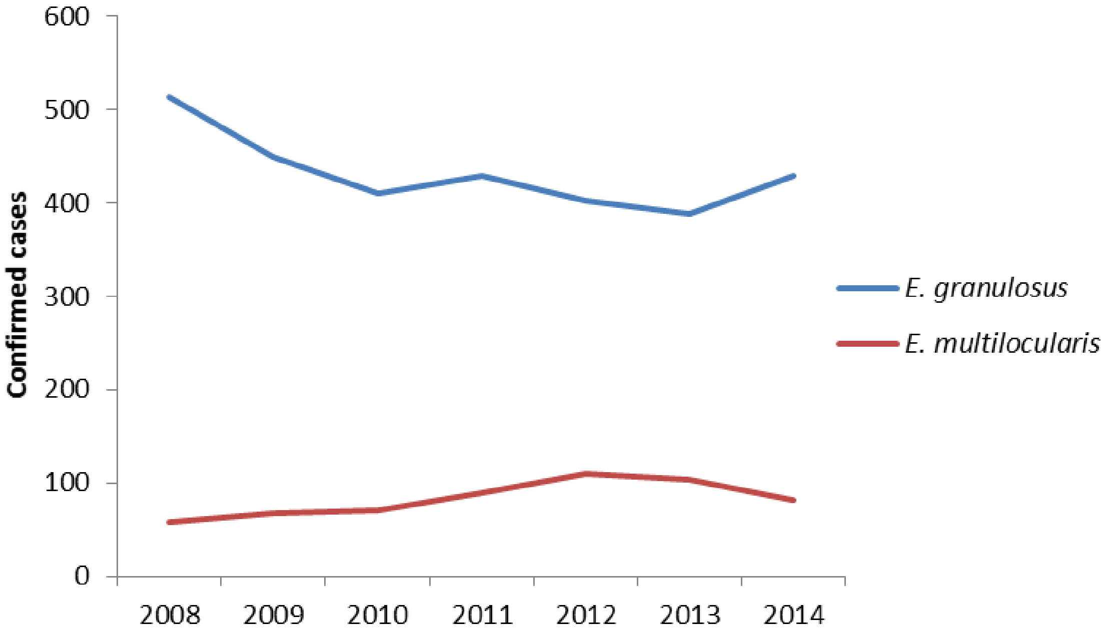
(a): Y: yes; N: no; A: aggregated data; C: case-based data; –: no report.
(b): All cases of unknown case classification.
(c): No surveillance system.
(d): Finland, Ireland, Malta, the United Kingdom and mainland Norway have been declared free of *E. multilocularis*.
(e): In Italy, no surveillance system exists, but according to the hospital discharge records, CE cases ranged from 2,204 in 2001 to 703 in 2012 with a statistically significant decrease (Brandu et al., 2014).

The two forms of the disease can be reported to ECDC by species, reporting is compulsory with a possibility to report species as unknown. Species information was provided for 521 cases (65% of confirmed cases) by 15 of 21 countries reporting echinococcosis cases in 2014. Eight MS (Bulgaria, Hungary, Latvia, Portugal, Romania, Slovenia, Spain and the United Kingdom) only reported cases of *E. granulosus*, two MS (Estonia and France) only reported cases of *E. multilocularis,* and five MS (Austria, Germany, Lithuania, Poland and Slovakia) reported both parasites in humans. In the EU/EEA, the reported cases of *E. granulosus* accounted for 439 cases (54.8% of confirmed cases, of which 68.8%; 302 cases were from Bulgaria), *E. multilocularis* for 82 cases (10.2%) and no information on species was provided for 280 cases (35.0%).

The EU/EEA trend in number of echinococcosis cases during 2008-2014 was stable but varied by species: the number of cases infected with *E. multilocularis* (AE) increased from 2008 to 2012, but decreased slightly in 2013–2014 (Figure 43). In contrast, there was a decreasing annual number of *E. granulosus* (CE) from 2008 to 2013 and a slight increase in 2014.

Concerning AE by reporting countries in 2014, a decrease in the number of reported cases was seen for five MS, an increase was observed for one MS and in one MS no difference was found compared with 2013.

Similarly for CE, an increase in the number of reported cases was seen during 2014 for five MS, a decrease was observed for two MS and in the remaining two MS no difference was found.



Source: TESSy data from 10 countries reporting species for most or all their cases throughout the period in 2008-2014. For *E. granulosus* from nine MS (Austria, Bulgaria, Estonia, Germany, Latvia, Lithuania, Poland, Slovakia and the United Kingdom). For *E. multilocularis* from seven MS (Austria, France, Germany, Latvia, Lithuania, Slovakia and Poland).

Figure 43: Reported confirmed human cases of echinococcosis by species in selected Member States, by year, 2008–2014

Thirteen MS provided information on hospitalisation for all or the majority of their confirmed cases of echinococcosis. Spain reported hospitalisation status for the first time in 2014, increasing the proportion of confirmed cases of echinococcosis with known hospitalisation status on EU-level from 22.7% to 24.0%. An overall decrease in the proportion of cases hospitalised from 70.6% to 63.5% was observed in 2013–2014. The proportion of cases hospitalised was 70.8% for *E. multilocularis* reported by five MS and 61.2% for *E. granulosus* reported by 10 MS in 2014.

Twelve MS provided information on the outcome of their echinococcosis cases. In 2014, one death, which was caused by *E. granulosus* was reported in Romania (Morar et al., 2014).

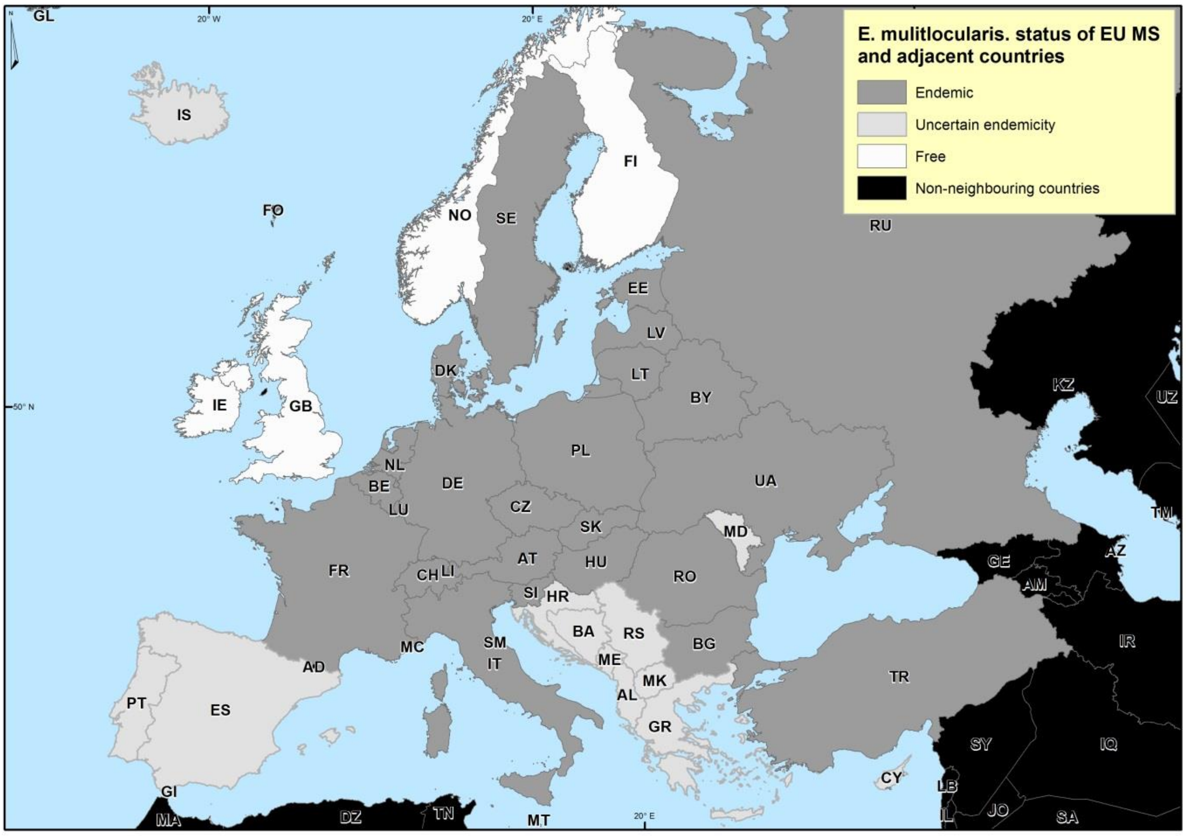
3.9.2. *Echinococcus* in animals

Comparability of data

E. granulosus and *E. multilocularis* are two different tapeworms that are the causative agents of two zoonoses with different epidemiology. For *E. granulosus* the definitive hosts are dogs and, rarely, other canids, while the intermediate hosts are mainly livestock. For *E. multilocularis*, in Europe the transmission cycle is predominantly sylvatic and is wildlife-based. The intermediate hosts for *E. multilocularis* are wild small rodents (microtine or arvicolid), while the definitive hosts in Europe are red foxes, raccoon dogs and, to a lesser extent, dogs and wolves.

As described above there was an increasing number of human cases reported of AE in the EU/EEA during the five-year period. It is of particular importance to assess the occurrence and distribution of *E. multilocularis* in Europe.

Four MS (Finland, Ireland, Malta, Norway and the United Kingdom) are considered free from *E. multilocularis* and according to Regulation (EU) No 1152/2011[33] these MS require an annual surveillance programmes in place to monitor the absence of *E. multilocularis*. One EEA State, mainland Norway (Svalbard excluded), has also claimed freedom from EM and implements a surveillance programme in line with Regulation (EU) No 1152/2011.[34] The status of *E. multilocularis* in the EU Member States and adjacent countries according a recently adopted EFSA opinion is shown in Figure 44 (EFSA AHAW Panel, 2015).



Free: documented free, i.e. MS listed in Commission Delegated Regulation (EU) No 1152/2011 of 14 July 2011 or adjacent countries (Norway); Uncertain endemicity: freedom not documented but no case reported (EFSA, 2015).

Figure 44: *E. multilocularis* status of EU Member States and adjacent countries

In all other MS, data on *E. multilocularis* rely on whether findings are notifiable and if monitoring is in place or if studies on *E. multilocularis* are performed. As data on *E. multilocularis* in animals vary geographically (also within countries) and timely, reported cases of *E. multilocularis* are difficult to compare within and between countries. According to the scientific literature *E. multilocularis* has been documented in wild carnivores, mainly foxes, in 19 MS (Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, France, Germany, Hungary, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Romania, Slovak Republic, Slovenia and Sweden).

Surveillance for *E. granulosus* is carried out at meat inspection (macroscopic (visual) examination of organs of relevant farm animals at slaughter) and data from this surveillance should be comparable given that the compulsory notification is in place.

[33] Commission Delegated Regulation (EU) No 1152/2011 of 14 July 2011 supplementing Regulation (EC) No 998/2003 of the European Parliament and of the Council as regards preventive health measures for the control of *Echinococcus multilocularis* infection in dogs. OJ L 296, 15.11.2011, pp. 6–12.

[34] Decision of the EEA Joint Committee No 103/2012 of 15 June 2012 amending Annex I (Veterinary and phytosanitary matters) to the EEA Agreement. OJ L 270, 4.10.2012, pp. 1–2.

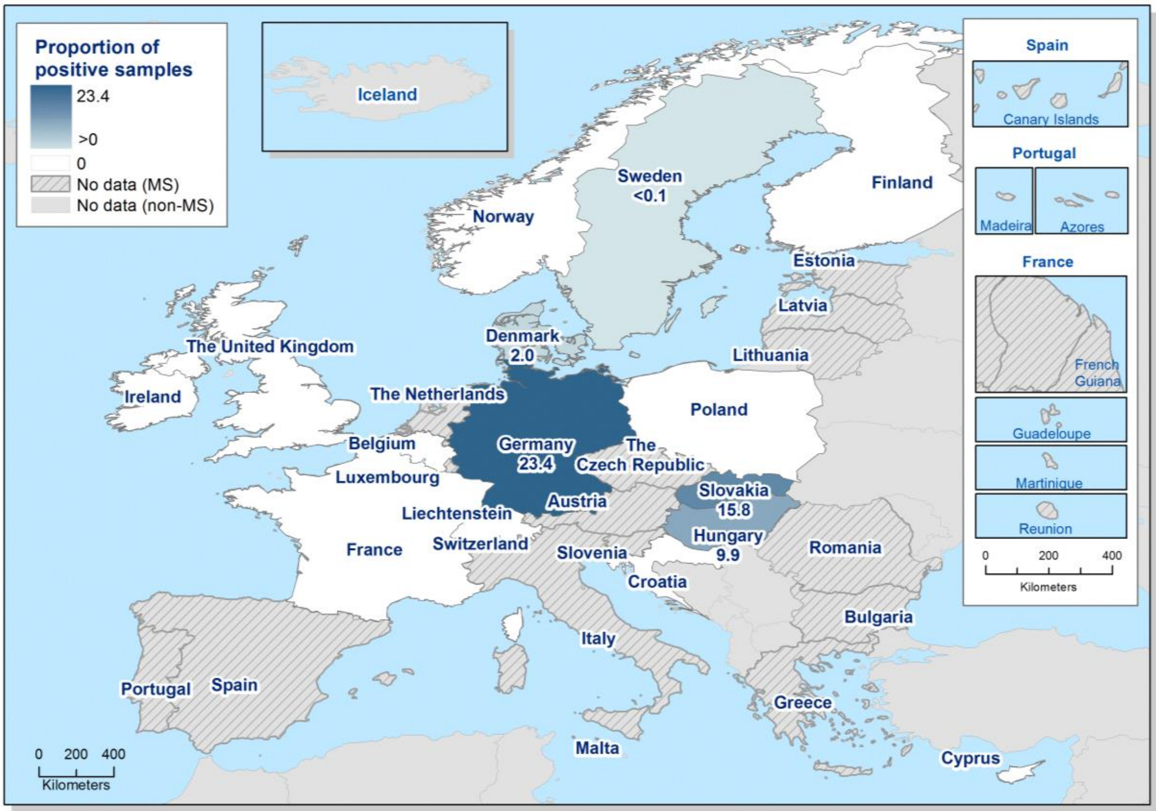
E. multilocularis in animals

E. multilocularis is mainly monitored in foxes. Finland, Ireland, Malta, Norway and the United Kingdom, considered free of *E. multilocularis* (Regulation (EU) No 1152/2011), all reported no cases during 2014 to European Commission (data not presented here).

In 2014, 13 MS and two non-MS reported data on 7,268 foxes examined for *Echinococcus,* and eight MS and one non-MS reported positive findings. Poland, Germany, Slovakia and France (95 tested foxes in a survey) reported the highest proportion of positive samples: 27.7%. 25.1%, 15.8%, 14.7%, respectively. Species information was provided from six out of the eight MS that reported infected foxes in 2014 (Table 2014_ECHINOFOX). Four MS (Denmark, Hungary, Slovakia and Sweden) only reported foxes infected with *E. multilocularis*, and reported proportions of positive findings were, respectively 2.0%, 9.9%, 15.8% and < 0.1%. Poland only reported *E. granulosus* cases (27.7%) and Germany reported *E. multilocularis* (23.6%) and *Echinococcus* unspecified cases in foxes (Figure 45). These findings are similar to last year. Belgium and France did not report speciation results of fox samples.

Ten MS and one non-MS reported investigations of foxes as being part of a monitoring programme, the remaining countries reported data from surveys (3), clinical investigation (1) or unspecified (2).

Ten MS have reported data on *E. multilocularis* in foxes for a minimum of four consecutive years, from 2005 to 2014. Sweden reported few positive findings in foxes. In the Czech Republic, an apparent increase in cases of *E. multilocularis* has been reported during 2005–2011, however, no data have been provided since 2011. Findings from France, Germany, Luxembourg, the Netherlands, Poland and Slovakia have fluctuated between years, but most years they have reported positive findings. Fluctuations in reported cases probably are driven by efforts done in a particular year, than reflecting a true change in prevalence.



Finland, Ireland, Malta, Norway and the United Kingdom are considered free of *E. multilocularis* (Regulation (EU) No 1152/2011).

Figure 45: Findings of *Echinococcus multilocularis* in foxes, 2014

Poland, Denmark and Switzerland reported *E. multilocularis* in other animal species; Poland reported seven positive pigs out of 200 animals tested, Denmark reported one positive raccoon dog out of 112 tested and Switzerland reported one beaver positive out of two tested (Table 2014_ECHINOOTHER).

Echinococcus granulosus and *Echinococcus* findings in other animals

Seventeen MS and two non-MS reported data from 92,440,091 domestic animals (cattle, goats, pigs, sheep and horses) tested for *Echinococcus.* These data are obtained mainly from the meat inspection performed at slaughterhouse. Eight MS reported a total of 188,076 positive samples (0.2%), mainly from goats (49.5% of the positive samples) and sheep (43.2%). Spain and Greece reported 50.3% and 48.9% of all *Echinococcus*-positive samples respectively. Overall, 50.3% of the positive samples were specified and identified as *E. granulosus* and almost exclusively by Spain (Table 2014_ECHINOOTHER).

Spain and Finland reported findings of *E. granulosus* in hunted wild boar, deer, reindeer and wolves, and France and Romania reported *Echinococcus* spp. in dogs, cats and monkey (Table 2014_ECHINOOTHER).

3.9.3. Discussion

The EU notification rate of confirmed human echinococcosis cases has been stable since 2010. The most commonly reported species in 2014 was *E. granulosus* (cystic echinococcosis, 13 countries), whereas seven countries reported cases of *E. multilocularis* (alveolar echinococcosis). The highest population-based risk was noted in Bulgaria (which only reported *E. granulosus*), where the notification rate was 23 times higher than the average EU rate.

There were over five times as many reported cases for *E. granulosus* as for *E. multilocularis.* After a steady increase of alveolar echinococcosis in the 7-year period 2008–2012, the number of infections stabilised in 2013 and decreased for the first time in 2014. At the same time, the number of cases with the cystic form of echinococcosis increased for the first time in 2014 after a 6-year period of decrease. An increase in *E. granulosus* was observed particularly in four MS. *E. granulosus* prevalence is high in northern Africa and Asia and importation from these regions might be considered a possible factor for the observed rise (Piseddu et al., 2015).

E. multilocularis was reported at low to moderate levels in foxes by eight MS. *E. multilocularis* has been reported in red foxes in most EU MS (EFSA AHAW Panel, 2007; Osterman et al., 2011). Surveillance of *E. multilocularis* in foxes is important in order to assess the prevalence in Europe, particularly as the distribution of *E. multilocularis* and the fox population is increasing in Europe (Vervaeke et al., 2006; Berke et al., 2008; Takumi et al., 2008; Combes et al., 2012; Antolová et al., 2014). Whether this is due to range expansion or reflects an increased surveillance effort will be difficult to prove, since there is a general lack of (negative) baseline data. Possibly, the parasite had been present, but undetected, in small transmission foci which rapidly expanded in the wake of population increases of red foxes. An increase in infected foxes can also lead to *E. multilocularis* being isolated from unusual intermediate hosts including beavers due to heavy environmental contamination with *E. multilocularis* eggs. Indeed, in Switzerland, where the prevalence of *E. multilocularis* in foxes is estimated between 30% and 70%, reported a positive beaver in 2014. In addition, the mapping of aggregated prevalence data of *E. multilocularis* (Figure 43) must be interpreted with caution since many variables such as temperature, rainfall, humidity levels and soil have been identified as relevant factors that explain partially the distribution of the parasite. These factors may vary a lot locally within MS leading to local foci within MS reporting positive cases.

E. multilocularis has never been found in Finland, Ireland, Malta, Norway and the United Kingdom, and in order to maintain the status of *E. multilocularis* freedom, the four MS (Finland, Ireland, Malta and the United Kingdom) are obliged to implement surveillance programme aimed at detecting the parasite in any part of the country (Regulation (EU) No 1152/2011). One EEA State, mainland Norway (Svalbard excluded), has also claimed freedom from EM and implements a surveillance programme in line with Regulation (EU) No 1152/2011. In 2013, EFSA carried out the assessment and found that under the assumption of unbiased representative sampling (in the case of Finland, Ireland and the United Kingdom) and unbiased risk-based sampling (in the case of Malta) and considering the sensitivity of the tests applied, all four MS have fulfilled the requirement of Regulation (EU) No 1152/2011 to the effect that the surveillance activities should detect a prevalence of *E. multilocularis* of 1% or less at a confidence level of at least 0.95 (EFSA, 2013b). It should however be noted that *E. multilocularis* can occur at lower prevalences as reported in Sweden where 0.1% of investigated foxes were infected with *E. multilocularis*. Information campaigns about *E. multilocularis* tend to focus on warnings against eating berries and mushrooms from areas where *E. multilocularis* has been detected in the wildlife population, while little consideration is given to ownership of dogs and contact with wild carnivores (Antolová et al., 2014). A case-control study has showed that having a dog and contact with wild carnivores are important risk factors (Kern et al., 2004).

One MS (Spain) reported almost all the positive findings of *E. granulosus*; mainly from domestic animals. All the human cases from Spain were also reported as *E. granulosus.*

The EFSA Panel on Animal Health and Welfare have stated in a scientific opinion that in many human cases the diagnosis is established only as echinococcosis, and the aetiological agent of the disease, *E. multilocularis* or *E. granulosus*, is not determined (EFSA AHAW Panel, 2007). Similarly, EFSA considers that the current data about the occurrence of human echinococcosis in MS do not provide an accurate picture of the epidemiological situation. In 2014, the species-specific aetiology of 35.0% of reported human cases remained undetermined. Distinction between infections with *E. granulosus* and *E. multilocularis* is needed because the two diseases require different management of prevention and treatment. Furthermore, the detection of CE or AE in EU citizens or immigrants is of great epidemiological importance. Regarding animal data, the quality of the data reported on *Echinococcus* has improved in recent years, with more information being provided about the sampling context and more data reported at species level. Also in animals notification is a requirement for reliable data and information on parasite speciation is very important for risk management efforts as *E. granulosus* and *E. multilocularis* have different epidemiology and pose different health risks to humans. For *E. granulosus*, notification requirement will ensure that comparable data between MS will be obtained from meat inspection of food producing animals. Concerning *E. multilocularis*, a general notification requirement for all MS can be questioned but should be required in countries free from *Echinococcus*. In countries where the parasite is endemic, reporting each case gives no additional valuable information. Therefore, repeated surveys, as surveillance for *E. multilocularis*, can be a basis for follow up and monitoring (EFSA AHAW Panel, 2015).

3.10. *Toxoplasma*

The Appendix contains hyperlinks to all data summarised for the production of this section, for animals. It also includes hyperlinks to *Toxoplasma* summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.10.1. Toxoplasmosis in humans

Data on congenital toxoplasmosis in the EU in 2014 are not included in this report but data will be available in the ECDC Surveillance Atlas (in preparation).

3.10.2. *Toxoplasma* in animals

Comparability of data

Most of the reporting countries provided information on the type of specimen taken and the analytical method used for testing. This (immunohistochemistry (IHC), PCR, histology) facilitated a better interpretation and description of the data. Some countries used direct methods to test meat or other tissues for the presence of *Toxoplasma* cysts or *Toxoplasma* antigens, while other countries used indirect serological assays (agglutination and immunofluorescence assays, ELISA, complement fixation test), to test blood or meat juice samples for the presence of *Toxoplasma*-specific 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. It also should be noted that the prevalence of *Toxoplasma* infection in farm animals is strongly influenced by the age of the tested animals and the production systems and husbandry conditions applied on the farm.

Animals

In 2014, 14 MS and two non-MS provided data on *Toxoplasma* in animals (Table 2014_TOXOOVERVIEW).

Only four MS reported data on *Toxoplasma* in pigs (Table 2014_TOXOPIGS). Overall, 9.7% of 2,557 units were positive for *Toxoplasma*. Italy accounted for most of the samples tested in this species (80.2%). However, the analytical method, the type of pig farming and the age of the pigs were not always specified. For objective sampling on farm, 16.6% of the herds (out of 905 tested) were positive, while at the slaughterhouse the percentage was 6.4% out of the 1,104 tested slaughter batches. Overall, 5.5% of the reported individual animals (n=490) and 15.6% of the reported flocks/herd (n=963) were positive for *Toxoplasma*. During a clinical investigation in the United Kingdom all 13 sampled pigs tested seropositive by latex agglutination test while no positive pig was detected among the 434 and 2 animals tested in Germany and Slovakia respectively.

Nine MS and Norway reported data on *Toxoplasma* in cattle in 2014 (Table 2014_TOXOCATTLE). Overall, 3.9% of 3,471 units tested in the MS were positive for *Toxoplasma*. As for pigs, Italy provided most of the samples, followed by Germany. Overall, 6.2% of the reported individual animals (n=1,000) and 2.7% of the reported flocks/herd (n=1,306) were positive for *Toxoplasma*. At animal level, there was a wide spectrum of reported prevalence, ranging from 0 to 100%, irrespective of which analytical method was used. In Italy, the prevalence was usually low at herd or slaughter batch level, except for some samples obtained during clinical investigations. The reported prevalence in Germany and Ireland was below 5%, while higher prevalence was reported in Poland, Spain and the United Kingdom, where generally only few animals were tested in the context of suspect sampling. No *Toxoplasma*-positive samples were reported by Hungary, Latvia, Slovakia and Norway.

Twelve MS and two non-MS reported information on *Toxoplasma* in sheep and goats with greater sample numbers compared to the other species, probably because of the clinical importance of the parasite in these animal species (Table 2014_TOXOOVINEGOAT). Overall, 26.2% of 7,248 units tested in the MS were positive for *Toxoplasma*. As in the previous year, high proportions of serological tests were found to be positive in several countries, particularly from clinical investigations and suspect sampling. Overall, 26.9% of the reported individual animals (n=4,694) and 34.2% of the reported flocks/herd (n=1,724) were positive for *Toxoplasma*.

Ten MS and two non-MS provided data on *Toxoplasma* in cats and dogs, mainly from clinical investigations, and often found positive samples, mostly using serological tests (Table 2014_TOXOCATDOG). Overall, 17.2% of the 1,769 cats tested in the 10 MS, were positive for *Toxoplasma*, while this was 12.2% in 1,767 tested dogs. Among the countries that sampled the largest number of animals, Italy reported high seroprevalence both in cats and in dogs. Finland on the other hand reported very low prevalence in cats (<2%) and no positive samples from dogs, albeit using histology instead of serological tests.

In addition, eight MS and two non-MS provided data on other animal species, reporting *Toxoplasma*-positive samples from deer, donkeys, foxes, hares, horses, lynx, mouflons, rabbits, water buffalo, wild rats and wolves (Table 2014_TOXOOTHERAN). Italy reported a considerable number of tests on horses, with variable prevalence depending on the analytic method. The percentage of positive samples/herds was always below 5%.

3.10.3. Discussion

As highlighted in the EFSA opinions on monitoring and surveillance of *Toxoplasma* as well as on modernisation of meat inspection, *Toxoplasma* poses an important risk to human health, and has to be considered as a relevant hazard to be addressed in revised meat inspection systems for pigs, sheep, goats, farmed wild boar and farmed deer (EFSA BIOHAZ Panel, 2007a, 2013b,c; EFSA BIOHAZ, CONTAM and AHAW Panels, 2011). The information reported by MS shows that *Toxoplasma* is present in most livestock species across the EU. This is supported by the fact that in most of the reported countries, *Toxoplasma* could be detected by direct as well as indirect methods. Positive samples were also reported in cats (the natural hosts), dogs, as well as in several other domesticated animal species, indicating the wide distribution of the parasite among different farm, domestic and wildlife animal species.

More detailed epidemiological interpretation of reported results is not feasible because of missing information as regards the use of different tests and analytical methods, on the sampling schemes, the age of the tested animals and the type of husbandry applied at the farm.

Recently, the relationship between seroprevalence in the main livestock species and presence of *Toxoplasma gondii* in meat has been extensively reviewed by a consortium of European institutions, supported by an EFSA grant (Opsteegh et al., in press).

3.11. Rabies

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans and animals. It also includes hyperlinks to rabies summary tables and figures that were not presented in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.11.1. Rabies in humans

Generally, very few cases of rabies in humans are reported in the EU, and most MS have not had any autochthonous cases for decades. In 2014, three travel-associated cases of rabies were reported in the EU. One patient was a 46-year old woman from Spain bitten by a dog in Morocco. A 57-year old man from France was infected by a canine strain of rabies virus in Mali, and a 35-year old Dutch woman was bitten by a dog in India.

3.11.2. Rabies in animals

Rabies is a notifiable disease in all MS and Switzerland. In 2014, 13 MS had their annual or multi-annual plan of rabies eradication co-financed by the EC.[35] Eradication programmes include:

- oral vaccination of wild animals through baiting;
- assessment of rabies incidence (surveillance) by testing any suspect animal[36] (wild or domestic) for rabies;
- monitoring of wild animals for vaccination effectiveness, based on the assessment of bait uptake and on the assessment of immunisation rates by testing for rabies antibodies in the target species (foxes and raccoon dogs) sampled in vaccinated areas.

Co-financed oral vaccination campaigns were carried out in 2014 in 13 MS – Bulgaria, Croatia, Finland, Greece, Estonia, Italy, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia. Some of these vaccinations were applied in neighbouring third countries to reduce the introduction of rabies via foxes or other potential carriers.

Domestic animals and wildlife

Rabies has been completely eradicated from Western and Central Europe. However, endemic rabies still occurs in foxes and other wildlife species in certain eastern parts of the EU, in particular Romania, with sporadic spill-over to domestic animals, mainly dogs and cats (pet and stray) and ruminants.

Overall, 319 rabies cases were reported in foxes by six MS: Romania (215 cases), Poland (73 cases), Hungary (20 cases), Greece (8 cases), Bulgaria (2 cases) and Croatia (1 case). The total number of cases decreased by 41.4% compared with 2013, when 544 rabies cases in foxes were reported by seven MS (mostly by Romania and Poland).This decrease in the number of positive cases from 2013 to 2014 is due to a drop in the cases reported by Romania (215 cases in 2014 versus 322 in 2013),

[35] Commission Implementing Decision (EC) No 2013/722/EU of 29 November 2013 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 2014. OJ L 328, 7.12.2013, p. 83–93.

[36] Suspect animals include autochthonous or imported animals (domestic or wild) showing clinical signs of rabies or abnormal behaviour suggestive of rabies, animals found dead, animals to which humans have been exposed (bites, scratches or licking of wounds, etc.) and road kill animals (only for rabies-endemic countries). These animals are used for rabies surveillance. This definition concerns infected and rabies-free countries.

Poland (73 cases in 2014 versus 136 in 2013), Croatia (1 case in 2014 versus 34 in 2013) and Greece (8 cases in 2014 versus 25 in 2013).

The geographical distribution of reported cases in foxes in 2014 is shown in Figure 46.

Figure 46: Classical rabies or unspecified lyssavirus cases in foxes, 2014

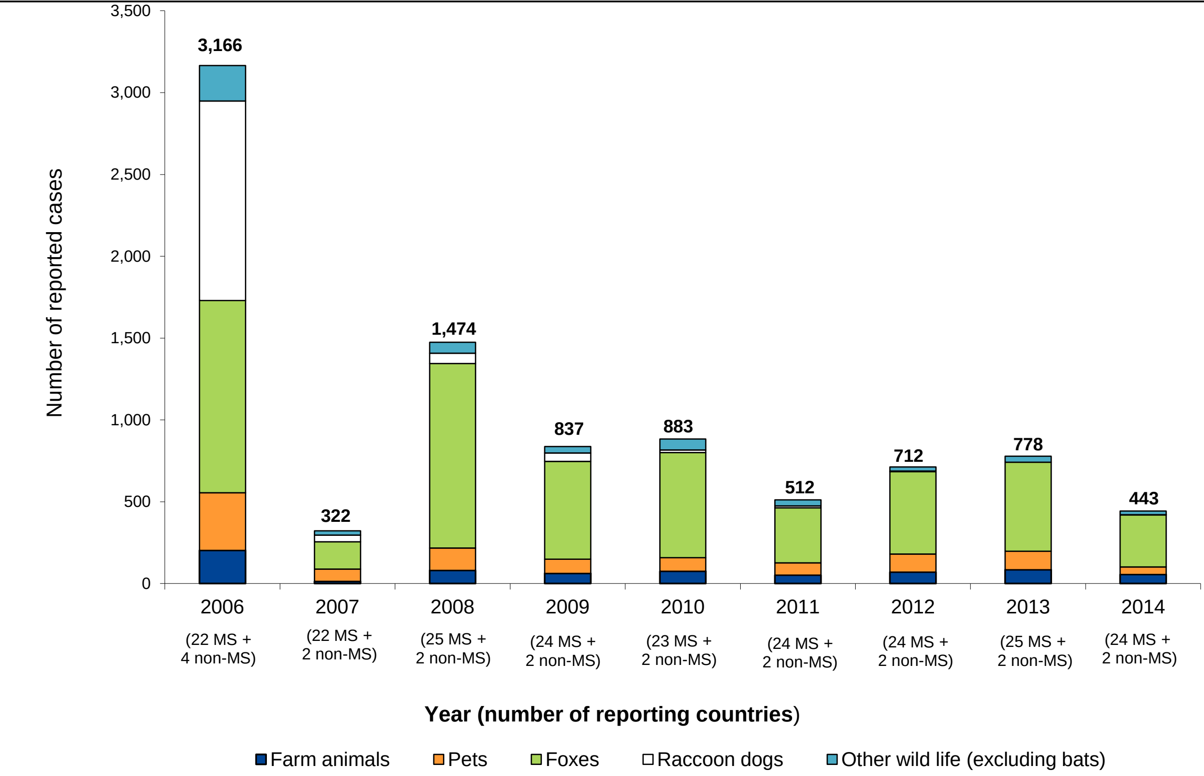
It is noteworthy that only one rabies-infected raccoon dog was reported in 2014 in Poland, out of 656 samples tested overall in EU, the majority in Finland (301), Germany (115), Poland (87), Estonia (72) and Latvia (72). Raccoon dogs are important rabies transmitters in northern and eastern Europe (1,215 cases reported in 2006), but the incidence in this species was substantially reduced following oral vaccination programmes.

Overall, in 2014, 443 animals other than bats tested positive for either classical rabies virus or unspecified lyssavirus, in reporting countries. The number of cases reported in 2014 is notably lower compared with 2013, when 778 cases were reported in animals other than bats.

In domestic farm animals, only three MS reported positive samples for unspecified lyssavirus: Poland and Romania reported positive cattle with 2 (confirmed classical rabies virus) and 43 out of 41 and 161 tested suspected samples respectively. Hungary and Romania reported positive goats (1 and 6 out of 11 and 39 tested suspected samples, respectively) and Romania was the only MS that reported positive pigs (2 out of 5 tested).

In 2014, three MS reported cases of rabies in pets: 13 infected cats and 17 infected dogs were reported by Romania, five infected cats and nine infected dogs were reported by Poland, and one case in a dog was reported by Hungary.

The reported cases of classical rabies or unspecified lyssavirus cases in animals other than bats from 2016 until 2014 are shown in Figure 47.



The number of reporting MS and non-MS is indicated at the bottom of each bar. The total number of rabid cases is reported at the top of each bar. Imported cases are not included.
Source 2014: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Netherlands, Norway, Poland, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Figure 47: Reported cases of classical rabies or unspecified lyssavirus cases in animals other than bats, in the Member States and non-Member States, 2006–2014

Bats

Bats infected lyssavirus were found in six MS (France, Germany, Poland, Spain, the Netherlands and the United Kingdom). In total, 27 positive cases were found out of 1,636 examined, the corresponding figures for 2013 being 19 and 1,442 respectively (Table 2014_RABIESBATS).Thus the rate of positive cases per examined samples remained constant in this period.

The apparent prevalence varies from 0.35% (1 out of 283 tested in the United Kingdom) to 26% (7 positive out of 27 tested in the Netherlands), but the numbers are probably too small to indicate clear differences between MS.

The geographical distribution of classical rabies or unspecified lyssavirus cases in bats in 2014 is shown in Figure 48.

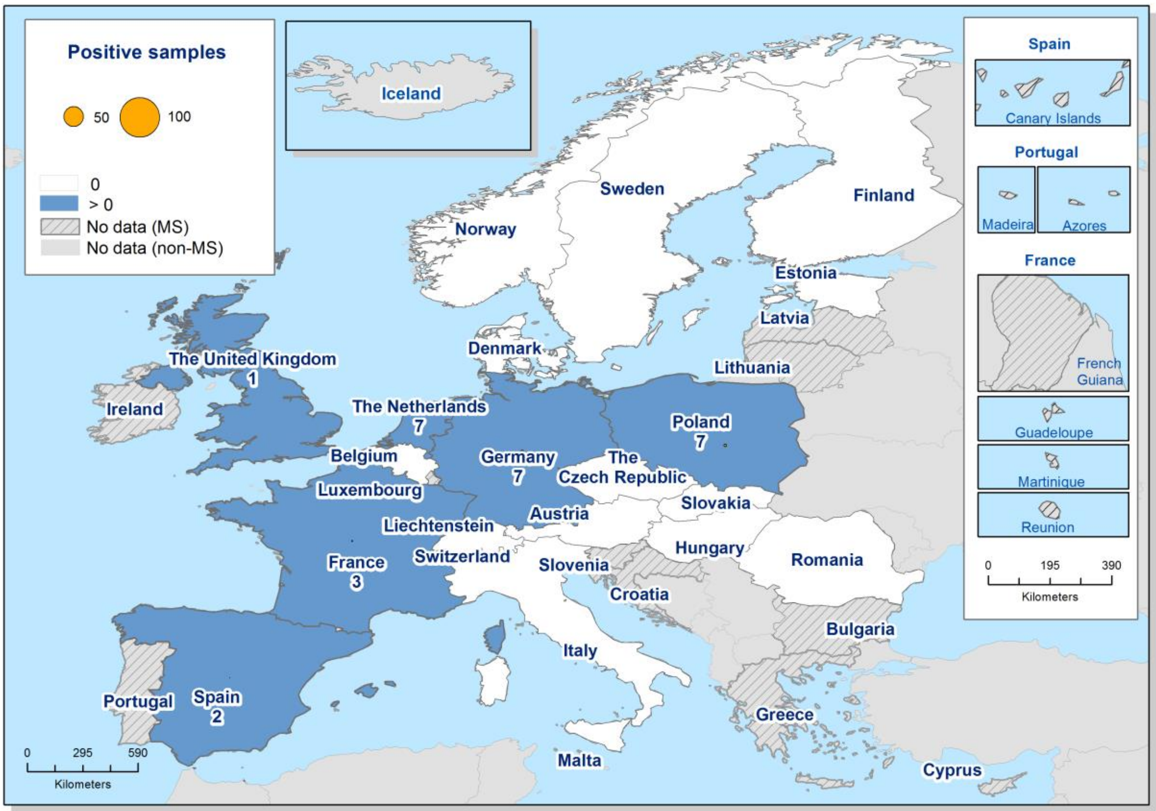


Figure 48: Classical rabies or unspecified lyssavirus cases in bats, 2014

3.11.3. Discussion

Human rabies claims more than 50,000 lives worldwide each year. It is a rare zoonosis in Europe and is preventable by vaccination, but the disease is invariably fatal in infected humans once the first clinical symptoms have appeared. Every year, one or two human cases are reported in European citizens, either travel-related or autochthonous. In 2014, three cases in patients who travelled to a non-EU/EEA country endemic for rabies were reported in the EU. It remains important to inform the public about the risk of contracting rabies if bitten by animals (especially dogs) while travelling to rabies-endemic countries or in MS which have not eradicated the disease in their animal population.

The incidence of rabies in both domestic and wild animals, particularly in foxes and raccoon dogs, in EU MS has been substantially reduced over the past decades, following systematic oral vaccination campaigns, and rabies cases have disappeared in western and most of central Europe. Thanks to EU co-financed eradication programmes, eastern European countries have also observed a rapid decline in the number of reported rabies cases in animals following their entry into the EU in 2004. Since 2010, the rate of EU funding for national rabies programmes has been increased up to 75% of the costs incurred by each MS. About €20 million is spent annually on oral vaccination programmes in wildlife in the MS and bordering areas of neighbouring third countries, as the vast majority of sylvatic rabies cases in the EU occur in those areas.[37] The endemicity of sylvatic rabies in neighbouring third countries is probably the reason for reintroduction and/or recurrence of rabies into certain border areas of EU.

The recurrence of rabies in some countries highlights the fragility of rabies-free status and the need for continuous surveillance. Mass vaccination of pets provides a first line of defence to prevent rabies in humans whereas oral vaccination of foxes and raccoon dogs has proved efficient for the long-term control and elimination of terrestrial sylvatic rabies. Rabies control programmes for foxes and raccoon dogs should be complemented by appropriate management measures in stray dogs and cats

[37] Commission Implementing Decision (EC) No 2013/722/EU of 29 November 2013 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 2014 and the following years. OJ 328, 7.12.2013, pp. 101–117.

(population registry, control and vaccination). It was shown that the successful elimination of fox rabies is a result of interaction of different key components during oral rabies vaccination campaigns such as vaccine strain, vaccine bait and strategy of distribution on a temporal and spatial scale (Müller et al., 2015). Rabies in pets imported from endemic countries is regularly reported in Europe (the most recent case in 2015, a dog imported from Algeria to France), highlighting the need for continued vigilance concerning pet movements and campaigns to raise awareness amongst pet owners.

3.12. Q fever

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans, and animals. It also includes hyperlinks to Q fever summary tables and figures that are not presented in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.12.1. Q fever in humans

In 2014, 25 EU MS, Iceland and Norway provided information on Q fever in humans. Overall, 777 confirmed cases of Q fever in humans were reported in the EU and one case was reported by Norway (Table 23). The EU notification rate was 0.18 per 100,000 population. The highest notification rate (0.60 cases per 100,000 population) was observed in Hungary, followed by Spain (0.54) and Croatia (0.49). The highest numbers of confirmed cases were reported by Germany and France (238 and 209, respectively). Eight countries (the Czech Republic, Estonia, Finland, Iceland, Ireland, Lithuania, Luxembourg and Malta) reported no human cases. A large majority of Q fever cases in the EU were domestically acquired. Only Germany, Greece, Hungary, the Netherlands, Norway, Poland, Sweden and the United Kingdom reported travel-associated cases. In Poland, Sweden and Norway, all cases (four in total) were travel-related. Of the 36 travel-associated cases reported in total, 14 were acquired within other EU countries including four in Spain, and five cases were acquired in Turkey.

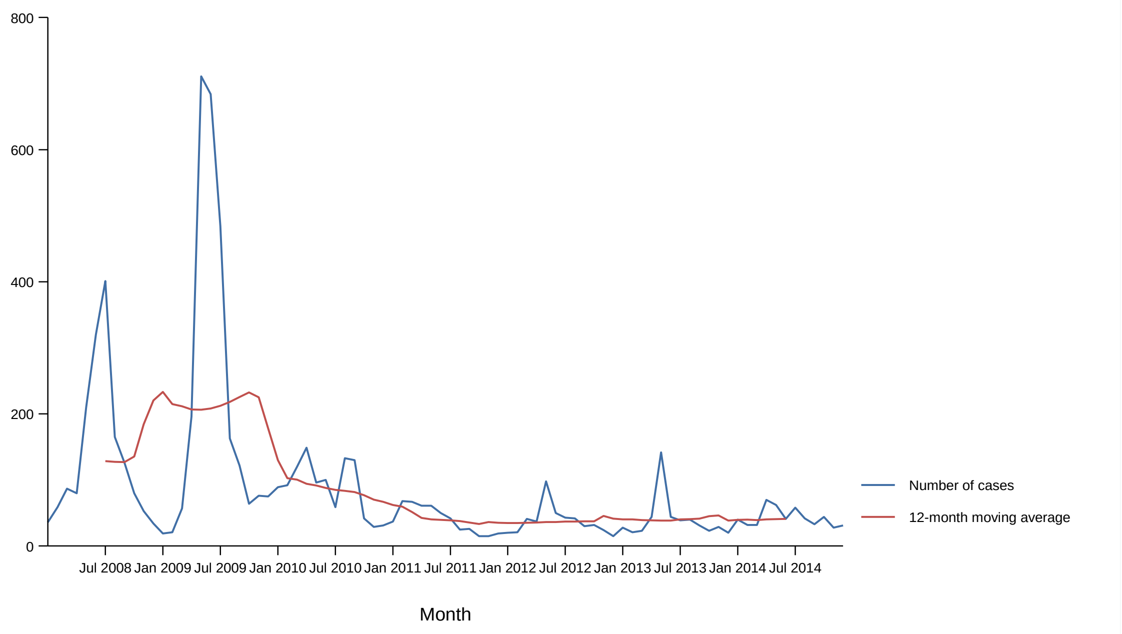
Table 23: Reported human cases of Q fever and notification rates per 100,000 in the EU/EEA, by country and year, 2010–2014

Country	2014					2013		2012		2011		2010	
	National coverage[a]	Data format[a]	Total cases	Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria[b]	–	–	–	–	–	–	–	–	–	–	–	–	–
Belgium[c]	N	C	16	0	–	6	–	18	–	6	–	30	–
Bulgaria	Y	A	17	15	0.21	23	0.32	29	0.40	12	0.16	14	0.19
Croatia	Y	A	21	21	0.49	–	–	43	1.02	–	–	–	–
Cyprus	Y	C	1	1	0.12	3	0.35	4	0.46	5	0.60	4	0.49
Czech Republic	Y	C	0	0	0.00	0	0.00	1	0.01	1	0.01	0	0.00
Denmark[b]	–	–	–	–	–	–	–	–	–	–	–	–	–
Estonia	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Finland	Y	C	0	0	0.00	5	0.09	0	0.00	4	0.07	5	0.09
France	Y	C	209	209	0.32	158	0.24	168	0.26	228	0.35	286	0.44
Germany	Y	C	262	238	0.30	114	0.14	198	0.24	287	0.35	326	0.40
Greece	Y	C	15	15	0.14	11	0.10	11	0.10	3	0.03	1	0.01
Hungary	Y	C	59	59	0.60	135	1.37	36	0.36	36	0.37	68	0.69
Ireland	Y	C	0	0	0.00	0	0.00	5	0.11	4	0.09	9	0.20
Italy[b]	–	–	–	–	–	–	–	–	–	–	–	–	–
Latvia	Y	C	3	3	0.15	1	0.05	1	0.05	1	0.05	2	0.09
Lithuania	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Luxembourg	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Malta	Y	C	0	0	0.00	2	0.48	0	0.00	0	0.00	0	0.00
Netherlands	Y	C	26	26	0.15	20	0.12	63	0.38	80	0.48	504	3.04
Poland	Y	C	1	1	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Portugal	Y	C	27	25	0.24	21	0.20	26	0.25	5	0.05	13	0.13
Romania	Y	C	21	21	0.11	24	0.12	16	0.08	6	0.03	7	0.04
Slovakia	Y	C	1	1	0.02	0	0.00	0	0.00	0	0.00	0	0.00
Slovenia	Y	C	3	3	0.15	1	0.05	1	0.05	0	0.00	1	0.05
Spain[d]	N	C	77	77	0.54	75	0.54	58	–	33	–	69	–
Sweden	Y	C	2	2	0.02	3	0.03	2	0.02	5	0.05	11	0.12
United Kingdom	Y	C	60	60	0.09	46	0.07	12	0.02	43	0.07	30	0.05

Country	2014					2013		2012		2011		2010	
	National coverage[(a)]	Data format[(a)]	Total cases	Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
EU Total	–	–	821	777	0.18	648	0.17	692	0.16	759	0.20	1380	0.35
Iceland	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Norway	Y	C	1	1	0.02	4	0.08	0	0.00	0	0.00	0	0.00
Switzerland[(e)]	Y	C	44	44	0.54	27	0.33	–	–	–	–	–	–

(a): Y: yes; N: no; A: aggregated data report; C: case-based data report; –: no report.
(b): Not notifiable, no surveillance system exists.
(c): Sentinel surveillance; no information on estimated coverage thus notification rate cannot be estimated.
(d): Sentinel surveillance; notification rates calculated on estimated coverage 30%.
(e): Switzerland provided data directly to EFSA. The human data for Switzerland also include the ones from Liechtenstein.

Overall, a decreasing trend in confirmed Q fever cases was observed over the period 2008–2014 in the EU/EEA (Figure 49). The peaks reported in 2008 and 2009 were due to a large outbreak occurring in the Netherlands between 2007 and 2010 and involving more than 4,000 human cases (Van der Hoek et al., 2012). Q fever cases show a seasonal variation peaking mostly between April and August.



Source: Belgium, Bulgaria, Cyprus, Czech Republic, Finland, Germany, Greece, Hungary, Ireland, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden. Estonia, Iceland, Lithuania and Luxembourg reported zero cases throughout the period. Austria, Croatia, Denmark, France, Latvia, Italy and the United Kingdom did not report to the level of detail required for the analyses.

Figure 49: Trend in reported confirmed human cases of Q fever in the EU/EEA, by month of reporting, 2008–2014

One death due to Q fever was reported in 2014 by Hungary resulting in an EU case fatality of 0.26% among the 380 confirmed cases with known outcome (51.2% of all confirmed cases from countries with case based reporting).

3.12.2. *Coxiella burnetii* in animals

Comparability of data

EU MS can report animal cases of Q fever to the EC under Directive 2003/99/EC on the monitoring of zoonoses and zoonotic agents. This directive states that, in addition to a number of zoonoses and zoonotic agents, for which monitoring is mandatory, others shall also be monitored where the epidemiological situation so warrants. 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. Proposals for harmonised schemes for the monitoring and reporting of Q fever in animals can be found in an External Scientific Report submitted to EFSA (Sidi-Boumedine et al., 2010).

Animals

Twenty MS and two non-MS provided data on Q fever (*Coxiella burnetii*) for 2014, three more than the previous year. All countries reported positive findings except Finland, Norway, Romania, Slovenia and Sweden.

Nineteen MS and two non-MS (Norway and Switzerland) provided data on cattle (Table 2014_COXCATTLE). The majority of samples were collected in Germany, Italy and Belgium. Overall, 48,141 individual animals were tested in the EU MS either by direct methods (e.g. PCR) or indirect methods (e.g. serological testing), and out of these, 4,385 (9.1%) animals were positive for *C. burnetii*. In addition, 808 (9.0%) positive herds were detected out of the 8,935 herds tested using either direct or indirect testing methods. Most of the data provided by the MS and non-MS were collected from clinical investigations or passive surveillance followed by monitoring, active surveillance and survey activities. Italy carried out a national survey testing 2,634 individual animals and reported six positive samples (0.23%). Furthermore, 280 holdings were tested for Q fever in Belgium and 225 (80.4%) tested positive. Cyprus, Finland, Romania, Sweden and Norway did not detect *C. burnetii* in cattle samples.

Nineteen MS and one non-MS provided data on sheep and goats for 2014 (Table 2014_COXOVINEGOAT). Again, the majority of samples were collected in Germany, Italy, Belgium, as well the Netherlands. In total, 9,005 individual animals were tested using direct or indirect methods, of which 540 (6%) tested positive for *C. burnetii*. Furthermore, 8,931 flocks/herds and 1,128 holdings were tested using direct and indirect methods and, out of these, 13.7% and 2.2% tested positive, respectively. Most data were gathered from monitoring, surveying or active surveillance, followed by clinical investigations surveys and passive surveillance. Czech Republic, Denmark, Finland, Latvia, Poland, Romania, Slovenia, Slovakia and Sweden did not detect *C. burnetii* in either sheep or goat samples. Of note is the difference in proportion of positive goat herds reported by Belgium and the Netherlands resulting from comparable investigations (monitoring of the milk producing farms in the countries by performing PCR tests on bulk milk samples); the former MS found 12.2% positive out of 117 and the latter only 1% out of 951.

In 2014, six MS and two non-MS sampled a range of domesticated, captive and wild animals as part of either clinical investigations or national surveys (Table 2014_COXOTHERAN). The majority of sampling was conducted in Italy. In total, 2,252 samples were tested and all countries reported negative findings apart from Italy and Denmark. Italy reported positive tests for foxes, solipeds, donkeys, wild boar, water buffalo, deer, dogs and mouflons. Most notably, 1,628 farmed water buffalo were tested and 169 (10.38%) were found to be positive. Denmark also tested two domestic pigs by ELISA, one was sero-positive.

3.12.3. Discussion

In 2014, the notification rate of confirmed human cases of Q fever in the EU/EEA increased slightly compared to 2013, but the overall trend has significantly decreased from 2008 to 2014. France and Germany accounted for the vast majority of confirmed cases reported since 2010.

Although Finland, Norway, Romania, Slovenia and Sweden did not detect *C. burnetii* in 2014, the pathogen is still widely distributed in the EU and infects a large number of domesticated and wild mammals. In these species, variation in surveillance strategies for detection of Q fever within the different MS (survey, passive surveillance, clinical detection, abortion testing, etc) as well as the different tests and analytical methods used, makes comparing the prevalence difficult. Interestingly, the prevalence of *C. burnetii* in the goat population in the Netherlands is low compared to previous years. This can be due to the preventive measures, such as intensified vaccination campaigns and culling after the outbreaks between 2007 and 2009 (van Asseldonk et al., 2015; van den Brom et al., 2015). Harmonised schemes for the monitoring and reporting of Q fever in animals are proposed in an External Scientific Report submitted to EFSA (Sidi-Boumedine et al., 2010).

The positive cases found in wild and stray animals in Italy demonstrate that Q fever is maintained in the environment by a wide range of mammals, birds and ticks (EFSA AHAW Panel, 2010).

3.13. West Nile virus

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans and animals. It also includes hyperlinks to West Nile virus (WNV)/ West Nile fever (WNF) summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.13.1. West Nile fever in humans

In 2014, 24 MS and one non-MS provided information on WNF in humans. Six MS (Austria, Greece, Hungary, Italy, Romania and the United Kingdom) reported human cases, four MS less than in 2013. In total, 77 human cases of WNF, of which 66 confirmed, were reported in the EU in 2014. The EU notification rate was 0.02 cases per 100,000 population (Table 24). There was a decrease of 0.06 per 100,000 population (71.0%) in the notification rate compared with 2013 (250 cases). As in previous years, Greece had the highest notification rate (0.14 cases per 100,000 per population) in 2014; however, surveillance systems vary between countries, making the comparison difficult. Compared with 2013, notification rates decreased in all countries (for the second year in Greece), apart from Romania where it remained stable.

All the cases reported in Greece, Hungary and Italy were domestically-acquired. The United Kingdom reported only travel-associated cases. Romania reported locally acquired cases as well as one travel-associated case. Of the three travel-associated cases reported by EU MS, one was acquired in Bulgaria and two cases contracted the infection in Africa and in the United States, respectively.

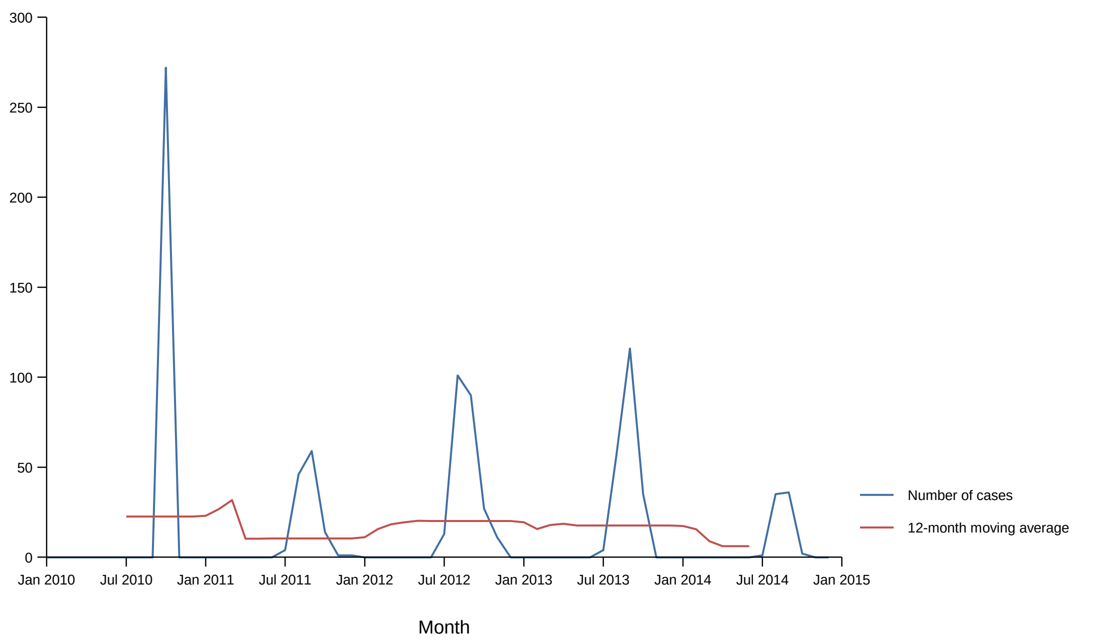
Table 24: Reported human cases of West Nile fever and notification rates per 100,000 population in the EU/EEA, by country and year, 2010–2014

Country	National data	Report type[(a)]	2014 Confirmed cases	2014 Total cases & rates		2013 Total cases & rates		2012 Total cases & rates		2011 Total cases & rates		2010 Total cases &rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	1	1	0.01	–	–	0	0.00	0	0.00	0	0.00
Belgium[(c)]	N	C	0	0	–	0	–	2	–	0	–	0	–
Bulgaria	Y	C	0	0	0.00	0	0.00	4	0.06	–	–	–	–
Croatia	–	–	–	–	–	20	0.48	6	0.14	–	–	–	–
Cyprus	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic	Y	C	0	0	0.00	1	0.01	0	0.00	0	0.00	0	0.00
Denmark[(b)]	–	–	–	–	–	–	–	–	–	–	–	–	–
Estonia	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Finland	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
France[(c)]	N	C	0	0	0.00	1	–	3	–	1	–	3	–
Germany[(b)]	–	–	–	–	–	–	–	–	–	–	–	–	–
Greece	Y	C	13	15	0.14	86	0.78	162	1.46	100	0.90	262	2.34
Hungary	Y	C	3	11	0.11	36	0.37	17	0.17	4	0.04	19	0.19
Ireland	Y	C	0	0	0.00	1	0.02	0	0.00	1	0.02	0	0.00
Italy[(d)]	N	C	24	24	–	79	0.13	28	0.05	14	0.02	5	0.01
Latvia	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Lithuania	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Luxembourg	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Malta	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Netherlands	Y	C	0	0	0.00	0	0.00	0	0.00	1	0.01	1	0.01
Poland	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Portugal[(b)]	–	–	–	–	–	–	–	–	–	–	–	–	–
Romania	Y	C	23	24	0.12	24	0.12	15	0.08	11	0.06	57	0.28
Slovakia	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Slovenia	Y	C	0	0	0.00	1	0.05	0	0.00	0	0.00	0	0.00
Spain	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	2	0.00
Sweden	Y	C	0	0	0.00	1	0.01	1	0.01	0	0.00	0	0.00
United Kingdom	Y	C	2	2	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Country	National data	Report type[(a)]	2014 Confirmed cases	2014 Total cases & rates		2013 Total cases & rates		2012 Total cases & rates		2011 Total cases & rates		2010 Total cases &rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
EU Total	–	–	66	77	0.02	250	0.08	238	0.07	132	0.04	349	0.11
Iceland	–	–	–	–	–	–	–	–	–	–	–	–	–
Switzerland	Y	C	0	0	0	1	0.01	1	0.01	0	0.00	0	0.00
Norway	Y	C	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00

(a): Y: yes; N: no; A: aggregated data report; C: case-based data report;–: no report.
(b): No surveillance system.
(c): Sentinel surveillance; coverage unknown, hence notification rate cannot be estimated.
(d): No national coverage in 2014, hence notification rate not calculated.

WNF has been notifiable at the EU level since 2008. The number of cases varied from year to year (Figure 50). There was strong seasonality in the number of WNF cases reported in the EU in 2010–2014, with most cases being reported between July and September. The number of reported cases usually reached a peak in August, apart from in 2014 where the peak was recorded in September.



Source: Czech Republic, Greece, Hungary, Italy, Norway, Romania, Slovenia, Spain and the United Kingdom. Belgium, Cyprus, Estonia, Finland, France, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Slovakia and Sweden reported zero cases throughout the period. Austria, Bulgaria and Croatia did not report data to the level of detail required for the analysis. Denmark, Germany and Portugal do not have a surveillance system for this disease.

Figure 50: Trend in reported total cases of human West Nile fever in the EU/EEA, by month of reporting, 2010–2014

In 2014, a total of 66 neuroinvasive, nine non-neuroinvasive and two unknown infections were reported by the affected MS. The overall case fatality in the EU for neuroinvasive illness cases was 15.5% (n=7, reported by Greece and Romania) among the 45 probable and confirmed documented cases.

In Greece, the proportion of neuroinvasive illness cases that died in 2013 (10 out of 51; 20%) was lower than the proportion neuroinvasive illness cases that died in 2014 (6 out of 14; 43%), while the case numbers decreased, suggesting that only the more severe cases may have been diagnosed.

3.13.2. West Nile virus in animals

Comparability of data

Although the reporting of WNV infections in animals is not mandatory, MS can report WNV infections in animals to the EC in accordance with the Zoonoses Directive 2003/99/EC. This directive specifies that, in addition to the number of zoonoses and zoonotic agents, for which monitoring is mandatory; others shall also be monitored when the epidemiological situation so warrants.

Owing to heterogeneity in study design and analytical methods, the reported WNV prevalence in birds and solipeds from different countries is not directly comparable. Proposals for harmonised schemes for the monitoring and reporting of WNV in animals can be found in an External Scientific Report submitted to EFSA (Mannelli et al., 2012).

In 2014, a total of 23,629 animals (solipeds, birds and farmed red deer) were reported to be tested for WNV, which is more than in 2013 when 21,221 animals were tested. In 2014, 10,246 birds have been sampled for WNV in seven MS and one non-MS – Belgium (2,789), Croatia (1,230), Germany (134), Hungary (36), Italy (4,920), Spain (694), the United Kingdom (443) and Switzerland (235). A total of 180 positive bird samples were reported by Croatia (109), Hungary (1), Italy (53) and Spain (17) (Figure 51). Only Spain reported the WNV presence to be detected in two birds, which were positive to a confirmatory test (Table 2014_WNVBIRDS).

Figure 51: Findings of West Nile virus in birds in the EU, in 2014

Furthermore, in 2014, 13,377 solipeds were tested in 12 MS and one non-MS (Croatia, Cyprus, the Czech Republic, Germany, Greece, Hungary, Italy, Latvia, Romania, Slovakia, Spain, the United Kingdom and Switzerland) (Table 2014_WNVSOLIP). Eight MS detected 134 test-positive animals: Croatia (23 confirmatory test-positive), Cyprus (54), the Czech Republic (13), Greece (4), Hungary (1), Italy (27), Romania (4) and Spain (8) (Figure 52).

Figure 52: Findings of West Nile virus in domestic solipeds in the EU, in 2014

3.13.3. Discussion

In 2014, the notification rate of WNF in humans in the EU decreased markedly compared with 2013. Two MS (Hungary and Romania) have reported human cases for nine consecutive years, Italy for seven years, and Greece for five years. In Greece, the notification rate was higher in 2012 than in 2011 and then decreased again steadily in 2013-2014, but still had the highest notification rate in EU in 2014; however, surveillance systems vary between countries, making the comparison difficult. WNV testing may have focused on more severe cases, as suggested by the higher case fatality observed in Greece during 2014.

Variations and differences in case numbers are partly due to variations and differences in surveillance systems. It is difficult to compare case numbers and notification rates between countries, because some report all cases, including asymptomatic and mild cases, while others report only neuroinvasive cases. Variations in case reporting can also 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 transfusion safety authorities) are alerted at the beginning of the season, as are the stakeholders involved in animal and entomological surveillance. Some countries (e.g. Italy, Greece or Portugal) implemented a mosquito surveillance scheme to see if increased mosquito activity and early detection of the virus circulation mosquitoes could be used as an early warning system (Osório et al., 2014). An interactive overview map for both the EU and neighbouring countries, including at the regional level, is published on the ECDC website (ECDC, 2012b) with an epidemiological update summarising the WNF season, the weekly updates of the ECDC West Nile risk map and historical maps.

In 2012, MS agreed to begin reporting on WNV at the EU level under Directive 2003/99/EC on the monitoring of zoonoses and zoonotic agents. Reporting is focused on birds (prime reservoir hosts) and other species such as horses that can be infected incidentally. The overall number of tested birds and solipeds and those found positive increased in 2014 compared with the previous year.

Seven MS tested for WNV antibodies in birds and Croatia, Italy, Spain and Hungary detected positive samples. Croatia reported 8.9% poultry screening tests positive but no confirmatory testing was reported. Croatia also reported confirmatory test-positive horses, indicating acute infection. In Spain, WNV was detected in two birds that were positive to a sero-neutralisation test allowing discrimination among infections by different flaviviruses and which is used as confirmation technique. Spain also reported WNV cases in solipeds which were positive for IgM WNV-specific antibodies, indicating acute infection. The latter, using an IgM-capture ELISA, was also the case for Croatia and Romania. Greece reported positive cases using a screening test as well as positive cases for IgM WNV-specific antibodies indicating acute infections in solipeds; however, no information was reported on the use of confirmatory tests. Compared to 2013, Cyprus reported the largest increase in positive horses compared to 2013; however more sampling was implemented in 2014. The Czech Republic reported positive horses for the third year, but no sampling of birds was reported. Italy, Spain and Greece reported fewer test-positive solipeds compared with 2013, despite their enhanced surveillance.

3.14. Tularaemia

The Appendix contains hyperlinks to all data summarised for the production of this section, for humans and animals. It also includes hyperlinks to tularaemia summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

3.14.1. Tularaemia in humans

In 2014, 28 MS, Iceland and Norway provided information on tularaemia in humans. A total of 480 confirmed cases of tularaemia in humans were reported in the EU. The highest case numbers were reported from Sweden and Hungary (150 and 140 respectively), 46 cases were reported in Norway (Table 25). Eleven EU MS (Austria, Belgium, Cyprus, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Romania and the United Kingdom) and Iceland reported no human cases. The EU notification rate was 0.10 cases per 100,000 population, increasing by 43% from 2013. As in the previous 4 years, the notification rate was highest in Sweden (1.56 per 100,000), slightly exceeding the rate in 2013 (1.13 per 100,000). The largest increases in notification rate were observed in Hungary (0.94 per 100,000) and Spain (0.13 per 100,000). Both countries experienced outbreaks.

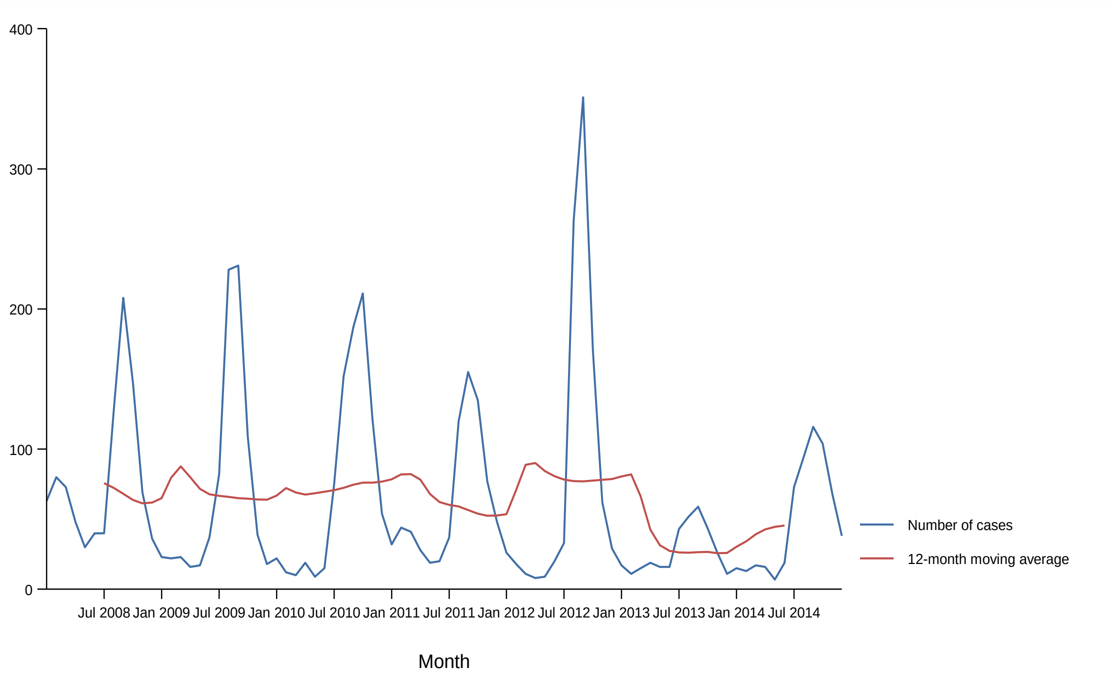
Less than 1% of tularaemia cases in Europe were reported to be travel-related, but for 46.7% of cases this information was not available. Germany, Hungary and the Netherlands reported five travel-associated cases, with three of them acquired within another EU country.

Table 25: Reported human cases of tularaemia and notification rates per 100,000 population in the EU/EEA, by country and year, 2010–2014

Country	2014					2013		2012		2011		2010	
	National coverage[(a)]	Data format[(a)]	Total cases	Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates		Confirmed cases & rates	
				Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	0	0	0.00	2	0.02	2	0.02	0	0.00	3	0.04
Belgium	Y	C	0	0	0	1	0.01	0	0.00	0	0.00	0	0.00
Bulgaria	Y	A	1	1	0.01	1	0.01	0	0.00	0	0.00	3	0.04
Croatia	Y	C	2	2	0.05	2	0.05	1	0.02	–	–	–	–
Cyprus	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic	Y	C	48	48	0.46	36	0.34	42	0.40	57	0.54	50	0.48
Denmark[(b)]	–	–	–	–	–	–	–	–	–	–	–	–	–
Estonia	Y	C	1	1	0.08	1	0.08	0	0.00	2	0.15	0	0.00
Finland	Y	C	9	9	0.17	15	0.28	233	4.31	75	1.40	91	1.70
France	Y	C	57	19	0.03	21	0.03	5	0.01	16	0.03	22	0.03
Germany	Y	C	21	21	0.03	20	0.02	21	0.03	17	0.02	31	0.04
Greece	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Hungary	Y	C	140	140	1.42	48	0.48	18	0.18	15	0.15	126	1.28
Ireland	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Italy	Y	C	0	0	0	1	0.00	2	0.00	0	0.00	1	0.00
Latvia	Y	C	0	0	0.00	0	0.00	6	0.29	0	0.00	0	0.00
Lithuania	Y	C	4	4	0.14	4	0.14	3	0.10	0	0.00	1	0.03
Luxembourg	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Malta	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Netherlands	Y	C	5	5	0.03	1	0.01	–	–	–	–	–	–
Poland	Y	C	11	11	0.03	8	0.02	6	0.02	6	0.02	4	0.01
Portugal[(b)]	–	–	–	–	–	–	–	–	–	–	–	–	–
Romania	Y	C	0	0	0.00	1	0.01	0	0.00	0	0.00	4	0.02
Slovakia	Y	C	6	6	0.11	9	0.17	8	0.15	5	0.09	17	0.32
Slovenia	Y	C	1	1	0.05	2	0.10	4	0.20	0	0.00	0	0.00
Spain	Y	C	90	62	0.13	0	0.00	1	0.00	1	0.00	1	0.00
Sweden	Y	C	150	150	1.56	108	1.13	590	6.22	350	3.72	484	5.18
United Kingdom	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	1	0.00
EU Total	–	–	546	480	0.10	279	0.07	942	0.20	544	0.12	839	0.18
Iceland	Y	C	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Norway	Y	C	46	46	0.90	28	0.55	50	1.00	180	3.66	33	0.68
Switzerland[(b)]	Y	C		38	0.46	29	0.35	40	0.50	15	0.19	14	0.18

(a): Y: yes; N: no; A: aggregated data; C: case-based data;
(b): Switzerland provided data directly to EFSA. Liechtenstein has no surveillance system.

There was no significant increasing or decreasing trend of confirmed tularaemia cases in 2008–2014 (Figure 53). The peak in 2012 was due to high case numbers in Finland and Sweden. The number of tularaemia cases varies seasonally peaking mostly between July and October.



Source: Austria, Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. Cyprus, Greece, Iceland, Ireland, Luxembourg and Malta reported zero cases throughout the period. Belgium, Bulgaria, Croatia, Lithuania and Netherlands did not report data to the level of detail required for the analysis. Denmark, Portugal and Liechtenstein do not have a surveillance system for this disease.

Figure 53: Trend in reported confirmed human cases of tularaemia in the EU/EEA, by month of reporting, 2008–2014

Eight MS provided data on hospitalisation for all or some of their cases, which accounted for 47.1% of confirmed cases in the EU. On average, 40.7% of confirmed tularaemia cases were hospitalised. Nine MS provided information on the outcome of their cases which accounted for 49% of all confirmed cases. No deaths due to tularaemia were reported in 2014.

3.14.2. *Francisella tularensis* in animals

Only one MS, Sweden, and Switzerland reported on the occurrence of *Francisella tularensis* in animals (Table 2014_FRANCISELLAANI). Sweden investigated 31 wild hares and found two positives (6.5%), which is lower than in 2013 (11 positive out of 37 (29.7%)) and 2012 (12 positive out of 41 tested (29.3%)). Switzerland reported positive wild hares and one positive monkey in a zoo.

3.14.3. Discussion

Notification rates for tularaemia vary considerably among MS. In previous years, most cases were diagnosed in Sweden and Finland, followed by Norway, Hungary and the Czech Republic. In 2014, the majority of cases were reported by Sweden, followed by Hungary and Spain both of which reported an unusually high number of cases (Luquue-Larena et al., 2015). The notification rate in Finland has decreased markedly since 2012. The Netherlands has reported tularaemia cases to ECDC only since 2013. In 2014, after more than 50 years without any autochthonous cases, the Netherlands reported five human cases of tularaemia and three confirmed cases in hares. The human cases were found at different locations throughout the Netherlands

The occurrence of *F. tularensis* in wild hares was reported by Sweden and Switzerland. The number of positive tested hares in Sweden was remarkably lower compared to the previous years. A monkey in a zoo was also found to be infected in Switzerland.

3.15. Other zoonoses and zoonotic agents

3.15.1. *Cysticercus*

Belgium, Slovenia, Romania and Sweden reported information on *Cysticercus bovis (Taenia saginata)* in slaughtered cattle.

In Belgium, 1,172 (0.14%) out of 837,470 cattle inspected at the slaughterhouse were found to be positive for cysticerci in 2014, of which 18 were heavily infected. This was in line with previous year 2013. Slovenia found two out of 25 tested cattle positive for *T. saginata*. In Sweden, one cattle out of 431,830 inspected bovine carcases detected was detected as positive for cysticerci, as in 2013.

Sweden tested 2,566,040 pig carcases and reported none positives for *T. solium* cysticerci, as in 2013. Romania tested five pigs and five wild boar and found one pig from a mixed farm positive for *T. solium* cysticerci.

3.15.2. *Sarcocystis*

Belgium reported data on *Sarcocystis* in bovine carcases at the slaughterhouse in 2014. Of the 837,470 carcases inspected, 94 (0.010%) were found to be positive, compared to 0.009% in 2013.

3.16. Food-borne outbreaks

The Appendix contains hyperlinks to all data summarised for the production of this section, for food-borne outbreaks. It also includes hyperlinks to food-borne outbreaks summary tables and figures that were not included in this section because they did not trigger any marked observation. The summarised data are presented in downloadable Excel and PDF files, and are listed by subject.

Comparability of data

It is important to note that the food-borne outbreak investigation systems at the national level are not harmonised among MS. 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 MS; rather they may indicate differences in the sensitivity of the surveillance systems for food-borne outbreaks in the different MS. In addition, some MS have implemented changes in national systems over time, which may have had an impact on the number of outbreaks reported by the same MS in different years.

3.16.1. General overview

The reporting of investigated food-borne outbreaks has been mandatory for EU MS since 2003. Starting in 2007, harmonised specifications on the reporting of food-borne outbreaks at the EU level have been applied. Since 2010, revised reporting specifications for food-borne outbreaks were implemented and the distinction between 'verified' and 'possible' food-borne outbreaks was abandoned (EFSA, 2011a). 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 where the evidence for food-borne outbreaks implicating a particular food vehicle was weak, only a limited dataset was reported including the number of outbreaks per causative agent and the number of human cases, hospitalisations and deaths. In this section, the term 'weak-evidence outbreak' also covers outbreaks for which no particular food vehicle was suspected. From 2014, MS have also had the possibility to report detailed information for weak-evidence outbreaks (EFSA, 2014).

Data from 2014 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 as well as water-borne outbreaks are included in the tables and figures. In Section 3.16.2, outbreaks are presented in more detail and are categorised by the causative agent, excluding strong-evidence water-borne outbreaks. All water-borne outbreaks with strong-evidence are addressed separately in Section 3.16.3.

In 2014, 26 MS and three non-MS provided data on food-borne outbreaks, whereas no outbreak data were reported by Cyprus and Luxembourg.

Types of evidence supporting the 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. For strong-evidence outbreaks, the types of supporting evidence are:

- Epidemiological evidence:
  - convincing descriptive epidemiological evidence;
  - well-conducted analytical epidemiological evidence.
- Microbiological evidence:
  - detection of the indistinguishable causative agent in the food vehicle or its component and in humans;
  - detection of the indistinguishable causative agent in the food chain or its environment and in humans;
  - detection of the causative agent in the food vehicle or its component and symptoms and onset of illness pathognomonic of the causative agent found in the food vehicle or its component or in the food chain or its environment;
  - detection of the causative agent in the food chain or its environment and symptoms and onset of illness pathognomonic of the causative agent found in the food vehicle or its component or in the food chain or its environment.

The types of evidence reported for the strong-evidence outbreaks, including strong-evidence water-borne outbreaks, are presented in Table 2014_FBOEVID.

Number of outbreaks and human cases

In 2014, a total of 5,251 food-borne outbreaks, including both weak- and strong-evidence outbreaks, were reported by 26 MS, compared with 5,196 outbreaks reported by 24 MS in 2013. The overall reporting rate in 2014 at the EU level was 1.04 outbreaks per 100,000 population (Table 26), which was a decrease compared to the rate observed in 2013 (1.19 outbreaks per 100,000 population).

As in 2013, Latvia continued to have the highest reporting rate (24.3), followed by Slovakia (8.6) and Lithuania (8.3) (Table 26 and Figure 55). France reported the largest number of outbreaks and accounted for 26.0% of all reported outbreaks, followed by Latvia with 9.4% of the total outbreaks reported.

A total of 592 strong-evidence outbreaks were reported by 21 MS, representing 11.3% of the total number of food-borne outbreaks recorded in 2014 (Table 26). This was 29.4% less than the number of strong-evidence outbreaks reported in 2013 (839 outbreaks). The highest numbers of strong-evidence outbreaks were reported by Spain, France and Poland, accounting for 56.8% of the total number of reported strong-evidence outbreaks in 2014 (Table 26). As in previous years, a variation is seen among the MS in the proportion of reported strong- and weak-evidence outbreaks (Figure 55).

Overall, the 5,251 outbreaks reported by the MS involved 45,665 human cases, 6,438 hospitalisations and 27 deaths. The 71 outbreaks reported in total by the non-MS (Iceland, Norway and Switzerland) comprised 1,153 cases with nine hospitalisations and four fatal cases. It is important to mention that for some outbreaks the number of involved cases is unknown.

In the 592 strong-evidence outbreaks reported in the EU, a total of 12,770 cases were involved, of which 1,476 people (11.6%) were admitted to hospital and 15 people died (0.12%). In these three non-MS, 16 strong-evidence outbreaks were reported involving 358 human cases with six hospitalisations and four deaths (Table 26). Of the 15 fatalities related to strong-evidence outbreaks reported in the EU, 11 were associated with *Salmonella*, three with *Clostridium perfringens*

(*C. perfringens*) toxins and one with mushroom toxins. In addition, Switzerland reported four fatal cases related to a strong-evidence outbreak caused by *Listeria*.

Further details on the number of food-borne outbreaks and human cases reported in the EU and in non-MS in 2014 can be found in Table 26.

Table 26: Number of all food-borne outbreaks and human cases in the EU, 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Austria	13	601	71	1	83	189	50	0	96	1.14
Belgium	16	387	37	0	354	1,402	27	0	370	3.31
Bulgaria	0	0	0	0	14	130	36	0	14	0.19
Croatia	25	256	37	0	19	109	12	0	44	1.03
Czech Republic	0	0	0	0	37	1,100	239	0	37	0.35
Denmark	31	1,667	15	0	26	521	8	0	57	1.02
Estonia	0	0	0	0	6	12	10	0	6	0.45
Finland	16	555	17	0	25	423	4	0	41	0.76
France	122	1,646	116	0	1,242	10,416	530	2	1,364	2.08
Germany	28	788	156	4	402	1,516	327	2	430	0.53
Greece	1	13	1	0	3	113	2	0	4	0.04
Hungary	13	776	63	2	24	931	49	0	37	0.37
Ireland	3	9	4	0	17	125	1	0	20	0.44
Italy	0	0	0	0	1	4	1	0	1	0
Latvia	3	22	18	0	488	1,282	910	0	491	24.26
Lithuania	11	143	89	0	236	585	496	0	247	8.31
Malta	0	0	0	0	22	91	7	0	22	5.22
Netherlands	6	107	3	0	201	1,548	22	1	207	1.23
Poland	71	910	323	2	311	3,758	896	5	382	0.99
Portugal	6	193	55	0	19	709	58	0	25	0.24
Romania	13	262	138	0	14	117	61	0	27	0.13
Slovakia	8	372	72	0	457	2,401	985	0	465	8.59
Slovenia	4	178	32	0	4	47	5	0	8	0.39
Spain	143	2,130	183	2	291	2,699	194	2	434	0.93
Sweden	14	489	3	0	338	1,843	11	0	352	3.68
United Kingdom	45	1,266	43	4	25	824	21	0	70	0.11
Iceland	4	39	0	0	1	3	0	0	5	1.55
Norway	5	188	0	0	50	751	0	0	55	1.09
Switzerland	7	131	6	4	4	41	3	0	11	0.14
Total (MS)	592	12,770	1476	15	4,659	32,895	4,962	12	5,251	1.04

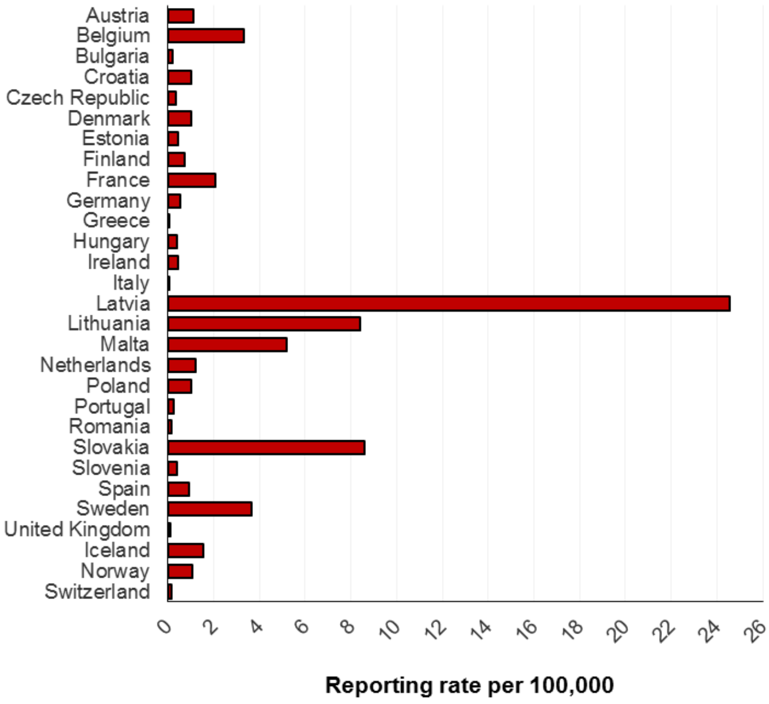


Figure 54: Reporting rate per 100,000 population in Member States and non-Member States, 2014

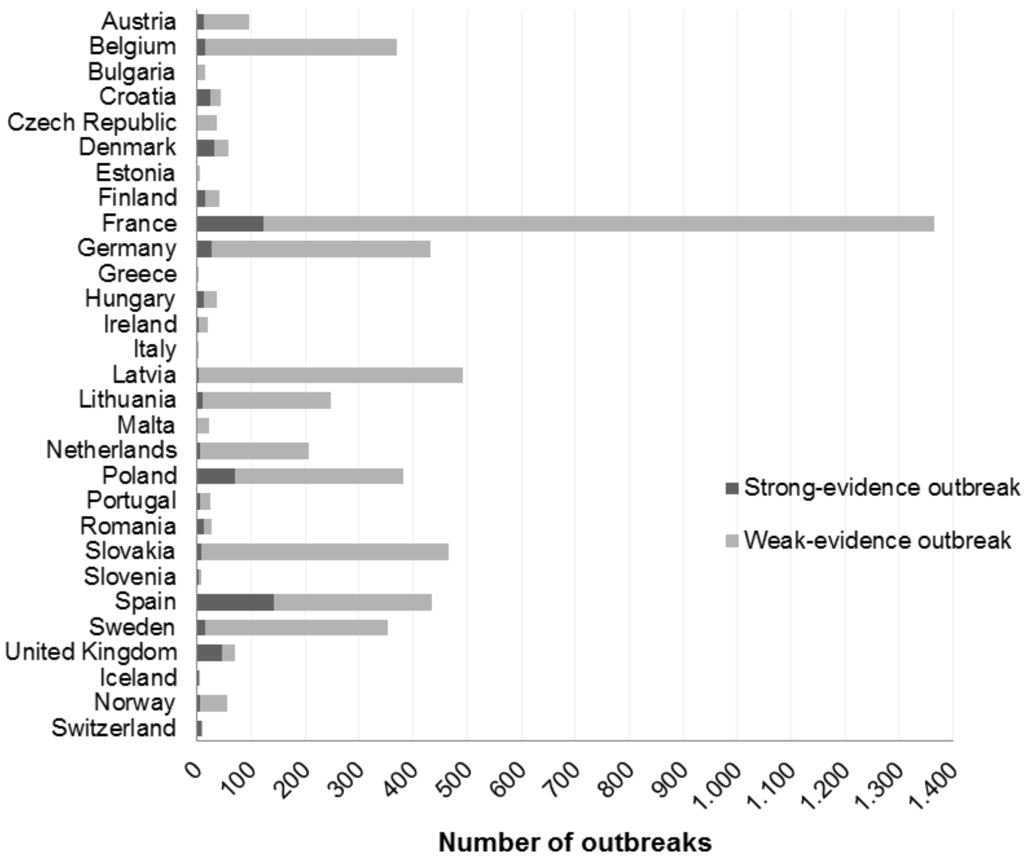


Figure 55: Distribution of food-borne outbreaks in Member States and non-Member States, 2014

Causative agents

Within the EU, the causative agent was known in 70.9% of the reported outbreaks (Table 27 and Figure 56). In 2014, food-borne viruses were, for the first time, identified as the most commonly detected causative agent in the reported food-borne outbreaks (20.4% of all outbreaks), followed by *Salmonella* (20% of all outbreaks), bacterial toxins (16.1% of all outbreaks) and *Campylobacter* (8.5% of all outbreaks). Other agents each accounted for 2.7% or less of the food-borne outbreaks.

The number of viral food-borne outbreaks within the EU varied during the 6-year period 2008–2014. After a peak in 2009 of 1,043 reported outbreaks, the number of reported viral food-borne outbreaks in the EU decreased until 2011. Since 2011, the number of outbreaks caused by viruses has more than doubled (from 525 in 2011 to 1,072 in 2014) and in 2014 reached the highest level yet reported (Figure 57). The total number of *Salmonella* outbreaks in 2014 decreased compared with 2013 (from 1,168 outbreaks to 1,049). From 2008, when there were 1,888 outbreaks due to *Salmonella*, the number of outbreaks has decreased markedly by 44.4%. In outbreaks due to *Campylobacter* and bacterial toxins, an increase was observed between 2013 and 2014, of 7.7% and 1.1%, respectively (Figure 57).

Within all the strong-evidence outbreaks reported in the EU, the causative agent was known in 92.6% of the cases. *Salmonella* was the most frequent causative agent of strong-evidence outbreaks (38.2% of the outbreaks), followed by bacterial toxins and viruses, responsible for 18.4% and 14.2% of outbreaks, respectively (Table 27).

Considering the outbreaks reported for each individual causative agent, the highest proportion of strong-evidence outbreaks was reported for parasites (51.5%), followed by the group of 'other causative agents' (41.4%), pathogenic *E. coli* – excluding VTEC (23.3%) and *Salmonella* (21.5%) (Table 27, Figure 56)

Further details of the number of food-borne outbreaks and human cases per causative agent reported in the EU in 2014 can be found in Table 27 and Figure 56.

Food vehicle

In 2014, the food vehicle was reported in all 592 strong-evidence outbreaks, even though 41 outbreaks (6.9%) were linked to 'other foods' with no additional information on the implicated food vehicle. As in previous years, 'eggs and egg products' was the most common food vehicle associated with strong-evidence outbreaks (18.2%), followed by 'mixed food' (12.8%), 'crustaceans, shellfish, molluscs and products thereof' (8.1%) and 'vegetables and juices' (7.1%). The latter has increased from 2013, where 'vegetables and juices' were reported in 4.4% of the outbreaks. The food vehicle 'crustaceans, shellfish, molluscs and products thereof' was mainly associated with outbreaks caused by calicivirus (Norwalk-like virus) and corresponds to 58.3% of these outbreaks. The distribution of the strong-evidence outbreaks by food vehicle in the EU is shown in Figure 58.

Information on suspected contributory factors was reported for 91.6% of the strong-evidence outbreaks, even though for 258 outbreaks these factors were reported to be either 'unknown' or 'other contributory factor'. In 51 (8.6%) strong-evidence outbreaks inadequate heat treatment was reported as a contributing factor, an infected food handler was reported as contributing factor in 43 (7.3%) outbreaks, inadequate chilling was indicated in 23 (3.9%) outbreaks, followed by cross-contamination that was reported as a contributing factor in 19 (3.2%) outbreaks. A combination of different contributory factors was reported for 93 (15.7%) strong-evidence outbreaks.

Information on the food vehicle was also provided for all 4,659 weak-evidence outbreaks reported by the EU MS, even though no detail on the implicated food (indicated as either 'unknown' or 'other foods') was provided for 3,401 outbreaks (73%). Where detailed information on the food vehicle was reported for the weak-evidence outbreaks, 'mixed food' was the most frequently reported food vehicle (360 outbreaks), followed by 'eggs and egg products' (130 outbreaks), 'crustaceans, shellfish, molluscs and products thereof' (106 outbreaks) and 'fish and fishery products' (105 outbreaks).

Setting

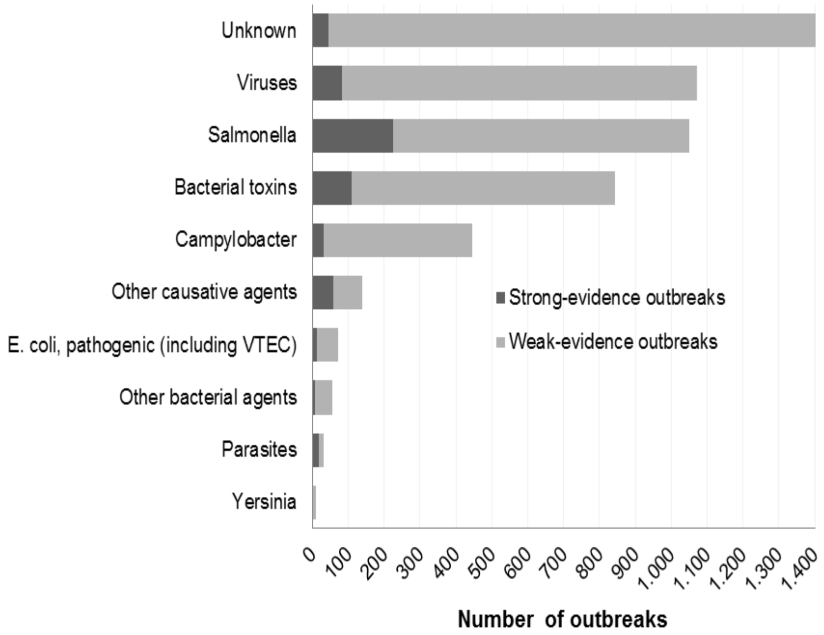
The term setting gives information about the place of exposure to the implicated food that causes the outbreak and typically refers to the location where the food was consumed (e.g. household, restaurant/café/pub/bar/hotel) or where the final stages of preparation took place (e.g. canteen or workplace catering, household). This information was provided in 96.8% of the 592 strong-evidence outbreaks, although the setting was reported as either 'others' or 'unknown' in 15.0% of the outbreaks. The category 'household' was the most commonly reported setting (37.3%), followed by 'restaurant, café, pub, bar, hotel' (26.0%), 'school or kindergarten' (5.4%) and 'residential institution' (nursing home, prison or boarding school) (4.6%). The distribution of the strong-evidence outbreaks by setting in the EU is shown in Figure 59.

Where information on the place of exposure was provided for the weak-evidence outbreaks, the most commonly reported settings were 'household' (610 outbreaks) and 'restaurant, café, pub, bar, hotel' (597 outbreaks). However, it should be noted that information on the place of exposure was either not reported or reported as 'unknown' or 'others' for 3,083 weak-evidence outbreaks (66.2% of the total outbreaks).

Table 27: Number of outbreaks and human cases per causative agents in food-borne outbreaks in the EU (including water-borne outbreaks), 2014

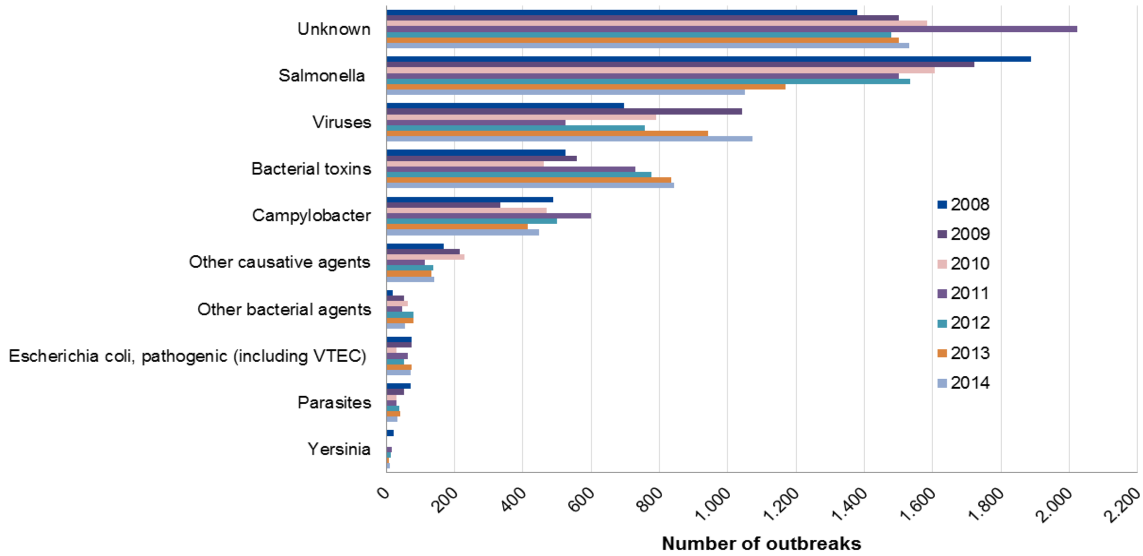
Causative agent	Strong-evidence outbreaks					Weak-evidence outbreaks					Total outbreaks	%
	Number	%	Cases	Hospitalised	Deaths	Number	%	Cases	Hospitalised	Deaths		
Viruses	84	14.19	3,654	112	0	988	21.2	8,086	2,374	2	1,072	20.41
Salmonella	226	38.18	3,677	890	11	823	17.66	5,617	1,059	3	1,049	19.98
Bacterial toxins	109	18.41	3,026	187	3	734	15.75	6,342	405	2	843	16.05
Campylobacter	31	5.24	525	40	0	415	8.91	1,383	149	0	446	8.49
Other causative agents	58	9.8	238	38	1	82	1.76	322	33	1	140	2.67
Other bacterial agents	8	1.35	101	12	0	47	1.01	398	69	1	55	1.05
E. coli, pathogenic – verotoxigenic *E. coli* (VTEC)	7	1.18	138	8	0	34	0.73	147	28	0	41	0.78
Parasites	17	2.87	287	82	0	16	0.34	62	4	0	33	0.63
E. coli, pathogenic (excluding VTEC)	7	1.18	448	90	0	23	0.49	288	15	0	30	0.57
Yersinia	1	0.17	55	4	0	10	0.21	153	5	0	11	0.21
Unknown	44	7.43	621	13	0	1,487	31.91	10,097	821	3	1,531	29.15
Total	592	100	12,770	1,476	15	4,659	100	32,895	4,962	12	5,251	100

Food-borne viruses include adenovirus, calicivirus, hepatitis A virus, flavivirus, rotavirus and other unspecified viruses. Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus*. Other causative agents include chemical agents, histamine, lectin, marine biotoxins, mushroom toxins and wax esters (from fish). Parasites include primarily *Trichinella*, but also *Cryptosporidium*, *Giardia* and *Anisakis*. Other bacterial agents include *Brucella*, *Listeria*, *Shigella*, *Vibrio parahaemolyticus* and other unspecified bacteria agents.



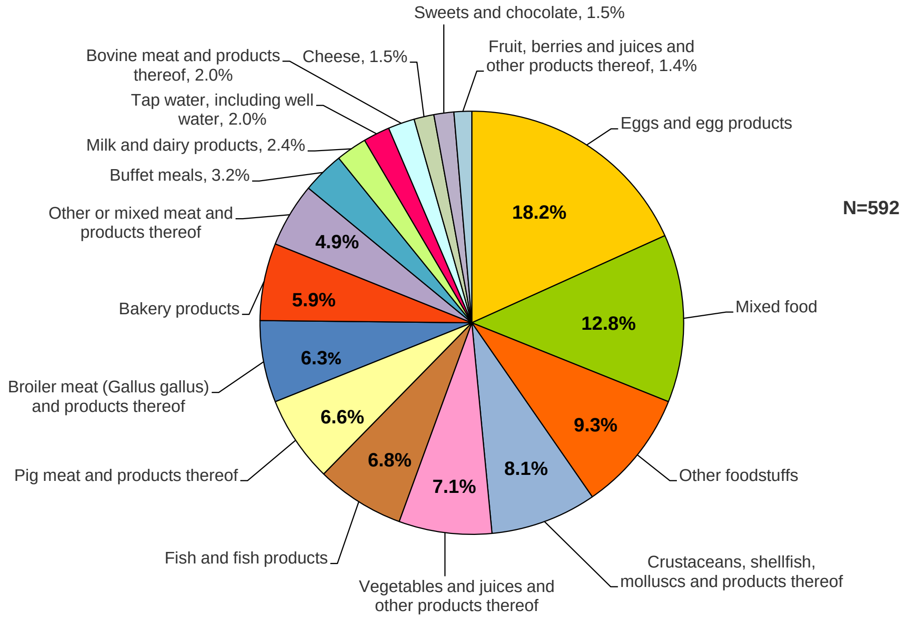
Food-borne viruses include adenovirus, calicivirus, hepatitis A virus, flavivirus, rotavirus and other unspecified viruses. Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus*. Other causative agents include chemical agents, histamine, lectin, marine biotoxins, mushroom toxins and wax esters (from fish). Parasites include primarily *Trichinella*, but also *Cryptosporidium*, *Giardia* and *Anisakis*. Other bacterial agents include *Brucella*, *Listeria*, *Shigella*, *Vibrio parahaemolyticus* and other unspecified bacteria agents. In this figure, outbreaks due to pathogenic *E. coli* other than VTEC and VTEC outbreaks have been aggregated into the category '*E. coli* (including VTEC)'.

Figure 56: Distribution of all food-borne outbreaks per causative agent in the EU, 2014



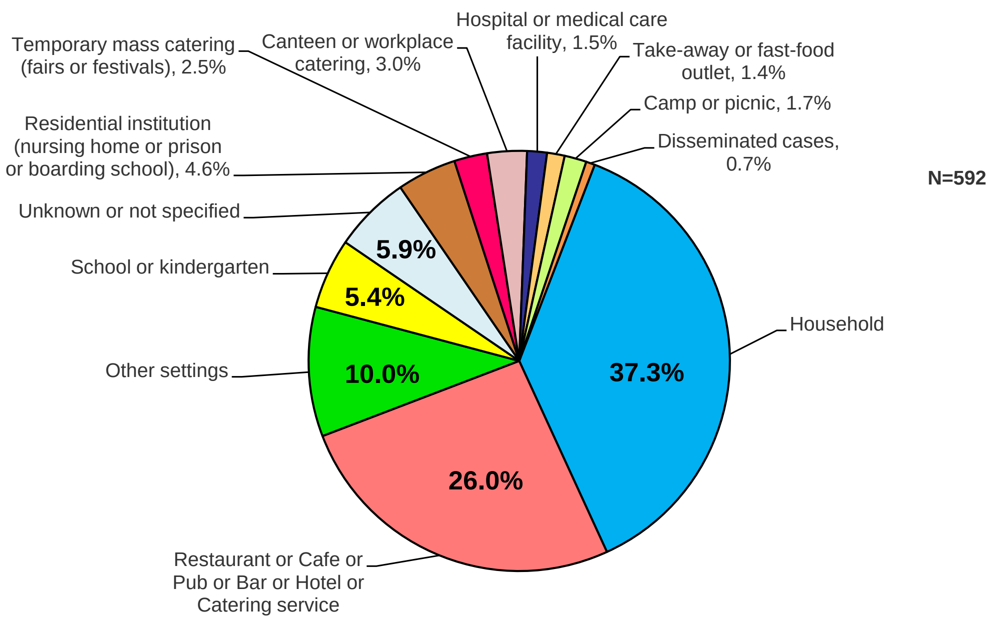
Food-borne viruses include adenovirus, calicivirus, hepatitis A virus, flavivirus, rotavirus and other unspecified viruses. Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus*. Other causative agents include chemical agents, histamine, lectin, marine biotoxins, mushroom toxins and wax esters (from fish). Parasites include primarily *Trichinella*, but also *Cryptosporidium*, *Giardia* and *Anisakis*. Other bacterial agents include *Brucella*, *Listeria*, *Shigella*, *Vibrio parahaemolyticus* and other unspecified bacteria agents. In this figure, outbreaks due to pathogenic *Escherichia coli* other than VTEC and VTEC outbreaks have been aggregated into the category '*E. coli* (including VTEC)'.

Figure 57: Total number of food-borne outbreaks in the EU, 2008–2014



Data from 592 outbreaks with strong evidence are included: Austria (13), Belgium (16), Croatia (25), Denmark (31), Finland (16), France (122), Germany (28), Greece (1), Hungary (13), Ireland (3), Latvia (3), Lithuania (11), Netherlands (6), Poland (71), Portugal (6), Romania (13), Slovakia (8), Slovenia (4), Spain (143), Sweden (14) and the United Kingdom (45).
Other foodstuffs (N=55) include: canned food products (2), cereal products including rice and seeds/pulses (nuts, almonds) (7), drinks, including bottled water (1), other foods (45). Other or mixed meat and products thereof (29) include: turkey meat and products thereof (4), sheep meat and products thereof (2), meat and meat products (7), other or mixed red meat and products thereof (14), other, mixed or unspecified poultry meat and products thereof (2). Milk and dairy products (14) include: milk (10) and dairy products other than cheeses (4).

Figure 58: Distribution of strong-evidence outbreaks by food vehicle in the EU, 2014



Data from 592 outbreaks are included: Austria (13), Belgium (16), Croatia (25), Denmark (31), Finland (16), France (122), Germany (28), Greece (1), Hungary (13), Ireland (3), Latvia (3), Lithuania (11), the Netherlands (6), Poland (71), Portugal (6), Romania (13), Slovakia (8), Slovenia (4), Spain (143), Sweden (14) and the United Kingdom (45).
Other settings (n=59) include: farm (3), mobile retailer, market/street vendor (1), multiple places of exposure in one country (1) and other settings (54). Unknown or not specified (35) include: unknown (16) and 19 outbreaks for which information on the setting was not provided.

Figure 59: Distribution of strong-evidence outbreaks by settings in the EU, 2014

3.16.2. Overview by causative agent

Agent-specific information on the reported food-borne outbreaks can be found in this section. The figures of outbreaks presented here do not include water-borne outbreaks, which are addressed separately in Section 3.16.3.

Viruses

Overall, 18 MS reported a total of 1,070 food-borne outbreaks caused by viruses (excluding two weak-evidence water-borne outbreaks) (Table 28); this represents an increase by 105.4% since 2011, when 521 food-borne outbreaks (excluding water-borne outbreaks) were reported. In 2014, only 84 (7.6%) of the reported food-borne outbreaks caused by viruses in the EU were supported by strong-evidence, and these were reported by 14 MS.

In 2014, the overall reporting rate in the EU was 0.27 outbreaks per 100,000 population, which is an increase from 2013 where the overall reporting rate was 0.23 per 100,000 population. Overall, the outbreaks implicated 11,740 cases, 2,486 hospitalisations and 2 deaths. Latvia reported the highest number of outbreaks (33.1% of all reported food-borne outbreaks caused by viruses), which were all weak-evidence outbreaks, followed by Lithuania (18.7%) and Slovakia (12.8%). However, it should be noted that the total number of outbreaks reported by Latvia (including 85 outbreaks caused by norovirus and 269 outbreaks caused by rotavirus) comprise together undistinguishable food-borne and contact-related outbreaks caused by norovirus and rotavirus, with a consequent likely overestimation of the total number of viral food-borne outbreaks reported by Latvia. Denmark and France reported the highest number of strong-evidence outbreaks due to viruses (16 outbreaks each). In addition, two non-MS (Norway and Switzerland) reported 16 outbreaks (Table 28).

In the 84 strong-evidence outbreaks caused by viruses, ‘crustaceans, shellfish, molluscs and products thereof’ was the most commonly implicated food vehicle (44.7% of outbreaks), followed by ‘buffet meals’ (15.8% of outbreaks), ‘mixed food’ (13.2%) and ‘fruit’ and ‘berries and juices’ (both 5.3%).

Information on the type of outbreak was reported for 77 out of the 84 strong-evidence outbreaks: 60 were general outbreaks, and 17 were household/domestic kitchen outbreaks. The place of exposure most frequently reported was ‘restaurant, café, pub, bar, hotel’ (31 outbreaks), followed by the household (16 outbreaks).

The two most often reported contributory factors for the strong-evidence virus outbreak were reported as ‘unknown’ in 31 outbreaks and as an ‘infected food handler’ in 24 of 84 strong-evidence outbreaks.

The number of the strong-evidence outbreaks caused by the different viral agents and related cases are presented in Table 29.

Detailed outbreak information (e.g. on the food vehicle, place of exposure, contributing factors, etc.) was only rarely reported for weak-evidence food-borne outbreaks caused by viruses.

Table 28: Strong- and weak-evidence food-borne outbreaks caused by viruses (excluding water-borne outbreaks) in the EU, 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Austria	3	308	8	0	1	2	0	0	4	0.05
Belgium	2	220	0	0	3	55	0	0	5	0.04
Croatia	1	26	0	0	1	8	0	0	2	0.05
Czech Republic	0	0	0	0	2	100	24	0	2	0.02
Denmark	16	1,047	1	0	8	292	0	0	24	0.43
Finland	5	121	10	0	4	94	1	0	9	0.17
France	16	137	6	0	85	970	50	1	101	0.15
Germany	2	247	0	0	44	424	145	0	46	0.06
Hungary	4	350	0	0	4	174	1	0	8	0.08
Latvia[(a)]	0	0	0	0	354	892	668	0	354	17.49
Lithuania	2	45	45	0	198	503	431	0	200	6.73
Netherlands	2	22	0	0	23	691	0	0	25	0.15
Poland	7	232	33	0	76	1,210	292	1	83	0.22

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Portugal	0	0	0	0	5	243	0	0	5	0.05
Slovakia	0	0	0	0	137	1,270	755	0	137	2.53
Spain	10	362	7	0	15	303	3	0	25	0.05
Sweden	4	188	0	0	17	382	2	0	21	0.22
United Kingdom	10	349	2	0	9	381	2	0	19	0.03
Norway	3	48	0	0	12	259	0	0	15	0.3
Switzerland	0	0	0	0	1	3	1	0	1	0.01
Total (MS)	84	3,654	112	0	986	7,994	2,374	2	1,070	0.27

(a): Latvian data comprise together undistinguishable food-borne and contact-related outbreaks caused by norovirus and rotavirus, with a consequent likely overestimation of the total number of viral food-borne outbreaks reported. Therefore, the total number of outbreaks caused by viruses reported by Latvia should not be considered comparable with data from other countries.

Table 29: Strong-evidence food-borne outbreaks caused by viruses (excluding strong-evidence water-borne outbreaks) in the EU, 2014

Causative agent	Country	Strong-evidence outbreaks			
		Number	Cases	Hospitalised	Deaths
Calicivirus – norovirus (Norwalk-like virus)	Austria	3	308	8	0
	Belgium	2	220	0	0
	Denmark	16	1,047	1	0
	Finland	4	109	0	0
	France	14	128	3	0
	Germany	2	247	0	0
	Hungary	4	350	0	0
	Lithuania	1	41	41	0
	Netherlands	2	22	0	0
	Poland	6	230	31	0
	Spain	8	326	6	0
	Sweden	4	188	0	0
	United Kingdom	10	349	2	0
	Norway	2	15	0	0
Flavivirus	Lithuania	1	4	4	0
Hepatitis A virus	Finland	1	12	10	0
	France	1	3	3	0
	Norway	1	33	0	0
Rotavirus	Croatia	1	26	0	0
	Poland	1	2	2	0
	Spain	1	5	1	0
Viruses	France	1	6	0	0
	Spain	1	31	0	0
Total (MS)		84	3,654	112	0

Calicivirus

Calicivirus (all reported cases were norovirus) was the most commonly reported virus implicated in the strong-evidence outbreaks (76 norovirus outbreaks out of 84 strong-evidence outbreaks caused by virus) and accounted for 97.6% (3,565 cases) of cases, and 29.6% of these cases was reported by Denmark (Table 29). The distribution of food vehicles in strong-evidence outbreaks caused by norovirus in the EU is shown in Figure 60.

In addition, 345 weak-evidence outbreaks were reported as being caused by norovirus, and two weak-evidence outbreaks as being caused by sapovirus (Sapporo-like virus).

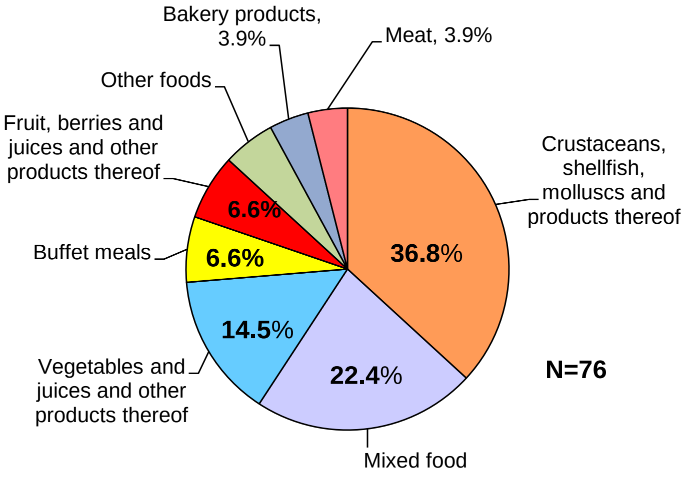


Figure 60: Distribution of food vehicles in strong-evidence outbreaks caused by norovirus in the EU, 2014

Salmonella

In 2014, 23 MS reported a total of 1,048 food-borne outbreaks caused by *Salmonella* (excluding one strong-evidence water-borne outbreak). The total number of *Salmonella* outbreaks within the EU decreased by 44.4% between 2008 (1,888 food-borne outbreaks) and 2014 (1,048 outbreaks). This corresponds with the decreasing trend in the number of human *Salmonella* cases in general. In 2014, the reporting rate for the annual total number of *Salmonella* outbreaks in the EU was 0.24 per 100,000 population. Overall, the outbreaks involved 9,226 cases, 1,944 hospitalisations and 14 deaths. Slovakia reported the highest number of outbreaks (200) followed by France and Poland (177 and 165 outbreaks, respectively). In total, 16 MS reported 225 *Salmonella* outbreaks with strong-evidence (21.5%). Spain, Poland and France together reported 67.1% of the strong-evidence outbreaks. Two non-MS (Norway and Switzerland) reported in total three outbreaks. Detailed information on the distribution of the food-borne outbreaks (excluding water-borne outbreaks) of human salmonellosis in the different EU MS and non-MS, the number of cases, hospitalisations and deaths, are summarised in Table 30.

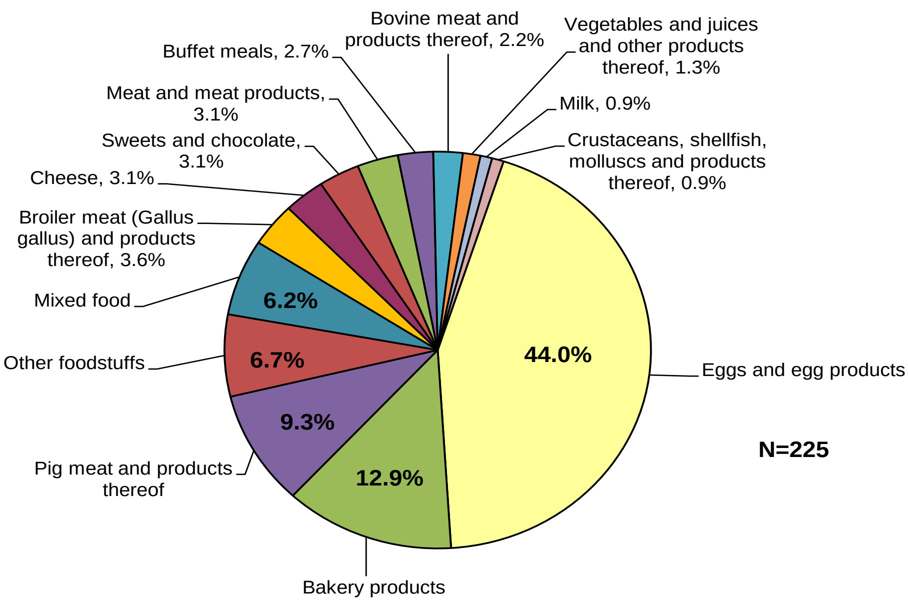
In total, 14 fatal *Salmonella* cases were reported from eight *Salmonella* outbreaks, of which five were reported as strong-evidence outbreaks. Four outbreaks were due to *S. Enteritidis* of which two strong-evidence outbreaks were caused by *S.* Enteritidis PT14b and one strong-evidence outbreak was due to *S.* Enteritidis PT8. One of the *S.* Enteritidis outbreaks was reported as a weak-evidence outbreak. In addition, one strong-evidence outbreak was due to *S.* Muenchen (see text box below) and one was reported as due to 'unspecified' *Salmonella*.

Table 30: Strong- and weak-evidence food-borne outbreaks caused by *Salmonella* (excluding strong-evidence water-borne outbreaks), 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Austria	7	287	60	1	40	94	29	0	47	0.56
Belgium	3	68	4	0	2	12	1	0	5	0.04
Bulgaria	0	0	0	0	1	69	9	0	1	0.01
Croatia	18	121	22	0	11	33	7	0	29	0.68
Czech Republic	0	0	0	0	30	783	87	0	30	0.29
Denmark	4	71	7	0	6	88	4	0	10	0.18
Estonia	0	0	0	0	3	6	6	0	3	0.23
France	42	379	79	0	135	925	131	0	177	0.27
Germany	9	312	93	4	122	472	102	1	131	0.16
Hungary	4	150	40	2	8	294	41	0	12	0.12
Ireland	0	0	0	0	3	5	1	0	3	0.07
Latvia	2	7	4	0	18	90	29	0	20	0.99

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Lithuania	6	78	41	0	23	50	34	0	29	0.98
Malta	0	0	0	0	7	48	5	0	7	1.66
Netherlands	1	74	3	0	7	110	20	1	8	0.05
Poland	54	520	185	1	111	687	220	1	165	0.43
Portugal	0	0	0	0	1	152	0	0	1	0.01
Romania	3	124	91	0	1	15	15	0	4	0.02
Slovakia	8	372	72	0	192	615	165	0	200	3.7
Slovenia	4	178	32	0	4	47	5	0	8	0.39
Spain	55	716	139	0	88	743	139	0	143	0.31
Sweden	0	0	0	0	5	34	0	0	5	0.05
United Kingdom	5	152	13	3	5	245	9	0	10	0.02
Norway	0	0	0	0	1	17	0	0	1	0.02
Switzerland	2	34	0	0	0	0	0	0	2	0.02
Total (MS)	225	3,609	885	11	823	5,617	1,059	3	1,048	0.24

As in previous years, 'eggs and egg products' were the most frequently identified food vehicles, associated with 44.0% of the reported *Salmonella* strong-evidence outbreaks (44.9% in 2013). France, Poland and Spain together reported 69.7% of these outbreaks. Bakery products accounted for 12.9% outbreaks (5.1% in 2013) and pig meat and products thereof for 9.3% of the outbreaks (as in 2013). In addition, in 2014, one water-borne strong-evidence outbreak caused by *Salmonella* was reported by Croatia. Figure 61 shows the distribution of the most common food vehicles implicated in the strong-evidence *Salmonella* outbreaks in 2014. The most common food vehicles reported for the weak-evidence outbreaks were, as for strong-evidence outbreaks, eggs and egg products, which accounted for 44.4% of the 180 weak-evidence outbreaks for which detailed information on food vehicle was provided. However, no detailed information on the food vehicle was provided for the majority of the weak-evidence outbreaks (643 outbreaks), where the food vehicle was reported as either 'unknown' or 'other foods'.



Data from 225 outbreaks are included: Austria (7), Belgium (3), Croatia (18), Denmark (4), France (42), Germany (9), Hungary (4), Latvia (2), Lithuania (6), the Netherlands (1), Poland (54), Romania (3), Slovakia (8), Spain (55) and the United Kingdom (5). This graph does not include one water-borne outbreak caused by *Salmonella*.
Other foodstuffs (n=15) include: cereal products including rice and seeds / pulses (nuts, almonds) (1) and other foods (14).
Meat and meat products (n=7) include: meat and meat products (3), other or mixed red meat and products thereof (3), and Turkey meat and products thereof (1).

Figure 61: Distribution of food vehicles in strong-evidence outbreaks caused by *Salmonella* in the EU, 2014

In 2014, information on the type of outbreak was reported for 216 of the strong-evidence *Salmonella* outbreaks: 92 were general outbreaks and 124 were household/domestic kitchen outbreaks. The latter were mainly reported by Poland (41 outbreaks) followed by France (31 outbreaks) and Spain (27 outbreaks).

The most frequently reported setting in strong-evidence *Salmonella* outbreaks was 'household' (129 outbreaks), followed by 'restaurant, café, pub, bar, hotel' (41 outbreaks), and 'schools and kindergarten' (10 outbreaks). The most common setting reported for the weak-evidence outbreaks was, as for strong-evidence outbreaks, 'household' (193 outbreaks) and 'restaurant, café, pub, bar, hotel' (55 outbreaks). However, for the majority of the weak-evidence outbreaks (545 outbreaks) the information on the type of setting was either not provided or reported as 'unknown' or 'others'.

Inadequate heat treatment (27 outbreaks) was the most frequently reported factor implicated in the strong-evidence *Salmonella* outbreaks, followed by cross-contamination and an infected food handler (both accounted for 10 outbreaks).

In 2014, 142 outbreaks with strong-evidence were caused by *S.* Enteritidis, which is a decrease of 31.4% compared with 2013. As in previous years, 'eggs and egg products' were the food vehicles most frequently associated with *S.* Enteritidis outbreaks. However, this proportion decreased from 59.9% in 2013 to 46.1% in 2014. *S.* Typhimurium was implicated in 12.0% of the strong-evidence outbreaks (27 outbreaks). 'Pig meat and products thereof' was, as in 2013, the most common food vehicle category associated with *S.* Typhimurium outbreaks where the source was known (48.1%). The distribution of food vehicles in strong-evidence outbreaks caused by *S.* Enteritidis and *S.* Typhimurium in the EU is shown in Figures 2014_FBOSALMENTVEHIC and 2014_FBOSALMTYPVEHIC.

For those food-borne outbreaks where a phage type (PT) was reported, the most common type reported was *S.* Enteritidis PT8 and PT14b (18 and 12 outbreaks, respectively).

Germany reported one food-borne outbreak of *Salmonella* Muenchen affecting 164 people, of which 60 were hospitalised and four persons died. This was a general outbreak and was associated with the consumption of various pork products, mostly raw, in private households and in a residential institution. A large investigation was conducted including both analytical and descriptive epidemiology, microbiological testing with detection of the causative agent in the food chain and detection of the indistinguishable causative agent in the human cases. The outbreak strain was detected in various food samples and in primary pig production. Even though a product tracing investigation was conducted, the complete movements of all the incriminated products could not be followed.

[Source: complementary information provided by Germany to EFSA in the context of the 2014 data reporting on zoonoses and food-borne outbreaks]

Bacterial toxins

In this report the category 'bacterial toxins' includes toxins produced by *Bacillus, Clostridium* and *Staphylococcus*.

In 2014, 18 MS reported a total of 840 food-borne outbreaks caused by bacterial toxins (excluding three water-borne outbreaks) (Table 27), which represents a slight increase compared with 2013. In addition, 10 outbreaks caused by bacterial toxins were reported by the non-MS: three strong-evidence outbreaks reported by Iceland and Switzerland, respectively and four weak-evidence outbreaks reported by Norway.

Bacillus toxins

In 2014, 12 MS reported 287 outbreaks caused by *Bacillus* toxins, representing 5.5% of all outbreaks reported within the EU. This is a small increase (3.2%) compared with 2013, when nine MS reported 278 *Bacillus* toxin outbreaks. The overall reporting rate in the EU was 0.1 per 100,000 population. As in 2013, France reported the majority (89.9%) of these outbreaks, which included 2,432 human cases, 89 hospitalisations and no deaths Table 31.

Table 31: Strong- and weak-evidence food-borne outbreaks caused by Bacillus toxins (excluding strong-evidence water-borne outbreaks), 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Belgium	4	20	0	0	7	26	0	0	11	0.1
Czech Republic	0	0	0	0	1	110	110	0	1	0.01
Denmark	1	4	0	0	1	7	0	0	2	0.04
Finland	2	55	0	0	0	0	0	0	2	0.04
France	19	437	18	0	239	1,995	71	0	258	0.39
Germany	2	9	0	0	0	0	0	0	2	0
Hungary	1	170	15	0	0	0	0	0	1	0.01
Netherlands	2	9	0	0	0	0	0	0	2	0.01
Poland	0	0	0	0	2	152	11	0	2	0.01
Portugal	3	57	32	0	0	0	0	0	3	0.03
Spain	1	18	0	0	0	0	0	0	1	0
Sweden	0	0	0	0	2	4	0	0	2	0.02
Iceland	3	36	0	0	0	0	0	0	3	0.93
Norway	0	0	0	0	4	24	0	0	4	0.08
Switzerland	1	41	4	0	0	0	0	0	1	0.01
Total (MS)	35	779	65	0	252	2,294	192	0	287	0.09

In the 35 strong-evidence *Bacillus* toxin outbreaks, 'mixed food' was the most commonly implicated food vehicle (34.3% of outbreaks), followed by 'cereal products' (11.4% of outbreaks). 'Broiler meat', 'crustaceans, shellfish and molluscs' and 'vegetables and juices' accounted for 5.7% of the strong-evidence outbreaks. The distribution of food vehicles in strong-evidence outbreaks caused by *Bacillus* toxins is shown in Figure 2014_FBOBACILLUSVEHIC. Detailed information on the implicated food vehicle was only provided for 116 of the 252 weak-evidence outbreaks, which were mostly associated with the consumption of 'mixed food'.

Information on the type of outbreak was available for all the strong-evidence *Bacillus* outbreaks: 32 were general outbreaks, and three were household/domestic kitchen outbreaks. The two most frequently reported settings were 'restaurant, café, pub, bar, hotel' and 'canteen or workplace catering' (six outbreaks each), followed by 'school and kindergarten' (four outbreaks). In nine outbreaks the setting was reported as 'others'. The most common setting reported for the weak-evidence outbreaks was, as for strong-evidence outbreaks, 'restaurant, café, pub, bar, hotel' (110 outbreaks) and household (50 outbreaks). The most common contributory factors reported for the strong-evidence outbreaks were 'storage time/temperature abuse' and 'unprocessed contaminated ingredient', in five outbreaks each.

Clostridium toxins

Thirteen MS reported 160 food-borne outbreaks caused by *C. perfringens* (124 outbreaks), *C. botulinum* (9 outbreaks) or unspecified *Clostridia* (27 outbreaks). This represents 3.1% of all outbreaks and is comparable with 2013, when 12 MS reported 170 outbreaks representing 3.3% of all outbreaks. In total, 42 outbreaks were reported as strong-evidence outbreaks. France reported the majority (71.3%) of the outbreaks and 52.5% of the cases. In total, 3,285 cases, 65 hospitalisations and three deaths were reported by the MS. Details of the number of reported food-borne outbreaks and human cases caused by *Clostridium* toxins are summarised in Table 32.

Table 32: Strong- and weak-evidence food-borne outbreaks caused by *Clostridium toxins* (excluding strong-evidence water-borne outbreaks), 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Belgium	1	17	1	0	0	0	0	0	1	0.01
Denmark	2	461	0	0	4	63	0	0	6	0.11
Finland	1	67	0	0	0	0	0	0	1	0.02
France	15	421	0	0	99	1,304	18	0	114	0.17
Germany	2	62	20	0	0	0	0	0	2	0
Hungary	1	6	5	0	0	0	0	0	1	0.01
Lithuania	0	0	0	0	1	2	2	0	1	0.03
Poland	0	0	0	0	1	2	2	0	1	0

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Portugal	1	30	1	0	1	2	1	0	2	0.02
Slovakia	0	0	0	0	2	5	5	0	2	0.04
Spain	9	456	8	2	6	120	0	0	15	0.03
Sweden	0	0	0	0	2	32	0	0	2	0.02
United Kingdom	10	207	1	1	2	28	1	0	12	0.02
Total (MS)	42	1,727	36	3	118	1,558	29	0	160	0.04

Forty-two of the *Clostridium* toxin outbreaks were supported by strong-evidence. France, the United Kingdom and Spain reported 34 of these outbreaks (15, 10 and 9 outbreaks respectively). In total, 36 of the strong-evidence outbreaks were reported as general outbreaks and six outbreaks as household outbreaks.

The most common food vehicles reported for the strong-evidence *Clostridium* toxin outbreaks were reported as 'other foods' associated with eight outbreaks and 'bovine meat and products thereof' associated with six outbreaks. The distribution of food vehicles in strong-evidence outbreaks caused by *Clostridium* toxins is shown in Figure 2014_FBOCLOSTRIDIUMVEHIC.

The most common setting reported for the strong-evidence outbreaks were 'restaurant, café, pub, bar, hotel' in 13 outbreaks followed by 'residential institutions' (nine outbreaks) and 'household' (eight outbreaks). The most frequently reported contributory factors were inadequate heat treatment and storage time/temperature abuse in nine and six outbreaks respectively.

In total, five strong-evidence outbreaks caused by *C. botulinum* were reported by four MS. These outbreaks were household outbreaks, except for one general outbreak, and accounted for 17 cases and 12 hospitalisations. The strong-evidence *C. botulinum* outbreaks were associated with the consumption of 'canned food products' (two outbreaks) and 'vegetables and juices and other products thereof' (two outbreaks). In one outbreak no detailed information on the food vehicle was provided (reported as 'other foods').

Overall, 37 strong-evidence outbreaks caused by *C. perfringens* were reported in the EU. Where detailed information on the food vehicle was provided, the food categories most frequently associated with the *C. perfringens* outbreaks were 'bovine meat and products thereof' (6 outbreaks), 'other or mixed red meat and products thereof' (5 outbreaks) and 'mixed foods' (4 outbreaks). Denmark reported two strong-evidence *C. perfringens* outbreaks of which one outbreak was associated with a composite meal and affected 391 cases (11.9% of all reported cases). Inaccurate cooling of the meal on the day before serving was reported as a contributory factor.

From 2014, it has been possible to provide detailed information for weak-evidence outbreaks and information on setting was provided in 86.4% of the weak-evidence *Clostridium* toxin outbreaks. The most common setting was 'restaurant, cafe, pub, bar, hotel' (38 outbreaks), 'others' (17 outbreaks), 'household' (16 outbreaks) and 'canteen or workplace catering' (11 outbreaks). The most common food vehicle was reported as 'other foods' without any additional information (49 outbreaks) and as 'mixed foods' (17 outbreaks). Various types of meat were associated with the outbreaks: 'pig meat and products thereof' (8), 'meat and meat products' (6), 'other or mixed red meat and products thereof' (6) and 'bovine meat and products thereof' (5 outbreaks). The most commonly reported implicated factor in association with the weak-evidence outbreaks was 'infected food handler' in nine outbreaks.

Staphylococcal enterotoxins

In 2014, 12 MS reported 393 food-borne outbreaks caused by staphylococcal toxins. This represents 7.5% of all outbreaks, a small increase compared with 2013 when 12 MS reported 386 outbreaks caused by staphylococcal toxins. The overall reporting rate in the EU was 0.12 per 100,000. As in previous years, France reported the majority (89.6%) of the outbreaks. In addition, Switzerland reported two strong-evidence outbreaks caused by staphylococcal enterotoxins.

Details on the number of food-borne outbreaks and human cases caused by staphylococcal enterotoxins reported in 2014 are summarised in Table 33.

Table 33: Strong- and weak-evidence food-borne outbreaks caused by staphylococcal toxins (excluding strong-evidence water-borne outbreaks), 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Belgium	2	22	11	0	2	17	0	0	4	0.04
Croatia	4	37	10	0	0	0	0	0	4	0.09
Czech Republic	0	0	0	0	1	54	15	0	1	0.01
France	9	56	6	0	343	2,268	147	0	352	0.54
Germany	3	42	7	0	0	0	0	0	3	0
Hungary	2	20	3	0	1	33	7	0	3	0.03
Latvia	1	15	14	0	1	4	4	0	2	0.1
Portugal	2	106	22	0	0	0	0	0	2	0.02
Romania	1	24	8	0	0	0	0	0	1	0
Slovakia	0	0	0	0	1	20	2	0	1	0.02
Spain	5	70	5	0	13	58	3	2	18	0.04
United Kingdom	2	106	0	0	0	0	0	0	2	0
Switzerland	2	20	0	0	0	0	0	0	2	0.02
Total (MS)	31	498	86	0	362	2,454	178	2	393	0.12

In 2014, the number of strong-evidence outbreaks caused by staphylococcal toxins was very low (31 outbreaks) compared with 2013, where 94 strong-evidence outbreaks were reported. The most commonly reported single food category in the 31 strong-evidence outbreaks in 2014 was 'mixed foods' (29.0%), followed by 'pig meat and products thereof' and 'broiler meat and products thereof' (both 9.7%). The distribution of food vehicles in strong-evidence outbreaks caused by staphylococcal toxins is shown in Figure 2014_FBOSTAPHYLVEHIC.

Information on the type of outbreak was, except for one outbreak, available for all the strong-evidence outbreaks caused by staphylococcal toxins: 18 were general outbreaks, 12 were household outbreaks. The setting most frequently reported was 'household' (10 outbreaks), followed by 'restaurant, café, pub, bar, hotel' (7 outbreaks) and 'school or kindergarten' (3 outbreaks). The setting was either not reported or indicated as 'others' or 'unknown' for nine outbreaks.

From 2014, it has been possible to provide detailed information for the weak-evidence outbreaks. The most common food vehicles reported for 362 weak-evidence outbreaks caused by staphylococcal toxins were 'other foods' (138 outbreaks) and 'mixed foods' (57 outbreaks), followed by a various number of food vehicles: 'Other or mixed red meat and products thereof' (22 outbreaks), eggs and egg products (17 outbreaks), 'bovine meat and products thereof', 'pig meat and products thereof' and 'vegetables and juices' (16 outbreaks, respectively) and 'crustaceans, shellfish, molluscs and products thereof' associated with 15 outbreaks. The most commonly reported setting for the weak-evidence outbreaks was 'restaurant, café, pub, bar, hotel' (159 outbreaks), 'household' (99 outbreaks) and 'school or kindergarten' (47 outbreaks). In 27 of the outbreaks, a contributory factor was reported to be 'infected food handler'.

Campylobacter

In 2014, 16 MS reported a total of 444 food-borne *Campylobacter* outbreaks within the EU (excluding two water-borne outbreaks). This is an increase compared with 2013, when a total of 414 outbreaks were reported, but still lower than 2012, when 501 *Campylobacter* outbreaks were reported. The reporting rate for the annual total number of *Campylobacter* outbreaks was 0.11 per 100,000 population and the outbreaks represent 8.5% of the total reported food-borne outbreaks in the EU (excluding water-borne outbreaks). Only 29 (6.5%) *Campylobacter* outbreaks were classified as strong-evidence outbreaks. In total, the outbreaks affected 1,805 cases of which 189 were hospitalised, but no deaths were reported by the MS. In addition, Switzerland reported one strong-evidence outbreak involving five cases. Detailed information on the distribution of the food-borne *Campylobacter* outbreaks (excluding water-borne outbreaks) in the EU MS and non-MS, the number of cases, hospitalisations and deaths, is summarised in Table 34.

Table 34: Strong- and weak-evidence food-borne outbreaks caused by *Campylobacter* (excluding strong-evidence waterborne outbreaks), 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Austria	3	6	3	0	37	78	14	0	40	0.47
Belgium	0	0	0	0	1	2	0	0	1	0.01
Croatia	0	0	0	0	3	34	0	0	3	0.07
Czech Republic	0	0	0	0	3	53	3	0	3	0.03
Denmark	2	5	1	0	0	0	0	0	2	0.04
Estonia	0	0	0	0	3	6	4	0	3	0.23
Finland	1	22	0	0	0	0	0	0	1	0.02
France	6	38	1	0	32	220	14	0	38	0.06
Germany	4	99	34	0	181	503	63	0	185	0.23
Hungary	1	80	0	0	1	3	0	0	2	0.02
Ireland	0	0	0	0	1	9	0	0	1	0.02
Latvia	0	0	0	0	2	4	1	0	2	0.1
Lithuania	0	0	0	0	10	21	21	0	10	0.34
Malta	0	0	0	0	12	35	1	0	12	2.85
Netherlands	0	0	0	0	5	11	2	0	5	0.03
Poland	0	0	0	0	3	8	4	0	3	0.01
Slovakia	0	0	0	0	111	252	20	0	111	2.05
Spain	1	15	0	0	7	80	2	0	8	0.02
Sweden	1	11	0	0	1	55	0	0	2	0.02
United Kingdom	10	146	1	0	2	9	0	0	12	0.02
Iceland	0	0	0	0	1	3	0	0	1	0.31
Norway	0	0	0	0	3	21	0	0	3	0.06
Switzerland	1	5	2	0	0	0	0	0	1	0.01
Total (MS)	29	422	40	0	415	1,383	149	0	444	0.11

As in previous years, broiler meat was the most frequently identified food vehicle associated with strong-evidence *Campylobacter* outbreaks (55.2%). All other food vehicles were associated with one or two outbreaks. Twenty-four outbreaks were reported as general outbreaks and four as household outbreaks (one outbreak was reported as 'unknown'). The most frequently reported setting was 'restaurant, café, pub, bar, hotel' (14 outbreaks), followed by household (three outbreaks). Cross-contamination and/or inadequate heat treatment were reported as possible contributory factors in 11 strong-evidence *Campylobacter* outbreaks.

Where detailed information was reported for the weak-evidence outbreaks, broiler meat was the most frequently reported food vehicle (12 outbreaks) and 'household' was the most frequently reported setting (41 outbreaks).

Detailed information on the distribution of the most common food vehicles implicated in the strong-evidence *Campylobacter* outbreaks is summarised in Figure 2014_FBOCAMPVEHIC.

Verotoxigenic *Escherichia coli* and other food-borne pathogenic *Escherichia coli*

In 2014, 13 MS reported a total of 67 food-borne outbreaks caused by pathogenic *E. coli* (excluding four water-borne outbreaks) representing 1.3% of the total number of the reported food-borne outbreaks in the EU. This is a decrease compared with 2013, when 73 outbreaks were reported. In total, 957 people were affected of which 139 (14.5%) were hospitalised, no deaths were reported. In addition, Norway reported one outbreak with 38 cases (Table 35).

Table 35: Strong- and weak-evidence food-borne outbreaks caused by pathogenic *Escherichia coli* (excluding strong-evidence waterborne outbreaks), 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Austria	0	0	0	0	3	11	5	0	3	0.04
Belgium	0	0	0	0	1	2	1	0	1	0.01
Croatia	0	0	0	0	2	4	2	0	2	0.05
Denmark	0	0	0	0	3	16	4	0	3	0.05
France	3	119	2	0	22	267	10	0	25	0.04
Germany	1	5	0	0	4	9	1	0	5	0.01

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Ireland	0	0	0	0	8	19	0	0	8	0.17
Malta	0	0	0	0	2	6	0	0	2	0.47
Poland	1	77	74	0	1	4	2	0	2	0.01
Slovakia	0	0	0	0	1	3	3	0	1	0.02
Spain	2	63	2	0	1	3	1	0	3	0.01
Sweden	0	0	0	0	4	19	5	0	4	0.04
United Kingdom	4	263	18	0	4	67	9	0	8	0.01
Norway	0	0	0	0	1	38	0	0	1	0.02
Total (MS)	11	527	96	0	56	430	43	0	67	0.02

Eleven of the pathogenic *E. coli* outbreaks were supported by strong evidence and the United Kingdom and France reported four and three outbreaks, respectively. Nine of the strong-evidence outbreaks were reported as general outbreaks and two outbreaks as household outbreaks.

The most common food vehicles reported for the strong-evidence outbreaks caused by pathogenic *E. coli* were 'milk' and 'vegetables and juices' (both three outbreaks), followed by 'mixed food' and 'other foods' (both two outbreaks) and 'dairy products other than cheeses' (one outbreak). Two of the three milk-associated outbreaks were linked to the consumption of raw milk. The settings reported for the strong-evidence outbreaks were diverse: 'hospital or medical care facility' (two outbreaks), household (two outbreaks), farm (1), 'restaurant, café, pub, bar, hotel' (1), 'school or kindergarten' (1) and 'take-away or fast-food outlet' (1).

From 2014, it has been possible to provide detailed information for weak-evidence outbreaks. However, no specific information on the implicated food vehicle was provided for 49 out of 56 outbreaks (reported as either 'other foods' or 'unknown'). The only food vehicles reported for the weak-evidence outbreaks due to pathogenic *E. coli* were 'bovine meat and products thereof' (four outbreaks), 'vegetables and juices' (two outbreaks) and 'cheese' (one outbreak). Where reported, the most common settings for the weak-evidence outbreaks caused by pathogenic *E. coli* were 'restaurant, café, pub, bar, hotel' (11 outbreaks) and 'household' (10 outbreaks).

Verotoxigenic *E. coli* (VTEC) was reported as the causative agent in 38 of the pathogenic *E. coli* outbreaks (excluding water-borne outbreaks) involving 270 cases and 34 hospitalisations. Eight of these outbreaks were caused by VTEC O157. Five of the VTEC outbreaks were supported by strong evidence. Three of strong-evidence VTEC outbreaks were associated with milk, which in two outbreaks was served unpasteurised (raw milk); the other two strong-evidence VTEC outbreaks were associated with different types of RTE salads.

Other causative agents

In this report the category 'other causative agents' includes chemical agents, histamine, lectin, marine biotoxins, mushroom toxins, and wax esters (from fish).

In 2014, 12 MS reported a total of 140 food-borne outbreaks due to other causative agents. This represents the 2.7% of all outbreaks reported at the EU level, a small increase compared with 2013, when 132 outbreaks were reported. The reporting rate was 0.04 per 100,000 population. In total, 58 strong-evidence outbreaks were reported by 10 MS, mainly by Spain (32 strong-evidence outbreaks). France reported the highest number of outbreaks (73 outbreaks, including both strong- and weak-evidence outbreaks) (Table 36).

Table 36: Strong- and weak-evidence food-borne outbreaks caused by other causative agents (excluding strong-evidence waterborne outbreaks), 2014

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Belgium	2	4	2	0	0	0	0	0	2	0.02
Bulgaria	0	0	0	0	1	0	0	0	1	0.01
Denmark	2	7	0	0	0	0	0	0	2	0.04
Finland	1	23	2	0	0	0	0	0	1	0.02
France	10	46	4	0	63	260	27	1	73	0.11
Germany	4	10	0	0	0	0	0	0	4	0
Ireland	1	4	1	0	0	0	0	0	1	0.02

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Poland	2	4	4	1	0	0	0	0	2	0.01
Spain	32	125	21	0	14	52	4	0	46	0.1
Sweden	3	13	2	0	4	10	2	0	7	0.07
United Kingdom	1	2	2	0	0	0	0	0	1	0
Total (MS)	58	238	38	1	82	322	33	1	140	0.04

The majority (53.2%) of outbreaks due to 'other causative agents' were caused by histamine, which accounted for 44.4% of human cases and 65.2% of hospitalisations reported in these outbreaks.

Most of the strong-evidence outbreaks caused by other agents (58.6% of the outbreaks) were associated with the consumption of 'fish and fishery products', followed by 'vegetables and juices and other products thereof' (17.2% of the outbreaks).

Information on the type of outbreak was available for all the strong-evidence outbreaks (except for three) caused by other agents: 30 were general outbreaks, 18 were household/domestic kitchen outbreaks and 7 outbreaks were classified as of 'unknown' type. The setting most frequently reported was 'restaurant, café, pub, bar, hotel' (25 outbreaks), followed by 'household' (17 outbreaks). The setting was either not reported or indicated as 'others' or 'unknown' for 9 outbreaks.

The number of the strong-evidence outbreaks caused by the different agents included in the category 'other causative agents' and related cases are presented in Table 37.

Table 37: Strong-evidence food-borne outbreaks caused by other causative agents (excluding strong-evidence water-borne outbreaks), 2014

Causative agent	Country	Strong-evidence outbreaks			
		Number	Cases	Hospitalized	Deaths
Chemical agents	Spain	2	13	0	0
Histamine	Belgium	2	4	2	0
	Denmark	1	3	0	0
	Finland	1	23	2	0
	France	5	25	4	0
	Germany	4	10	0	0
	Spain	18	84	3	0
	Sweden	3	13	2	0
	United Kingdom	1	2	2	0
Marine biotoxins	Ireland	1	4	1	0
Marine biotoxins – ciguatoxin	France	5	21	0	0
Marine biotoxins – muscle-paralysing toxin	Spain	1	2	0	0
Mushroom toxins	Poland	2	4	4	1
	Spain	10	24	18	0
Lectin	Denmark	1	4	0	0
Wax esters (from fish)	Spain	1	2	0	0
Total (MS)		58	238	38	1

Other bacterial agents

Under the category 'other bacterial agents', outbreaks due to *Shigella*, *Listeria*, *Brucella*, *Vibrio parahaemolyticus, Francisella, Leptospira* and other bacterial agents are reported.

In 2014, a total of 21 outbreaks of *Shigella* were reported by nine MS. All outbreaks were reported as weak-evidence outbreaks and five of the outbreaks were due to *Shigella sonnei*. The outbreaks affected 104 cases, of which 22 were hospitalised. The type of outbreak was reported as general in six of the outbreaks, five were household outbreaks and ten outbreaks were reported as unknown.

In 2014, a total of 15 *Listeria* outbreaks were reported by seven MS. This was an increase compared with 2013, where 12 outbreaks were reported and twice the number reported in 2011. Overall, the MS reported 106 cases, 19 hospitalisations and no deaths. In addition, Switzerland reported 31 cases and four fatalities in one outbreak. The largest *Listeria* outbreak was reported by Denmark affecting 41 cases associated with cold meat cuts (see text box below). Six of the reported outbreaks were supported by strong-evidence and all, except one (for which the type of outbreak was 'unknown'), were reported as general outbreaks. Two strong-evidence outbreaks were linked to the consumption of 'mixed foods', while each of the remaining four strong-evidence outbreaks were associated respectively with the consumption of 'fish and fishery products', 'buffet meals', 'other or mixed red meat and products thereof' and 'other foods'. Two of the reported outbreaks were located in a 'hospital or medical care facility', involving six cases, and two outbreaks were household outbreaks.

Denmark reported the largest outbreak caused by *L. monocytogenes* in the EU, which involved 41 human cases. The patients were 43–90 years old with a median age of 72 years, and 23 (56%) were women. Seventeen patients (41%) died within 30 days from the sample date.[38] All patients had underlying diseases, in particular cancers and haematological diseases, and many were in treatment with immunosuppressive drugs rendering them more susceptible to listeriosis. The outbreak investigation was aided by the use of a whole-genome sequencing typing-based method, which was introduced for routine typing of *Listeria* isolates in Denmark in 2014. The implementation of the whole-genome sequencing typing method has improved the identification and the comparison of clusters of isolates over long periods of time, and has complemented epidemiological investigations, making is possible to identify the source of the outbreak: a Danish cold cut RTE meat speciality from a specific producer (Anonymous, 2015).

Only two *Brucella* outbreaks were reported in 2014. Germany reported both of these outbreaks, in which five of seven cases were hospitalised and one person died. Both outbreaks were reported as weak-evidence outbreaks. No specific information on the food vehicle and on the place of exposure was reported for the *Brucella* outbreaks.

Five outbreaks due to *Vibrio* were reported by two MS. France reported four *Vibrio parahaemolyticus* outbreaks, of which one was supported by strong evidence. Spain reported one weak-evidence outbreak caused by unspecified *Vibrio*. Overall, 28 people were affected and one person was hospitalised. Information on the setting was reported for four of the five outbreaks: for three outbreaks the setting was reported as 'restaurant, café, pub, bar, hotel', and as 'household' in one outbreak. Two outbreaks (including the one supported by strong evidence) were associated with the consumption of 'crustaceans, shellfish, molluscs and products thereof', one outbreak was linked to the consumption of 'fish and fish products', while no specific information on the food vehicle (indicated as 'other foods') was reported for two outbreaks.

One domestic outbreak caused by unspecified *Francisella* was reported by France. This was linked to the consumption of 'other, mixed or unspecified poultry meat and products thereof' and involved three human cases. In addition, Norway reported one weak-evidence outbreak caused by *F. tularensis*, which involved four human cases. The food vehicle for this latter outbreak was 'unknown' and therefore it is not clear whether this was a food- or a water-borne outbreak.

In addition, one strong-evidence general food-borne outbreak due to other (unspecified) bacteria involving 28 cases was reported by Spain. The outbreak was associated with 'vegetables and juices' in a 'canteen or workplace catering'. In addition, 10 weak-evidence outbreaks were reported by Slovakia and Spain. Slovakia reported eight weak-evidence outbreaks involving 219 cases, of which 30 were hospitalised. Spain reported two weak-evidence outbreaks with five cases, two of which were hospitalised.

Parasites

The category 'parasites' includes outbreaks due to *Trichinella*, *Cryptosporidium*, *Giardia* and *Anisakis*.

In 2014, 10 MS reported a total of 33 food-borne outbreaks caused by parasites (Table 27). Overall, this represents 0.63% of all food-borne outbreaks reported in the EU.

[38] As stated in the 'Annual Report on Zoonoses in Denmark 2014' (Anonymous 2015), in the context of the Listeria outbreak 17 patients (41 %) died within 30 days from the sample date. However, it should be noted that Denmark do not report deaths related to outbreaks to EFSA, if a fatal cases had a seriously underlying disease and the infection is considered a contributing factor to the death only. For this reason, although indicated in the text box, the 17 deaths do not appear in the summary tables or in the main narrative text of the present EFSA report.

In 2014, 17 *Trichinella* outbreaks were reported by six MS. In total, 187 people were affected of which 84 were hospitalised. Fifteen of the outbreaks were reported with strong evidence, and 86.7% of these were associated with 'pig meat and products thereof' (including one outbreak involving wild boar meat). One outbreak was associated with meat from bears. Romania reported nine of the outbreaks (all with strong-evidence), which involved 114 cases.

Seven outbreaks caused by *Cryptosporidium* spp. were reported by two MS (excluding two water-borne outbreaks). One strong-evidence food-borne outbreak caused by *C. parvum* linked with the consumption of parsley was reported by Sweden and involved 83 cases in the setting of 'restaurant, café, pub, bar or hotel'. Sweden also reported four weak-evidence outbreaks of which two were associated with mixed foods by descriptive epidemiology. Germany reported two weak-evidence outbreaks.

In 2014, six weak-evidence outbreaks caused by *Giardia* were reported by one MS. This represent a decrease compared with the number of *Giardia* food-borne outbreaks reported in 2013, when 12 weak-evidence outbreaks were reported by four MS.

One weak-evidence outbreak caused by *Anisakis* was reported by Spain. This outbreak was linked to the consumption of fish and fish products and affected five human cases.

Yersinia

In 2014, 11 outbreaks caused by *Yersinia* (one strong-evidence outbreak and 10 weak-evidence outbreaks) were reported by six MS; this was an increase compared with 2013 (eight outbreaks).

Overall in 2014, the MS reported 208 cases, out of which nine were hospitalised. The only strong-evidence food-borne outbreak was reported by Finland and was associated with the consumption of unpasteurised milk. This outbreak was caused by *Y. pseudotuberculosis* (see text box). Four weak-evidence outbreaks were caused by *Y. enterocolitica*, while no further information on the type of *Yersinia* was provided for the remaining six weak-evidence outbreaks. Two weak-evidence outbreaks reported by France were associated with the consumption of 'mixed foods' and the consumption of 'pig meat and products thereof'. The food vehicle was 'unknown' for the remaining eight outbreaks.

In addition, Norway reported two *Y. enterocolitica* strong-evidence outbreaks, one associated with the consumption of mixed salad and the other with the consumption of pig meat and products thereof.

In March 2014, a *Y. pseudotuberculosis* outbreak was detected by a municipal authority in Southern Finland. Epidemiological, microbiological and trace-back investigations were conducted to identify the source of the outbreak. Between February and April 2014, 55 *Y. pseudotuberculosis* cases (45 with a positive stool culture and 10 seropositive cases) from 48 households were notified to the National Infectious Diseases Register in Finland. Illness was strongly associated with the consumption of raw milk from a single producer. The odds ratio of illness increased with the amount of raw milk consumed and previously healthy adults became infected after consuming raw milk. Identical *Y. pseudotuberculosis* strains were identified from cases' stool samples, raw milk sampled from one of the case's refrigerator and from the milk line filter at the farm. The raw milk originated from a single producer, who fulfilled the legal requirements for raw milk production. The producer voluntarily recalled the raw milk and stopped its production.

[Source: complementary information provided by Finland to EFSA in the context of the 2014 data reporting on zoonoses and food-borne outbreaks]

Unknown agents

In 2014, 19 MS reported 1,531 outbreaks (including seven water-borne outbreaks) representing 29.2% of all outbreaks in which the causative agent was unknown and these accounted for 23.5% of all outbreaks cases (Table 27). Since 2012, there has been a low increase in the number of outbreaks where the agent is reported as unknown (2013, n=1,499 and 2012, n=1,478). Forty outbreaks (excluding four water-borne outbreaks) were supported by strong-evidence (7.2% of all strong-evidence outbreaks, excluding waterborne outbreaks). The most common food vehicle was the category 'mixed foods' (10 outbreaks), followed by 'eggs and egg products' and 'crustaceans, shellfish, molluscs and products thereof' (five outbreaks each).

3.16.3. Water-borne outbreaks

In 2014, nine MS reported 22 water-borne outbreaks and 12 of these were reported as strong-evidence outbreaks by six MS. The outbreaks involved 556 cases of which 15 were hospitalised. In addition, one non-MS, Iceland, reported one strong-evidence outbreak.

Seven different agents were detected in the 12 strong-evidence outbreaks: *Salmonella, Campylobacter jejuni, Campylobacter coli,* pathogenic *E. coli* (excluding VTEC) and VTEC (VTEC O103 and O157), *Clostridium perfringens* and *Cryptosporidium parvum*. There were four water-borne outbreaks in which the causative agent was unknown. Six MS reported 10 weak-evidence outbreaks caused by calicivirus (Norwalk-like virus), *Cryptosporidium parvum,* VTEC, *Bacillus cereus* and *Leptospira*.

The largest water-borne outbreak was caused by *Campylobacter* in tap water and occurred in Finland, where 96 people were affected. In Croatia, one water-borne outbreak was caused by *S.* Enteritidis from untreated drinking water and this affected 68 people. In Ireland, VTEC O157 was detected in water in a private household. In the United Kingdom, *Cryptosporidium parvum* was detected in a water tank where spring water had been collected and 24 cases were involved in the outbreak.

Further details on the number of strong-evidence outbreaks and human cases, including information on the causative agents, reporting countries and settings can be found in Table 38.

Table 38: List of reported strong-evidence water-borne outbreaks in 2014

Causative agent	Country	Settings	Additional information	Strong-evidence outbreaks			
				Number	Cases	Hospitalised	Deaths
Bacterial toxins (*Clostridium perfringens*)	Spain	Camp or picnic		1	22	0	0
Campylobacter	Finland	Household	Tap water	1	96	0	0
	Sweden	Others	Pulsed field gel electrophoresis (PFGE) in water and cases conisdered as the same (> 90% similarity)	1	7	0	0
	Iceland	Unknown		1	3	0	0
Escherichia coli, pathogenic (excluding VTEC)	Spain	Camp or picnic		1	49	0	0
Escherichia coli, pathogenic – Verotoxigenic *E. coli* (VTEC)	Finland	Household		1	9	1	0
	Ireland	Household	VTEC O157 VT2 detected in water	1	1	1	0
Parasites (*Cryptosporidium parvum*)	United Kingdom	Others	spring water collected in tank, *C. parvum* ST 825.	1	24	0	0
Salmonella	Croatia	Others	water was untreated	1	68	5	0
Unknown	Finland	Camp or picnic	Well water	1	14	0	0
		Household	Tap water	2	93	0	0
	Spain	Camp or picnic		1	9	0	0
Total (MS)				12	392	7	0

3.16.4. Discussion

A total of 5,251 food-borne outbreaks were reported by 26 MS in 2014, compared with 5,196 outbreaks reported by 24 MS in 2013. The most commonly reported causative agents in these outbreaks were viruses and *Salmonella*, followed by bacterial toxins and *Campylobacter.* Food-borne viruses overtook *Salmonella* as the most common causative agents reported in association with food-borne outbreaks.

Overall, the outbreaks reported by MS involved 45,665 human cases, 6,438 hospitalisations and 27 deaths. The number of human cases and fatalities has increased compared with 2013, when 41,962 human cases and 11 fatalities were reported.

From 2014, MS had the possibility to report detailed information for weak-evidence outbreaks (EFSA, 2014). This has resulted in a higher proportion of outbreaks where the food vehicle and setting were reported, compared with the previous years when detailed information was only reportable for strong-evidence outbreaks. In 2014, a large reduction was observed in the number of reported strong-evidence outbreaks compared with 2013. It is unclear whether the new reporting guidelines for weak-evidence outbreaks have contributed to this reduction.

Overall, the most frequently reported food vehicle categories implicated in strong-evidence outbreaks were 'eggs and egg products', followed by 'mixed food', and 'crustaceans, shellfish, molluscs and products thereof'. The latter was mainly reported in connection with calicivirus (Norwalk-like virus).

The number of reported outbreaks caused by viruses has more than doubled between 2011 and 2014. However, it should be noted that there has been variability in the number of outbreaks due to food-borne viruses throughout the period from 2008 to 2013. Overall, compared to *Salmonella* outbreaks, not only were there more food-borne outbreaks caused by viruses reported in 2014, but also more people were involved, and more cases were hospitalised. The number of deaths due to *Salmonella* outbreaks, however, outnumbered those due to viruses.

As in previous years, a reduction was observed in the number of reported outbreaks caused by *Salmonella*. The total number of *Salmonella* outbreaks within the EU has decreased markedly, by 44.4%, since 2008, when National Control Programmes for *Salmonella* in laying hens were introduced, followed by restrictions on sale of fresh eggs from infected flocks in 2009.

Most of the *Salmonella* outbreaks were caused by 'eggs and egg products'. Bakery products were reported as the second most common food vehicle in *Salmonella* outbreaks in 2014, where 'sweets and chocolates' represented the second most commonly reported food vehicle in 2013.

A small rise, by 7.7%, was seen in the number of reported *Campylobacter* outbreaks between 2013 and 2014, when 444 outbreaks were reported. However, this was still lower than 2012, when 501 *Campylobacter* outbreaks were reported. It is possible that improved typing methods may have contributed to identification of outbreaks, although the numbers of *Campylobacter* cases in the EU been increasing despite various control initiatives at farm and abattoir level.

Broiler meat was the main food vehicle implicated in *Campylobacter* outbreaks, as in 2013. This is consistent with EFSA's BIOHAZ Panel Scientific Opinion (EFSA BIOHAZ, CONTAM and AHAW Panels, 2012) that handling, preparation and consumption of broiler meat may account for 20–30% of human cases.

The number of reported strong-evidence water-borne outbreaks increased compared with 2013. The largest water-borne outbreak was caused by *Campylobacter* and occurred in Finland, where 96 people were affected.

As in previous years, the data reported on food-borne outbreaks demonstrate that reporting by a single or a small number of MS can have a strong influence on the apparent distribution of causative agents and food vehicles at the EU level. It also appears that, within the MS, there may be large differences with regard to the reported causative agents and implicated food vehicles between years.

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Abbreviations

AE	alveolar echinococcosis
AHAW	EFSA Panel on Animal Health and Welfare
BIOHAZ	EFSA Panel on Biological Hazards
CE	cystic echinococcosis
CFT	complement fixation test
CFU	colony-forming unit
CONTAM	EFSA Panel on Contaminants in the Food Chain
DCF	Data Collection Framework
EBLV	European bat lyssavirus
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EFSA	European Food Safety Authority
EFTA	European Free Trade Association
ELISA	Enzyme-linked immunosorbent assay
ESRI	Economic and Social Research Institute
EURL	European Union Reference Laboratory
FAT	fluorescent antibody test
g	gram
HACCP	hazard analysis and critical control point
HAV	hepatitis A virus
HUS	haemolytic–uraemic syndrome
i-ELISA	indirect enzyme-linked immunosorbent assay
IFA	immunofluorescence assay
IHC	immunohistochemistry
ISO	International Organization for Standardization
LHT	low heat-treated
MLST	multi locus sequence typing
MRSA	meticillin-resistant *Staphylococcus aureus*
MS	Member State
NMKL	Nordic Committee on Food Analysis
NT	not typable
OBF	official brucellosis-free

ObmF	official *Brucella melitensis*-free
OIE	World Organisation for Animal Health
OTF	official tuberculosis-free
PCR	polymerase chain reaction
PFGE	pulsed field gel electrophoresis
PHC	process hygiene criteria
RTE	ready-to-eat
RT-PCR	reverse transcriptase-polymerase chain reaction
STEC	Shiga toxin-producing *Escherichia coli*
TESSy	The European Surveillance System
VTEC	verocytotoxigenic *Escherichia coli*
WNF	West Nile fever
WNV	West Nile virus
WAHID	World Animal Health Information Database
WHO	World Health Organization

Country codes

Austria	AT	Greece	GR	Norway	NO
Belgium	BE	Hungary	HU	Poland	PL
Bulgaria	BG	Iceland	IS	Portugal	PT
Croatia	HR	Ireland	IE	Romania	RO
Cyprus	CY	Italy	IT	Slovakia	SK
Czech Republic	CZ	Latvia	LV	Slovenia	SI
Denmark	DK	Liechtenstein	LI	Spain	ES
Estonia	EE	Lithuania	LT	Sweden	SE
Finland	FI	Luxembourg	LU	Switzerland	CH
France	FR	Malta	MT	United Kingdom	UK
Germany	DE	Netherlands	NL		

Appendix: List of usable data

Summary

Table abbreviation	Table name
2014_ZOONHOSPITRATES	Reported hospitalization and case-fatality rates due to zoonoses in confirmed human cases in the EU, 2014

Figure abbreviation	Figure name
2014_ZOONHUMRATES	Reported notification rates of zoonoses in confirmed human cases in the EU, 2014

3.1. Salmonella

Table abbreviation	Table name
2014_SALMOVERVIEW	Overview of countries reporting data for *Salmonella*

3.1.1. Salmonellosis in humans

	Table abbreviation	Table name
Humans	2014_SALMHUMRATES	Reported cases and notification rates for confirmed cases of human salmonellosis in the EU/ EEA, 2010–2014
	2014_SALMHUMSEROVARS	Distribution of reported confirmed cases of human salmonellosis in the EU/EEA, 2012–2014, by the 20 most frequent serovars in 2014

	Figure abbreviation	Figure name
Humans	2014_SALMHUMTREND	Trend in reported confirmed cases of human non-tuphodial salmonellosis in the EU/EEA, 2008-2014

3.1.2. Salmonella in food, animals and feed

	Table abbreviation	Table name
Food	2014_SALMCOMPLFOOD	Compliance with the food safety *Salmonella* criteria laid down by EU Regulations 2073/2005 and 1441/2007 and 1086/2030, 2014
	2014_SALMBROILMEAT	*Salmonella* in fresh broiler meat at slaughter, processing/cutting level and retail, 2014
	2014_SALMRTEBROIL	*Salmonella* in RTE products from broiler meat, 2014
	2014_SALMTURKMEAT	*Salmonella* in fresh turkey meat at slaughter, processing/cutting level and retail, 2014
	2014_SALMRTETURK	*Salmonella* in RTE products from turkey meat, 2014
	2014_SALMPIGMEAT	*Salmonella* in fresh pig meat, at slaughter, cutting/processing level and retail, 2014
	2014_SALMRTEPIG	*Salmonella* in RTE products from minced meat, meat preparation and meat products from pig meat, 2014

	Table abbreviation	Table name
Food	2014_SALMBOVINEMEAT	*Salmonella* in fresh bovine meat, at slaughter, cutting/processing level and retail, 2014
	2014_SALMRTEBOVINE	*Salmonella* in RTE products minced meat, meat preparations and meat products from bovine animals, 2014
	2014_SALMEGGS	*Salmonella* in table egg samples, 2014
	2014_SALMBIVMOLLUSC	*Salmonella* in live bivalve molluscs, 2014
	2014_SALMFRUIT	*Salmonella* in fruit, 2014
	2014_SALMFRUITVEG	*Salmonella* in fruit and vegetable, 2014
	2014_SALMVEGET	*Salmonella* in vegetables, 2014
	2014_SALMHERBS	*Salmonella* in spices and herbs, 2014
	2014_SALMSPRSEED	*Salmonella* in seeds, sprouted, 2014
	2014_SALMPIGCARCASHACCP	Salmonella in pig carcases, at slaughter, HACCP, 2014
	2014_SALMDRIEDSEED	*Salmonella* in seeds, dried, 2014
Animals	2014_SALMBREEDPROD	*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, 2014
	2014_SALMLAYPROD	*Salmonella* in laying hen flocks of *Gallus gallus* during the production period (flock-based data) in countries running control programmes in accordance with Regulation (EC) No 2160/2003, 2014
	2014_SALMBROIBS	*Salmonella* in broiler flocks of *Gallus gallus* before slaughter (flock-based data) in countries running control programmes, 2014
	2014_SALMBREEDTURK	*Salmonella* in breeding flocks of turkeys (adults, flock-based data) in countries running control programmes, 2014
	2014_SALMFATTURKBS	*Salmonella* in fattening flocks of turkeys before slaughter (flock-based data) in countries running control programmes, 2014
	2014_SALMAPBREEDEGGLINE	*Salmonella* in adult parent breeding flocks for the egg production line during the production period (*Gallus gallus*, flock-based data) in countries running control programmes in accordance with Regulation (EC) No 2160/2003, 2014
	2014_SALMAPBREEDMEAT	*Salmonella* in adult parent breeding flocks in the broiler meat production line (*Gallus gallus*, flock-based data) in countries running control programmes in accordance with Regulation (EC) No 2160/2003, 2014

	Table abbreviation	Table name
Animals	2014_SALMGPBREEDPROD	*Salmonella* in elite and grandparent breeding flocks of *Gallus gallus* during the production period (flock-based data) in countries running control programmes in accordance with Regulation (EC) No 2160/2003, 2014
	2014_SALMDUCKGEESE	*Salmonella* in flocks of ducks and geese (flock-based data), 2014
	2014_SALMPIGSBACT	*Salmonella* in pigs from bacteriological monitoring programmes, 2014
	2014_SALMCATBACT	*Salmonella* in cattle from bacteriological monitoring programmes, 2014
Feed	2014_SALMDERIVEDFEED	*Salmonella* in feedingstuffs, in the EU, 2014
	2014_SALMCOMPFEEDCATTLE	*Salmonella* in compound feedingstuffs for cattle, in the EU, 2014
	2014_SALMCOMPFEEDPIGS	*Salmonella* in compound feedingstuffs for pigs, in the EU, 2014
	2014_SALMCOMPFEEDPOULTRY	*Salmonella* in compound feedingstuffs for poultry, in the EU, 2014
Serovars	2014_SERALLMATRIX	Reported Salmonella serovar isolates, in animal species, food of animal origin and animal feedingstuffs, by matrix, EU, 2014
	2014_SERBROMEAT	Distribution of the ten most common *Salmonella* serovars in broiler meat, 2014
	2014_SERTURKMEAT	Distribution of the ten most common *Salmonella* serovars in turkey meat, 2014
	2014_SERMONTMEATPOU	Distribution of S. Typhimurium-like strains and monophasic S. Typhimurium detected in poultry meat, 2014
	2014_SERPIGMEAT	Distribution of the ten most common *Salmonella* serovars in pig meat, 2014
	2014_SERMONTMEATPIG	Distribution of *S.* Typhimurium-like strains and monophasic S. Typhimurium detected in meat from pigs, 2014
	2014_SERBOVMEAT	Distribution of the ten most common *Salmonella* serovars in bovine meat, 2014
	2014_SERMONTMEATBOV	Distribution of *S.* Typhimurium-like strains and monophasic S. Typhimurium detected in meat from bovine animals, 2014
	2014_SERGAL	Distribution of the ten most common *Salmonella* serovars in *Gallus gallus*, 2014
	2014_SERBRO	Distribution of the ten most common *Salmonella* serovars in broilers, 2014
	2014_SERTURK	Distribution of the ten most common *Salmonella* serovars in turkeys, 2014

	Table abbreviation	Table name
Serovars	2014_SERMONTPOU	Distribution of S. Typhimurium-like strains and monophasic S. Typhimurium detected in poultry flocks, 2014
	2014_SERPIGS	Distribution of the ten most common *Salmonella* serovars in pigs, 2014
	2014_SERMONTPIG	Distribution of *S.* Typhimurium-like strains and monophasic *S.* Typhimurium detected in pigs, 2014
	2014_SERBOV	Distribution of the ten most common *Salmonella* serovars in cattle, 2014
	2014_SERMONTBOV	Distribution of S. Typhimurium-like strains and monophasic S. Typhimurium detected in bovine animals, 2014
	2014_SERGALFEED	Distribution of the ten most common *Salmonella* serovars in compound feed for *Gallus gallus*, 2014
	2014_SERPIGSFEED	Distribution of the ten most common *Salmonella* serovars in compound feed for pigs, 2014
	2014_SERBOVFEED	Distribution of the ten most common *Salmonella* serovars in compound feed for cattle, 2014

	Figure abbreviation	Figure name
Food	2014_SALMCOMPLCRITERIA	Proportion of units not complying with the EU *Salmonella* criteria, 2011-2014
Animals	2014_SALMTRENDPOULTRY	Prevalence of *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and/or *S.* Hadar-positive breeding flocks of *Gallus gallus* during production in the EU, 2007-2014; of *S.* Enteritidis and/or *S.* Typhimurium-positive laying hen flocks, broiler flocks, flocks of breeding and fattening turkeys, during the production period in the EU, 2008-2014
	2014_SALMTARGETBREED	Prevalence of *S.* Enteritidis, *S.* Typhimurium, S. Infantis, S. Virchow and/or S. Hadar-positive breeding flocks of *Gallus gallus* during the production period and target for Member States, Iceland, Norway and Switzerland, 2014
	2014_SALMMAPBREED	Prevalence of the five target serovars (*S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and/or *S.* Hadar)-positive breeding flocks of *Gallus gallus* during the production period, 2014
	2014_SALMTARGETLAY	Prevalence of *S.* Enteritidis and/or *S.* Typhimurium-positive laying hen flocks of *Gallus gallus* during the production period and targets for Member States, Norway and Switzerland, 2014
Animals	2014_SALMMAPLAY	Prevalence of the two target serovars (*S.* Enteritidis and/or *S.* Typhimurium)-positive laying hen flocks of *Gallus gallus* during the production period, 2014

	Figure abbreviation	Figure name
Animals	2014_SALMTARGETBROIBS	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, 2014
	2014_SALMMAPBROIBS	Prevalence of the two target serovars (*S.* Enteritidis and/or *S.* Typhimurium)-positive broiler flocks of *Gallus gallus* before slaughter, 2014
	2014_SALMTARGETBREEDTURK	Prevalence of *S.* Enteritidis and/or *S.* Typhimurium-positive breeding flocks of turkeys during the production period and target for Member States, Iceland, Norway and Switzerland, 2014
	2014_SALMMAPBREEDTURK	Prevalence of the two target serovars (*S.* Enteritidis and/or *S.* Typhimurium)-positive breeding flocks of turkeys during the production period, 2014
	2014_SALMTARGETFATTURKBS	Prevalence of *S.* Enteritidis and/or *S.* Typhimurium-positive fattening flocks of turkeys and target for Member States, Iceland, Norway and Switzerland, 2014
	2014_SALMMAPFATTURKBS	Prevalence of the two target serovars (*S.* Enteritidis and/or *S.* Typhimurium)-positive fattening flocks of turkeys, 2014
Serovars	2014_SERSIMAPBROMEAT	Distribution of *S.* Infantis reported from broiler meat, 2014
	2014_SERBROMEATTREND	Trends in commonly reported *Salmonella* serovars from broiler meat, 2010-2014
	2014_SERSIMAPGAL	Distribution of *S.* Infantis reported from *Gallus gallus*, 2014
	2014_SERSKMAPGAL	Distribution of *S.* Kentucky reported from *Gallus gallus, 2014*
	2014_SERTRENDGAL	Trends in commonly reported Salmonella serovars from *Gallus gallus*, 2010-2014
	2014_SERTURKTREND	Trends in commonly reported *Salmonella* serovars from turkeys, 2010-2014
	2014_SERDIAGRALLMATRIX	Sankey diagram of reported *Salmonella* serovar isolates, in animal species, food of animal origin and animal feedingstuffs, by matrix, 2014

3.2. Campylobacter

Table abbreviation	Table name
2014_CAMPOVERVIEW	Overview of countries reporting data for *Campylobacter*, 2014

3.2.1. Campylobacteriosis in humans

	Table abbreviation	Table name
Humans	2014_CAMPHUMRATES	Reported cases and notifciation rates of human campylobacteriosis in the EU/ EEA, 2010–2014

	Figure abbreviation	Figure name
Humans	2014_CAMPHUMTREND	Trend in reported confirmed cases of human campylobacteriosis in the EU/EEA, 2008-2014

3.2.2. Campylobacter in food and animals

	Table abbreviation	Table name
Food	2014_CAMPBOVMEAT	*Campylobacter* in fresh bovine meat, 2014
	2014_CAMPBOVPROD	*Campylobacter* in ready-to-eat bovine meat products, 2014
	2014_CAMPBROILMEAT	*Campylobacter* in fresh broiler meat, 2014
	2014_CAMPBROILPROD	*Campylobacter* in ready-to-eat broiler meat products, 2014
	2014_CAMPCHEESE	*Campylobacter* in cheeses, 2014
	2014_CAMPMILK	*Campylobacter* in milk, 2014
	2014_CAMPOTHERPOULMEAT	*Campylobacter* in fresh other poultry meat, 2014
	2014_CAMPPIGMEAT	*Campylobacter* in fresh pig meat, 2014
	2014_CAMPPIGPROD	*Campylobacter* in ready-to-eat pig meat products, 2014
	2014_CAMPTURKMEAT	*Campylobacter* in fresh turkey meat, 2014
	2014_CAMPTURKPROD	*Campylobacter* in ready-to-eat turkey meat products
	2014_CAMPUNSPPROD	*Campylobacter* in ready-to-eat unspecified meat products, 2014
Animals	2014_CAMPBROILERS	*Campylobacter* in broilers, 2014
	2014_CAMPCATDOG	*Campylobacter* in cats and dogs, 2014
	2014_CAMPCATTLE	*Campylobacter* in cattle, 2014
	2014_CAMPOTHERAN	*Campylobacter* in other animals, 2014
	2014_CAMPPIGS	*Campylobacter* in pigs, 2014
	2014_CAMPTURKEYS	*Campylobacter* in turkeys, 2014

	Figure abbreviation	Figure name
Animals	2014_CAMPPROPBROILMEAT	Proportion of positive Campylobacter samples in broiler meat by sampling stage in Member States and non-Member States, 2008-2014

3.3. Listeria

Table abbreviation	Table name
2014_LISTERIAOVERVIEW	Overview of countries reporting data for *Listeria*, 2014.

3.3.1. Listeriosis in humans

	Table abbreviation	Table name
Humans	2014_LISTHUMRATES	Reported cases and notification rates per 100,000 of human listeriosis in 2009-2014

	Figure abbreviation	Figure name
Humans	2014_LISTHUMTREND	Trend in reported confirmed cases of human listeriosis in the EU/EEA, 2009-2014

3.3.2. Listeria in food and animals

	Table abbreviation	Table name
Food	2014_LISTERIABAKERY	*L. monocytogenes* in RTE bakery products, 2014

	Table abbreviation	Table name
Food	2014_LISTERIACOMPL	Compliance with the *L. monocytogenes* criteria laid down by Regulation (EC) No 2073/2005 in food categories in the EU, 2014
	2014_LISTERIACONF	*L monocytogenes* in RTE confectionary products and pastes, 2013
	2014_LISTERIAEGGPR	*L. monocytogenes* in RTE egg products, 2014
	2014_LISTERIAFISHPR	*L. monocytogenes* in RTE fishery products, 2014
	2014_LISTERIAFISH	*L. monocytogenes* in fish, 2014
	2014_LISTERIAFRUITVEG	*L. monocytogenes* in RTE fruit and vegetables, 2014
	2014_LISTERIAHCCOWPM	*L. monocytogenes* in hard cheeses made from pasteurised milk from cows, 2014
	2014_LISTERIAHCCOWRM	*L. monocytogenes* in hard cheeses made from raw or low heat treated milk from cows, 2014
	2014_LISTERIAHCGOATPM	*L. monocytogenes* in hard cheeses made from pasteurised milk from goats, 2014
	2014_LISTERIAHCGOATRM	*L. monocytogenes* in hard cheeses made from raw or low heat treated milk from goats, 2014
	2014_LISTERIAHCMIXEDPM	*L. monocytogenes* in hard cheeses made from pasteurised milk from mixed, unspecified or other animal milk, 2014
	2014_LISTERIAHCMIXEDRM	*L. monocytogenes* in hard cheeses made from raw or low heat-treated milk from mixed, unspecified or other animal milk, 2014
	2014_LISTERIAHCSHEEPPM	*L. monocytogenes* in hard cheeses made from pasteurised milk from sheep, 2014
	2014_LISTERIAHCSHEEPRM	*L. monocytogenes* in hard cheeses made from raw or low heat treated milk from sheep, 2014
	2014_LISTERIAMILK	*L. monocytogenes* in RTE milk, 2014
	2014_LISTERIAPREPDISH	*L. monocytogenes* in RTE other processed food products and prepared dishes, 2014
	2014_LISTERIARTEBOVINE	*L. monocytogenes* in RTE meat products from bovine animals, 2014
	2014_LISTERIARTEBROIL	*L. monocytogenes* in RTE meat products from broilers, 2014
	2014_LISTERIARTEPIG	*L. monocytogenes* in RTE meat products from pig, 2014
	2014_LISTERIARTETURK	*L. monocytogenes* in RTE meat products from turkey, 2014
	2014_LISTERIASALAD	*L. monocytogenes* in RTE salads, 2014
	2014_LISTERIASCCOWPM	*L. monocytogenes* in soft and semisoft cheeses made from pasteurised milk from cows, 2014
	2014_LISTERIASCCOWRM	*L. monocytogenes* in soft and semisoft cheeses made from raw or low heat treated milk from cows, 2014
	2014_LISTERIASCGOATPM	*L. monocytogenes* in soft and semisoft cheeses made from pasteurised milk from goats, 2014
	2014_LISTERIASCGOATRM	*L. monocytogenes* in soft and semisoft cheeses made from raw or low heat treated milk from goats, 2014
	2014_LISTERIASCSHEEPRM	*L. monocytogenes* in soft and semisoft cheeses made from raw or low heat-treated milk from sheep, 2014
	2014_LISTERIASCMIXEDPM	*L. monocytogenes* in soft and semisoft cheeses made from pasteurised milk from mixed, unspecified or other animal milk, 2014
	2014_LISTERIASCMIXEDRM	*L. monocytogenes* in soft and semisoft cheeses made from raw or low heat-treated milk from mixed, unspecified or other animal milk, 2014

	Table abbreviation	Table name
Food	2014_LISTERIASCSHEEPPM	*L. monocytogenes* in soft and semisoft cheeses made from pasteurised milk from sheep, 2014
	2014_LISTERIASAUCE	*L. monocytogenes* in sauce and dressings RTE, 2014
	2014_LISTERIASPICES	*L. monocytogenes* in RTE spices and herbs, 2014
Animals	2014_LISTERIAANIMALS	*Listeria monocytogenes* and other species in animals, 2014

	Figure abbreviation	Figure name
Food	2014_LISTERIACOMPLFIG	Proportion of single samples at processing and retail in non-compliance with EU *L. monocytogenes* criteria, 2011-2014
	2014_LISTERIAMEAT	Proportion of *L. monocytogenes*-positive units in ready-to-eat meat categories in the EU, 2014
	2014_LISTERIACHEESE	Proportion of *L. monocytogenes*-positive units in soft and semi-soft cheeses, and hard cheeses made from raw or low heat-treated milk and pasturised milk, 2014
	2014_LISTERIAFISHFIG	Proportion of *L. monocytogenes*-positive units in ready-to-eat fishery products categories in EU, 2014

3.4. Verocytotoxigenic *Escherichia coli*

Table abbreviation	Table name
2014_VTECOVERVIEW	Overview of countries reporting data for VTEC, 2014

3.4.1. VTEC in humans

	Table abbreviation	Table name
Humans	2014_VTECHUMRATES	Reported cases and notification rates of human VTEC infections in the EU, 2009–2014
	2014_VTECHUMSEROGROUP	Distribution of reported confirmed cases of human VTEC infections in the EU/EEA, 2011–2013, by the 20 most frequent serogroups in 2014

	Figure abbreviation	Figure name
Humans	2014_VTECHUMTREND	Trend in reported confirmed cases of human VTEC infections in the EU/EEA, 2009-2014

3.4.2. VTEC in food and animals

	Table abbreviation	Table name
Food and Animals	2014_VTECANMETH	Proportion of food and animal samples tested for the presence of VTEC with the different analytical methods in Member States and non-Member States, 2014
Food	2014_VTECBOVINEMEAT	VTEC in fresh bovine meat, 2014
	2014_VTECBROIMEAT	VTEC in fresh broiler meat, 2014
	2014_VTECDAIRY	VTEC in milk and dairy products, excluding raw milk, 2014
	2014_VTECFRUITS	VTEC in fruits, 2014
	2014_VTECGOATMEAT	VTEC in fresh goat meat, 2014
	2014_VTECOTHERFOOD	VTEC in other food, 2014
	2014_VTECOTHERMEAT	VTEC in fresh meat from other animal species, 2014
	2014_VTECOVINEMEAT	VTEC in fresh ovine meat, 2014
	2014_VTECPIGSMEAT	VTEC in fresh pigs meat, 2014

	Table abbreviation	Table name
Food	2014_VTECRAWCOWMILK	VTEC in raw cows' milk, 2014
	2014_VTECRAWGOATSMILK	VTEC in raw goats' milk, 2014
	2014_VTECRAWSHEEPMILK	VTEC in raw sheep' milk, 2014
	2014_VTECSEED	VTEC in sprouted seed, 2014
	2014_VTECTURKMEAT	VTEC in fresh turkey meat, 2014
	2014_VTECVEGETABLE	VTEC in vegetables, 2014
	2014_VTECTOP5GROUPFOOD	Proportion of positive samples for any VTEC and VTEC belonging to the "top-5" serogroups in food categories in Member States and non-Member States, 2014
	2014_VTECNONO157FOOD	Frequency distribution of non-O157 VTEC serogroups in food categories in Member States, 2014.
	2014_VTECGROUPTRENDFOOD	Proportion of food samples positive for the most frequent VTEC serogroups (per 1,000), reported by Member States and non-Member States between 2011 and 2014.
	2014_VTECFOODCOUNTRY	Frequency distribution of samples tested for VTEC (sampling fraction) by reporting Member States and non-Member States and by food/animal category, 2014
	2014_VTECMETHCOUNTRYFOODTREND	Proportion of Member States and non-Member States using the different analytical methods for testing food samples for VTEC, between 2011 and 2014.
	2014_VTECMETHFOODTREND	Proportion of food samples tested for VTEC by Member States and non-Member States between 2011 and 2014, by using the different analytical method.
	2014_VTECMETHANYO157FOODTREND	Proportion of food samples tested for VTEC by Member States and non-Member States between 2011 and 2014, by using analytical methods specifically aimed at detecting VTEC O157 or any VTEC, regardless the serotype
Animals	2014_VTECCATTLE	VTEC in cattle, 2014
	2014_VTECOTHERANIMAL	VTEC in other animals, 2014
	2014_VTECOVINEGOAT	VTEC in sheep and goats, 2014
	2014_VTECPIGS	VTEC in pigs, 2014
	2014_VTECGROUPTRENDANIM	Proportion of animal samples positive for the most frequent VTEC serogroups (per 1,000), reported by Member States between 2011 and 2014
	2014_VTECNONO157ANIM	Frequency distribution of non-O157 VTEC serogroups in animals in Member States, 2014

	Figure abbreviation	Figure name
Food	2014_VTECPROPORTIONFOOD	Proportion of VTEC positive samples in food categories in the reporting Member States, 2012-2014
	2014_VTECGROUPTRENDFOODFIG	Proportion of food samples positive for the most frequent VTEC serogroups (per 1,000 samples tested), reported by Member States and non-Member States between 2011 and 2014
Animals	2014_VTECPROPORTIONANIM	Proportion of VTEC positive samples in animals in the reporting Member States, 2012-2014

	Figure abbreviation	Figure name
Animals	2014_VTECGROUPTRENDANIMFIG	Proportion of animal samples positive for the most frequent VTEC serogroups (per 1,000 samples tested), reported by Member States and non-Member States between 2011 and 2014
Food and animals	2014_VTECATLASFOODANIM	Presence and absence of VTEC serogroups in foods and animals, sampled in the EU in 2014
	2014_VTECATLASGROUPCOUNTRY	Presence and absence of VTEC serogroups in animals and food sampled in 21 Member States and Switzerland in 2014, by reporting country
	2014_VTECGROUPATLASTREND	Trends in the presence of the different VTEC serogroups in food and animals reported in the EU between 2011 and 2014.

3.5. Yersinia

Table abbreviation	Table name
2014_YERSOVERVIEW	Overview of countries reporting *Yersinia* data, 2014

3.5.1. Yersinia in humans

	Table abbreviation	Table name
Humans	2014_YERSHUMRATES	Reported cases and notification rates per 100,000 of human yersiniosis in the EU, 2010-2014

	Figure abbreviation	Figure name
Humans	2014_YERSHUMTREND	Trend in reported confirmed cases of human yersiniosis in the EU/EEA, 2008-2014

3.5.2. Yersinia in food and animals

	Table abbreviation	Table name
Food	2014_YERSPIGMEAT	*Yersinia* in pig meat and products thereof, 2014
	2014_YERSBOVINEMEAT	*Yersinia* in bovine meat and products thereof, 2014
	2014_YERSOVINEMEAT	*Yersinia* in ovine meat and products thereof, 2014
	2014_YERSMILKDAIRY	*Yersinia* in milk and dairy products, 2014
Animals	2014_YERSPIGS	*Yersinia* in pigs, 2014
	2014_YERSDOMAN	*Yersinia* in domestic livestock other than pigs, 2014
	2014_YERSOTHERAN	*Yersinia* in other animal species, 2014

	Figure abbreviation	Figure name
Animals	2014_YERSANIMPROPORTION	Proportion of *Yersinia*-positive samples in animal in Member States and non-Member States, 2012-2014
	2014_YERSFOODPROPORTION	Proportion of *Yersinia*-positive samples in food in Member States and non-Member States, 2012-2014

3.6. Tuberculosis due to *Mycobacterium bovis*

Table abbreviation	Table name
2014_TUBOVERVIEW	Overview of countries reporting data for tuberculosis due to *M. bovis* for humans and for animals, 2014

3.6.1. M. bovis in humans

	Table abbreviation	Table name
Humans	2014_MBOVHUMRATES	Reported cases and notification rates per 100,000 of human tuberculosis due to *M. bovis* in 2010-2014

3.6.2. Tuberculosis due to M. bovis in cattle

	Table abbreviation	Table name
Animals	2014_DSTUBCOF	*M. bovis* in cattle herds in co-financed non-OTF Member States, 2014
	2014_DSTUBNONCOF	*M. bovis* in cattle herds in non-co-financed non-OTF Member States, 2014
	2014_TUBALL	Complementary reporting on *M. bovis* and on Mycobacteria other than *M. bovis*, 2014

	Figure abbreviation	Figure name
Animals	2014_DSTUBPROPINF	Proportion of existing cattle herds infected with or positive for *M. bovis*, 2009-2014
	2014_DSTUBMAP	Status of countries regarding bovine tuberculosis, 2014
	2014_DSTUBPROPMAP	Proportion of existing cattle herds infected with or positive for *M. bovis*, 2014

3.7. Brucella

Table abbreviation	Table name
2014_BRUCOVERVIEW	Overview of countries reporting data for *Brucella*, 2014

3.7.1. Brucellosis in humans

	Table abbreviation	Table name
Humans	2014_BRUCHUMRATES	Reported cases and notification rates per 100,000 of human brucellosis in the EU/ EEA, 2010-2014

	Figure abbreviation	Figure name
Humans	2014_BRUCHUMTREND	Trend in reported confirmed cases of human brucellosis in the EU, 2008-2014

3.7.2. Brucella in food and animals

	Table abbreviation	Table name
Food	2014_BRUCFOOD	*Brucella* in food, 2014
Animals	2014_DSBRUCOFCAT	*Brucella* in cattle herds in co-financed non-OBF Member States, 2014
	2014_DSBRUCOFOV	*Brucella* in sheep and goat herds in co-financed non-ObmF Member States, 2014
	2014_BRUCOTHERAN	*Brucella* in species other than cattle, sheep and goat, 2014

	Figure abbreviation	Figure name
Animals	2014_DSBRUCCATMAP	Status of countries regarding bovine brucellosis, 2014
	2014_DSBRUCCATPROPMAP	Proportion of existing cattle herds infected with or positive for *Brucella*, country-based data, 2014.
	2014_DSBRUCOVCAPMAP	Status of countries regarding ovine and caprine brucellosis, 2014
	2014_DSBRUCOVCAPPROPMAP	Proportion of existing sheep and goats herds infected with or positive for *Brucella*, country-based data, 2014
	2014_DSBRUCPROPINF	Proportion of existing cattle, sheep and goat herds infected with or positive for *Brucella*, 2005-2014

3.8. Trichinella

Table abbreviation	Table name
2014_TRICHOVERVIEW	Overview of countries reporting data on *Trichinella spp.*, 2014

3.8.1. Trichinellosis in humans

	Table abbreviation	Table name
Humans	2014_TRICHUMRATES	Reported cases and notification rates per 100,000 of human trichinellosis in 2010-2014

	Figure abbreviation	Figure name
Humans	2014_TRICHUMTREND	Trend in reported confirmed cases of human trichinellosis in the EU/EEA, 2008-2014

3.8.2. Trichinella in animals

	Table abbreviation	Table name
Animals	2014_TRICHPIGSNOT	Findings of *Trichinella* in pigs not raised under controlled housing conditions, 2014
	2014_TRICHPIGS	Findings of *Trichinella* in pigs other than not raised under controlled housing conditions, 2014
	2014_TRICHHORSE	Findings of *Trichinella* in domestic solipeds, 2014
	2014_TRICHFARMEDWILDBOAR	Findings of *Trichinella* in farmed wild boar, 2014
	2014_TRICHWILDWILDBOAR	Findings of *Trichinella* in hunted wild boar, 2014
	2014_TRICHFOX	Findings of *Trichinella* in foxes, 2014
	2014_TRICHBEARS	Findings of *Trichinella* in bears, 2014
	2014_TRICHRACCOON	Findings of *Trichinella* in raccoon dogs, 2014
	2014_TRICHOTHERWILD	Findings of *Trichinella* in other wildlife, 2014

	Figure abbreviation	Figure name
Animals	2014_TRICHMAPPIGSNOT	Findings of *Trichinella* in pigs not raised under controlled housing conditions, 2014
	2014_TRICHMAPWILDWILDBOAR	Findings of *Trichinella* in hunted wild boar, 2014.
	2014_TRICHMAPOTHERWILD	Findings of *Trichinella* in wildlife (including hunted wild boar), 2014
	2014_TRICHPROPORTION	Proportion of *Trichinella*-positive samples in animals in Member States and non-Member States, 2005-2014

3.9. Echinococcus

Table abbreviation	Table name
2014_ECHINOOVERVIEW	Overview of countries reporting data on *Echinococcus* spp., 2014

3.9.1. Echinococcus in humans

	Table abbreviation	Table name
Humans	2014_ECHINOHUMRATES	Reported cases and notification rates per 100,000 of human echinococcosis in the EU/ EEA, 2010-2014

	Figure abbreviation	Figure name
Humans	2014_ECHINOHUMTREND	Reported confirmed cases by species in selected MS, 2008-2014

3.9.2. Echinococcus in animals

	Table abbreviation	Table name
Animals	2014_ECHINOFOX	*Echinococcus* findings in foxes, 2014
	2014_ECHINOOTHER	Other *Echinococcus* findings in animals, 2014

	Figure abbreviation	Figure name
Animals	2014_ECHINOFOXMAP	Findings of *E. multilocularis* in foxes, 2014

3.10. Toxoplasma

Table abbreviation	Table name
2014_TOXOOVERVIEW	Overview of countries reporting data for *Toxoplasma*, 2014

3.10.1. Toxoplasma in animals

	Table abbreviation	Table name
Animals	2014_TOXOPIGS	*Toxoplasma* in pigs, 2014
	2014_TOXOCATTLE	*Toxoplasma* in cattle, 2014
	2014_TOXOOVINEGOAT	*Toxoplasma* in sheep and goats, 2014
	2014_TOXOCATDOG	*Toxoplasma* in cats and dogs, 2014
	2014_TOXOOTHERAN	*Toxoplasma* in other animal species, 2014

3.11. Rabies

Table abbreviation	Table name
2014_RABIESOVERVIEW	Overview of countries reporting data for Rabies, 2014

3.11.1. Rabies in humans

	Table abbreviation	Table name
Humans	2014_RABHUMCASES	Human rabies cases in the EU/EEA, 2009-2014

3.11.2. Rabies in animals

	Table abbreviation	Table name
Animals	2014_RABIESFARMED	Rabies in farmed animal, 2014
	2014_RABIESCAT	Rabies in cats, 2014
	2014_RABIESDOG	Rabies in dogs, 2014

Animals	2014_RABIESBATS	Rabies in bats, 2014
	2014_RABIESRACCOON	Rabies in raccoon dogs, 2014
	2014_RABIESFOX	Rabies in foxes, 2014
	2014_RABIESWILD	Rabies in wildlife other than bats, foxes and raccoon dogs, 2014

	Figure abbreviation	Figure name
Animals	2014_RABIESANIMEXCLBATS	Reported cases of classical rabies or unspecified lyssavirus in animals other than bats, in the Member States and non-Member States, 2006-2014
	2014_RABIESMAPBAT	European Bat lyssavirus (EBLV) or unspecified lyssavirus cases in bats.
	2014_RABIESMAPFOX	European Bat lyssavirus (EBLV) or unspecified lyssavirus cases in foxes.
	2014_RABIESMAPWILD	European Bat lyssavirus (EBLV) or unspecified lyssavirus cases in wild animals.

3.12. Q fever

Table abbreviation	Table name
2014_COXOVERVIEW	Overview of countries reporting data for Q fever, 2014

3.12.1. Q fever in humans

	Table abbreviation	Table name
Humans	2014_COXHUMRATES	Reported cases and notifcation rates per 100,000 of human Q fever in the Eu/ EEA, 2009-2014

	Figure abbreviation	Figure name
Humans	2014_COXHUMTREND	Trend in reported confirmed cases of human Q fever in the EU/EEA, 2009-2014

3.12.2. Coxiella burnetii in animals

	Table abbreviation	Table name
Animals	2014_COXCATTLE	Q fever in cattle, 2014
	2014_COXOVINEGOAT	Q fever in sheep and goats, 2014
	2014_COXOTHERAN	Q fever in other animals species, 2014

3.13. West Nile Virus

Table abbreviation	Table name
2014_WNVOVERVIEW	Overview of countries reporting data for West Nile Virus, 2014

3.13.1. West Nile Virus in humans

	Table abbreviation	Table name
Humans	2014_WNFHUMRATES	Reported cases and notification rates per 100,000 of human West Nile fever in 2010-2014
	2014_WNFHUMIMPORT	Proportion of West Nile fever cases associated with travel, domestic cases and cases with unknown travel information by country in 2014

	Figure abbreviation	Figure abbreviation
Humans	2014_WNFHUMTREND	Trend in reported cases of human West Nile fever in the EU, 2010-2014

3.13.2. West Nile Virus in animals

	Table abbreviation	Table name
Animals	2014_WNVSOLIP	West Nile Virus in solipeds, 2014
	2014_WNVBIRDS	West Nile Virus in birds, 2014
	2014_WNVOTHERAN	West Nile Virus in other animal species, 2014

	Figure abbreviation	Figure abbreviation
Animals	2014_WNVBIRDSMAP	Findings of West Nile Virus in birds in the EU, 2014.
	2014_WNVSOLIPMAP	Findings of West Nile Virus in solipeds in the EU, 2014.

3.14. Tularaemia

Table abbreviation	Table name
2014_FRANCISELLAOVERVIEW	Overview of countries reporting data for Francisella, 2014

3.14.1. Tularaemia in humans

	Table abbreviation	Table name
Humans	2014_TULARHUMRATES	Reported cases and notifciation rates per 100,000 of human tularaemia in the Eu/ EEA, 2010-2014

	Figure abbreviation	Figure name
Humans	2014_TULARHUMTREND	Trend in reported confirmed cases of human tularaemia in the EU/EEA, 2008-2014

3.14.2. F. tularensis in animals

	Table abbreviation	Table name
Animals	2014_FRANCISELLAANI	Francisella tularensis in animals, 2014

3.16. Food-borne outbreaks

3.16.1. General overview

Table abbreviation	Table name
2014_FBOOVERVIEW	Overview of countries reporting data on food-borne outbreaks, 2013
2014_FBOEVID	Evidence in strong-evidence food-borne outbreaks (including strong-evidence water-borne outbreaks) in the EU, 2013

Table abbreviation	Table name
2014_NOFBOSTR	Number of outbreaks and human cases per causative agents in food-borne outbreaks in the EU (including strong-evidence water-borne outbreaks), 2013
2014_NOOUTHUM	Number of all food-borne outbreaks and human cases in the EU, 2014

Figure abbreviation	Figure name
2014_FBOCOUNTRYRATE	Reporting rate per 100,000 population in Member States and non-Member States, 2014
2014_FBOCOUNTRYNUMOUT	Distribution of food-borne outbreaks in Member States and non-Member States, 2014
2014_FBOAGENTNUMOUT	Distribution of all food-borne outbreaks per causative agent in the EU, 2014
2014_FBOAGENTTREND	Total number of food-borne outbreaks in the EU, 2008-2014
2014_FBODISTRIBFOODVEHIC	Distribution of strong-evidence outbreaks by food vehicle in the EU, 2014
2014_FBODISTRIBSETTING	Distribution of strong-evidence outbreaks by settings in the EU, 2014

3.16.2. Agent specific outbreaks

Table abbreviation	Table name
2014_FBOSALM	Strong- and weak-evidence food-borne outbreaks caused by *Salmonella* (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOCAMP	Strong- and weak-evidence food-borne outbreaks caused by *Campylobacter* (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOECOLI	Strong- and weak-evidence food-borne outbreaks caused by pathogenic *E. coli* (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOSTRVIRUS	Strong-evidence food-borne outbreaks caused by viruses (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOBACIL	Strong- and weak-evidence food-borne outbreaks caused by *Bacillus* toxins (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOCLOSTOX	Strong- and weak-evidence food-borne outbreaks caused by *Clostridium* toxins (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOBOT	Strong-evidence food-borne outbreaks caused by Clostridium botulinum toxins (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOSTAPH	Strong- and weak-evidence food-borne outbreaks caused by staphylococcal (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOVIRUS	Strong- and weak-evidence food-borne outbreaks caused by viruses (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOOTHER	Strong- and weak-evidence food-borne outbreaks caused by other causative agents (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOSTROTHER	Strong-evidence food-borne outbreaks caused by other causative agents (excluding strong-evidence water-borne outbreaks), 2014

Figure abbreviation	Figure name
2014_FBOSALMVEHIC	Distribution of food vehicles in strong-evidence outbreaks caused by *Salmonella* in the EU, 2014
2014_FBOSALMENTVEHIC	Distribution of food vehicles in strong-evidence outbreaks caused by *S.* Enteritidis in the EU, 2014
2014_FBOSALMTYPVEHIC	Distribution of food vehicles in strong-evidence outbreaks caused by *S.* Typhimurium in the EU, 2014
2014_FBOCAMPVEHIC	Distribution of food vehicles in strong-evidence outbreaks caused by *Campylobacter* (excluding strong-evidence water-borne outbreaks), 2014
2014_FBONOROVIRUSVEHIC	Distribution food vehicles in strong-evidence outbreaks caused by norovirus (excluding strong evidence waterborne outbreaks) in the EU, 2014
2014_FBOBACILLUSVEHIC	Distribution of food vehicles in strong-evidence outbreaks caused by *Bacillus* toxins in the EU, 2014
2014_FBOCLOSTRIDIUMVEHIC	Distribution of food vehicles in strong-evidence outbreaks caused by *Clostridium* toxins (excluding strong-evidence water-borne outbreaks), 2014
2014_FBOSTAPHYLVEHIC	Distribution of food vehicles in strong-evidence outbreaks caused by staphylococcal toxins in the EU (excluding strong-evidence water-borne outbreaks), 2014

3.16.3. Water-borne outbreaks

Table abbreviation	Table name
2014_FBOWATER	List of reported strong evidence water-borne outbreaks in 2013