Technical University of Denmark

European Food Safety Authority, European Centre for Disease Prevention and Control; The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2009

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SCIENTIFIC REPORT OF EFSA AND ECDC

The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2009[1]

European Food Safety Authority[2, 3]

European Centre for Disease Prevention and Control[2, 3]

ABSTRACT

The European Food Safety Authority and the European Centre for Disease Prevention and Control have analysed the information on the occurrence of zoonoses and food-borne outbreaks in 2009 submitted by 27 European Union Member States. In 2009, 108,614 salmonellosis cases in humans were reported and the statistically significant decreasing trend in the case numbers continued. Eighteen Member States reached the European Union *Salmonella* reduction target for breeding flocks of fowl, 17 Member States met their reduction target for laying hens and 18 Member States met the reduction target for broilers. In foodstuffs, *Salmonella* was most often detected in fresh poultry and pig meat. Campylobacteriosis was the most commonly reported zoonosis with 198,252 human cases. *Campylobacter* was most often detected in fresh broiler meat. The number of listeriosis cases in humans increased by 19.1 % compared to 2008, with 1,645 cases in 2009. *Listeria* was seldom detected above the legal safety limit from ready-to-eat foods. Member States reported 3,573 verotoxigenic *Escherichia coli* (VTEC), 7,595 yersiniosis and 401 brucellosis cases in humans, while VTEC bacteria were mostly found from cattle and bovine meat and *Yersinia* from pigs and pig meat. Brucellosis and tuberculosis decreased in cattle, sheep and goat populations. In humans 1,987 Q fever cases were detected and Q fever was found in domestic ruminants. Trichinellosis and echinococcosis caused 748 and 790 human cases, respectively, and *Trichinella* and *Echinococcus* were mainly detected in wildlife. There were 1,259 human cases of toxoplasmosis reported and in animals *Toxoplasma* was most often found in sheep and goats. Rabies was recorded in one person in the European Union and the disease was also found in animals. Most of the 5,550 reported food-borne outbreaks were caused by *Salmonella*, viruses and bacterial toxins and the most important food sources were eggs, mixed or buffet meals and pig meat.

KEY WORDS

Zoonoses, surveillance, monitoring, *Salmonella*, *Campylobacter*, parasites, food-borne outbreaks, food-borne diseases, rabies, Q fever, *Listeria*

1 On request of EFSA, Question No EFSA-Q-2010-00766, issued on 23 February 2011.

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3 Acknowledgement: EFSA and ECDC wish to thank the members of the Task Force on Zoonoses Data Collection and the Food and Waterborne Disease Network who provided the data and reviewed the report. Also the contributions of EFSA's staff members: Pia Makela, Valentina Rizzi, Frank Boelaert, Pierre-Alexandre Beloeil, Giusi Amore, Francesca Riolo, Kenneth Mulligan and Fabrizio Abbinante; the contributions of ECDC's staff members: Johanna Takkinen, Angela Lahuerta-Marin and Therese Westrell and the contributions of EFSA's contractors: the Technical University of Denmark and their staff members Birgitte Borck and Helle Korsgaard as well as that of the peer-reviewer Harry Bailie for the support provided to this scientific output are gratefully acknowledged.

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THE EUROPEAN UNION SUMMARY REPORT

Trends and Sources of Zoonoses and Zoonotic Agents and Food-borne Outbreaks in 2009

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About EFSA

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

About ECDC

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

About the report

EFSA is responsible for examining the data on zoonoses, antimicrobial resistance and food-borne outbreaks submitted by Member States in accordance with Directive 2003/99/EC[6] and for preparing the EU Summary Report from the results. Data from 2009, in this EU Summary Report, were produced in collaboration with ECDC who provided the information on and analyses of zoonoses cases in humans. The Zoonoses Collaboration Centre (ZCC - contracted by EFSA) in the National Food Institute, the Technical University of Denmark assisted EFSA and ECDC in this task.

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

5 Regulation (EC) No 851/2004 of the European Parliament and of the Council of 21 April 2004 establishing a European Centre for disease prevention and control. OJ L 142, 30.4.2004, p. 1–11.

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

Summary

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

In 2009, 27 Member States and four other European countries submitted information on the occurrence of zoonoses, zoonotic agents and food-borne outbreaks to the European Commission, the European Food Safety Authority and the European Centre for Disease Prevention and Control. Assisted by the Zoonoses Collaboration Centre in Denmark, the European Food Safety Authority and the European Centre for Disease Prevention and Control analysed the data, the results of which are published in this annual European Union Summary Report, covering 14 diseases.

A total of 5,550 food-borne outbreaks were reported in the European Union, causing 48,964 human cases, 4,356 hospitalisations and 46 deaths. Most of the reported outbreaks were caused by *Salmonella*, viruses and bacterial toxins. The most important food sources were once again eggs and egg products, mixed or buffet meals and pig meat and products thereof. In addition, 15 waterborne outbreaks were reported in 2009 related to the contamination of private or public water sources.

The number of salmonellosis cases in humans decreased by 17.4 %, compared to 2008, and the statistically significant decreasing trend in the European Union continued for the fifth consecutive year. In total 108,614 confirmed human cases were reported in 2009 and in particular, human cases caused by *S*. Enteritidis decreased markedly. The case fatality rate was 0.08 %. It is assumed that the observed reduction of salmonellosis cases is mainly attributed to successful implementation of national *Salmonella* control programmes in fowl populations; but also other control measures along the food chain may have contributed to the reduction.

Together 18 Member States reached the European Union *Salmonella* reduction target for breeding flocks of *Gallus gallus* in 2009, and 17 Member States met their 2009 reduction target for flocks of laying hens, i.e. four Member States less than in 2008. However, 18 Member States already met the new *Salmonella* reduction target set for broiler flocks, which is to achieved by 2011. In the other farm animal species and food, no major changes in the occurrence of *Salmonella* were observed.

In foodstuffs, *Salmonella* was most often detected in fresh broiler, turkey and pig meat, on average at levels of 5.4 %, 8.7 % and 0.7 %, respectively. *Salmonella* was rarely detected in other foodstuffs, such as dairy products, fruit and vegetables. Products non-compliant with European Union *Salmonella* criteria were mainly observed in minced meat and meat preparations as well as in live molluscs.

The notification rate of campylobacteriosis in the European Union increased slightly in 2009 compared to 2008, and campylobacteriosis continued to be the most commonly reported zoonosis in the European Union with 198,252 confirmed human cases. The case fatality rate was 0.02 %, which is lower than for salmonellosis. In foodstuffs, the highest proportion of *Campylobacter*-positive samples was once again reported for fresh broiler meat where, on average, 31 % of samples were positive. *Campylobacter* was also commonly detected from live poultry, pigs and cattle.

The number of listeriosis cases in humans increased by 19.1 % compared to 2008, with 1,645 confirmed cases recorded in 2009. A high case fatality ratio of 16.6 % was reported among cases. *Listeria monocytogenes* was seldom detected above the legal safety limit from ready-to-eat foods and findings over this limit were most often reported from fishery products, cheeses, and meat products at levels of 0.3 %-1.1 % in the European Union.

Based on the reported fatality rates and the total numbers of reported confirmed cases, it is estimated that in 2009 there were approximately 270 human deaths due to listeriosis, 90 deaths due to salmonellosis and 40 deaths due to campylobacteriosis in the European Union.

A total of 3,573 confirmed verotoxigenic *Escherichia coli* (VTEC) infections and 7,595 confirmed yersiniosis cases in humans were reported in the European Union in 2009. The number of reported VTEC cases seems to have increased, while that of yersiniosis has been decreasing during the past years with a statistically

significant trend. Among animals and foodstuffs, human pathogenic VTEC bacteria were most often reported in cattle and bovine meat. *Yersinia* bacteria were mostly isolated from pigs and pig meat.

The numbers of confirmed brucellosis cases in humans have declined at a statistically significant rate and, in total, 401 confirmed cases were reported in the European Union in 2009. Human tuberculosis cases due to *Mycobacterium bovis* have also remained at a low level with 115 confirmed cases reported in 2008. Brucellosis and tuberculosis positive herds are also slowly decreasing in cattle, sheep and goat populations in the European Union.

Q fever cases in humans continued to increase and a total of 1,987 confirmed cases were reported in 2009, with a majority of cases reported from one Member State. Q fever was also found by almost all reporting Member States in domestic ruminants and most frequently in goats and sheep.

Two parasitic zoonoses, trichinellosis and echinococcosis, caused 748 and 790 confirmed human cases in the European Union, respectively. Uninspected pig and wild boar meat appeared to be the most important source of human trichinellosis cases. *Trichinella* species were mainly detected in wildlife and *Echinococcus* in foxes. Additionally, 1,259 confirmed human cases of toxoplasmosis were reported in 2009. In animals *Toxoplasma* was most often found in sheep and goats.

Rabies was reported in one person in 2009 and the infection was acquired within European Union. Rabies was still found from domestic and wildlife animals in the Baltic and some eastern European Member States, mostly in foxes and raccoon dogs. Ten Member States reported rabies cases in bats.

Some data were also reported on *Cysticerci* and *Francisella* with few *Cysticerci* findings in farm animals.

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CD-ROM
Electronic version of the report & overview of all data submitted by Member States (Level 3 files)

1. INTRODUCTION

The framework of reporting

The European Union (EU) system for the monitoring and collection of information on zoonoses is based on the Zoonoses Directive 2003/99/EC[7], which obligates EU Member States (MSs) to collect relevant and, where applicable, comparable data of zoonoses, zoonotic agents, antimicrobial resistance and food-borne outbreaks. In addition, MSs shall assess trends and sources of these agents as well as outbreaks in their territory, transmitting an annual report to the European Commission (EC), covering the data collected. The European Food Safety Authority (EFSA) is assigned the tasks of examining these data and publishing the EU Summary Report.

The Decision 2119/98/EC[8] on setting up a network for the epidemiological surveillance and control of communicable diseases in EU, as complemented by Decision 2000/96/EC[9] with amendment 2003/542/EC[10] on the diseases to be progressively covered by the network, established the basis for data collection on human diseases from MSs. The Decisions foresee that data from the networks shall be used in the EU Summary Report.

In this report, data related to the occurrence of zoonotic agents in animals, foodstuffs and feedingstuffs as well as to antimicrobial resistance in these agents, are collected in the framework of Directive 2003/99/EC. This also applies to the information on food-borne outbreaks. The information concerning zoonoses cases in humans and related antimicrobial resistance is derived from the networks under Decision 2119/98/EC.

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

This EU Summary Report 2009 was prepared in collaboration with ECDC with the assistance of EFSA's Zoonoses Collaboration Centre (ZCC), at the National Food Institute of the Technical University of Denmark. MSs, other reporting countries, the EC, members of EFSA's scientific panels on Biological Hazards (BIOHAZ) and Animal Health and Welfare (AHAW) and the relevant EU Reference Laboratories were consulted while preparing the report.

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

The data flow for the 2009 EU Summary Report is shown in Figure IN1.

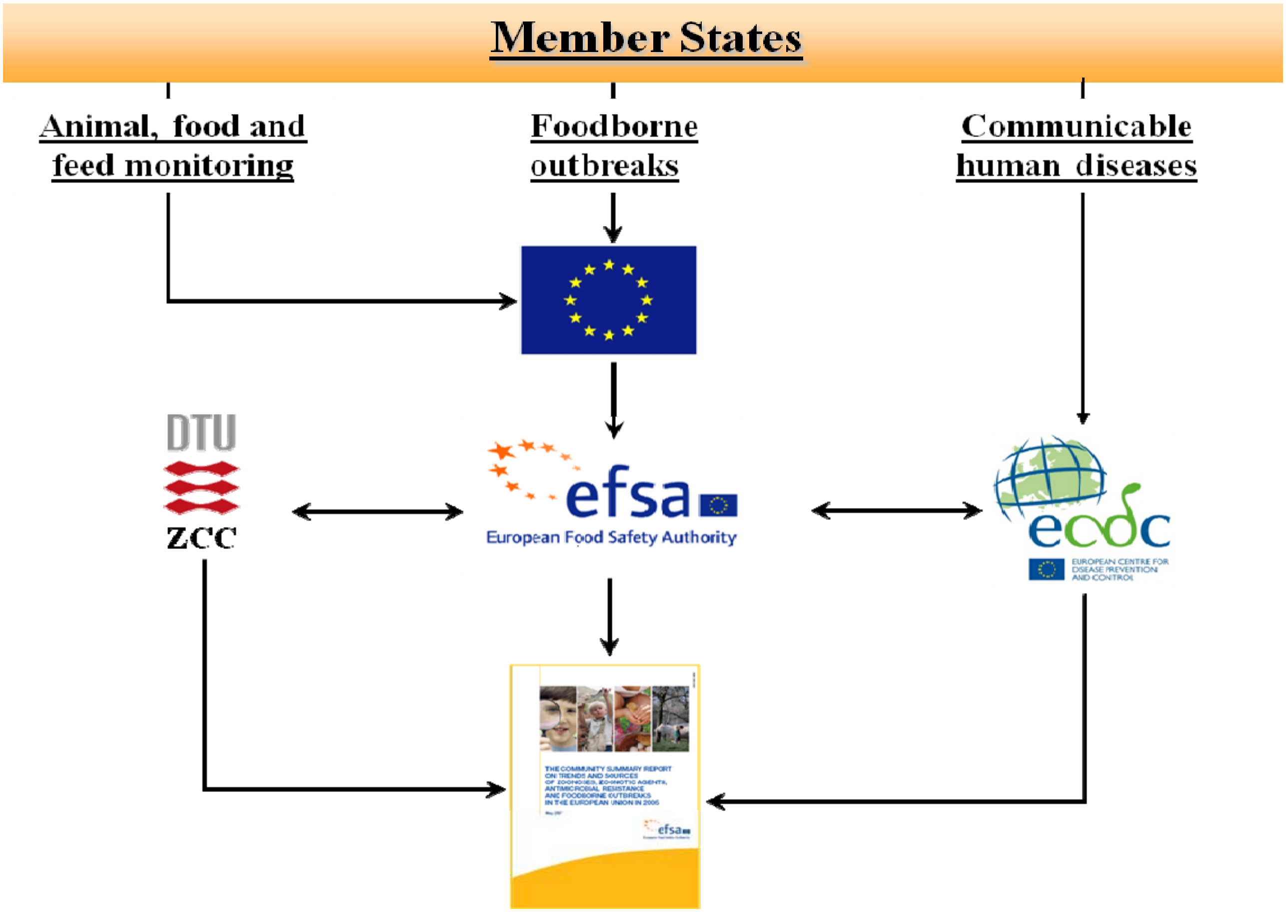
7 Directive 2003/99/EC of the European Parliament and of the Council of 17 November 2003 on the monitoring of zoonoses and zoonotic agents, amending Council Decision 90/424/EEC and repealing Council Directive 92/117/EEC. OJ L 325, 12.12.2003 p. 31-40.

8 Decision 2119/98/EC of the European Parliament and of the Council of 24 September 1998 setting up a network for the epidemiological surveillance and control of communicable diseases in the EU. OJ L 268, 3.10.1998, p.1-7.

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

10 Commission Decision 2003/542/EC of 17 July 2003 amending Decision 2000/96/EC as regards the operation of dedicated surveillance networks. OJ L 185, 24.7.2003, p. 55–58.

Figure IN1. Scheme of the data flow for the EU Summary Report, 2009



Note: Human data is collected by ECDC through The European Surveillance System (TESSy)

Data received for 2009

In 2009, data were collected on a mandatory basis for the following eight zoonotic agents: *Salmonella*, thermophilic *Campylobacter*, *Listeria monocytogenes*, verotoxigenic *Escherichia coli*, *Mycobacterium bovis*, *Brucella*, *Trichinella* and *Echinococcus*. Data on human cases were reported via TESSy by the 27 MSs and three EEA/EFTA countries (Iceland, Lichtenstein and Norway) for all diseases. Switzerland reported human cases directly to EFSA. Moreover, mandatory reported data included antimicrobial resistance in *Salmonella* and *Campylobacter* isolates, food-borne outbreaks and susceptible animal populations. Additionally, based on the epidemiological situations in MSs, data were reported on the following agents and zoonoses: *Yersinia*, rabies, Q fever, *Toxoplasma, Cysticerci,* and *Francisella*. Data on antimicrobial resistance in indicator *E. coli* and enterococci isolates were also submitted. Furthermore, MSs provided data on certain other microbiological contaminants in foodstuffs: histamine, staphylococcal enterotoxins and *Enterobacter sakazakii* (*Cronobacter* spp.), for which food safety criteria are set down in EU legislation.

All 27 MSs submitted national zoonoses reports concerning the year 2009. In addition, zoonoses reports were submitted by two non-MSs (Norway and Switzerland). Data on zoonoses cases in humans were also received from all 27 MSs and additionally from four non-MSs: Iceland, Liechtenstein (human data only), Norway and Switzerland. The deadline for data submission was 31 May 2010.

The draft EU Summary Report was sent to MSs for consultation on 29 October 2010 and comments were collected by 22 November 2010. The utmost effort was made to incorporate comments and data amendments within the available time frame. The final report was finalised by 23 February 2011 and published online by EFSA and ECDC on 22 March 2011.

The structure of the report

The information received from 2009 is published in two EU Summary Reports. This first report, covers information reported on zoonoses, zoonotic agents and food-borne outbreaks. The second report will cover data reported on antimicrobial resistance.

The current report is divided into three levels. Level 1 consists of the summary, an introduction to reporting, general conclusions, main findings and zoonoses or item-specific summaries. Level 2 of the report presents an EU assessment of the specific zoonoses and zoonotic agents and a description of materials and methods, as well as an overview of notification and monitoring programmes implemented in EU (Appendix 2). Levels 1 and 2 of the report are available in print and are disseminated to all EU stakeholders. Level 3 of the report consists of an overview of all data submitted by MSs in table format and is only available online and in the CD ROM inserted in the published report.

In the current report, information on the most common and important zoonoses and zoonotic agents (*Salmonella*, *Campylobacter* and *Listeria monocytogenes)* are analysed in-depth. Typically, these are the agents where a substantial amount of data is available each year and where there is the need to follow trends to verify progress made in control/eradication programmes/measures. In addition, a thorough analysis of data available on *Trichinella, Echinococcus, Toxoplasma* from 2007 to 2009 is presented.

For the other important, but less common, zoonoses (tuberculosis due to *M. bovis*, brucellosis and verotoxigenic *E. coli*) a briefer overview of the situation in EU is presented. However, these zoonoses will be thoroughly analysed on regular intervals in the EU Summary Report where data covering several reporting years will then be used.

For the other zoonoses (*Yersinia*, Q fever, *Francisella, Cysticerci* and rabies), where less data are available through the EFSA reporting system or where no major annual developments in EU are expected to take place in the short term, a lighter overview of the situation in EU is presented. However, these zoonoses will be thoroughly analysed on regular intervals in the EU Summary Report where data covering several reporting years will then be used. As regards the information reported on a voluntary basis on some microbiological contaminants, *Enterobacter sakazakii*, histamine, and staphylococcal enterotoxins will be the subject of an analysis in a specific report on microbiological contaminants in food in 2004-2009 in EU to be issued in 2012.

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

Data presented in this report were chosen so that trends could be identified whenever possible. As a general rule, and as described for food, feed and animal samples, a minimum number of 25 tested samples were required for the data to be selected for analysis. Furthermore, as a general rule, data from at least five MSs should be available to warrant presentation, leading to a table or a figure. However, for some zoonoses or zoonotic agents fewer data have been accepted for analysis. Historical data and trends are presented, whenever possible. Data reported as Hazard Analysis and Critical Control Points (HACCP) or own control are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded.

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

2. MAIN FINDINGS

2.1 Main conclusions of the EU Summary Report on Zoonoses 2009

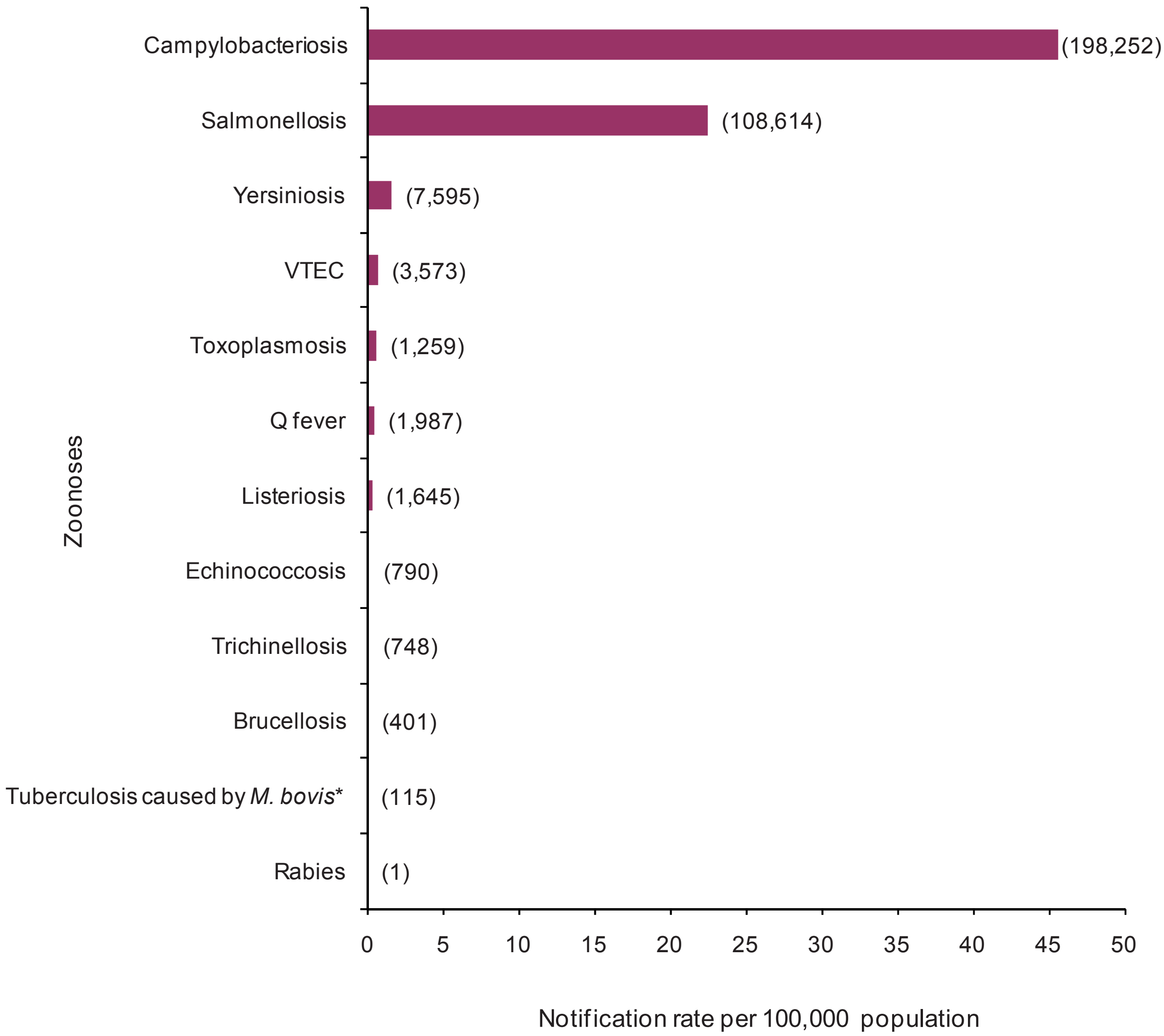
- The numbers of human salmonellosis cases reported in EU continued to decline in 2009 as a part of a statistically significant trend since 2005. The reduction was particularly substantial for the most frequently reported serovar, *S*. Enteritidis. It is assumed that the observed reduction of salmonellosis cases is mainly due to successful *Salmonella* control programmes in fowl populations.
- The number of food-borne outbreaks caused by *Salmonella* was also at a lower level in 2009 than in previous years. Most of these outbreaks were still caused by contaminated eggs and egg products, even though in decreasing numbers.
- *Salmonella* prevalence in EU fowl (*Gallus gallus)* population continued to decrease in 2009 as well, even though at a slower rate than in 2008. EU *Salmonella* reduction target for breeding flocks of *Gallus gallus* was to be met by the end of 2009, and 18 MSs reached the target in 2009, which are two MSs less than in 2008. Similarly, 17 MSs met their *Salmonella* reduction target for flocks of laying hens in 2009, four MSs less than in 2008. However, 18 MSs had already met the *Salmonella* reduction target set for 2011 for broiler flocks even though 2009 was the first year of implementation of mandatory control programmes. In the other farm animal species and food, no major changes in the occurrence of *Salmonella* were observed.
- The notification rate of campylobacteriosis in EU increased slightly in 2009 compared to 2008, and campylobacteriosis was once again by far the most frequently reported zoonotic disease in humans. EU notification rate has been fluctuating around the same level for the past years. The occurrence of *Campylobacter* continued to be high in broiler meat and broiler flocks along the entire production chain in many MSs.
- At EU level, the number of listeriosis cases in humans increased in 2009 compared to the previous year, with the highest number of cases reported in 2009 in the past five-year period. Elderly persons were especially affected by the disease and overall, a high case fatality ratio of 16.6 % was recorded among cases where this information was available. In ready-to-eat food, the occurrence of *L. monocytogenes* in quantities exceeding EU *Listeria* criteria (100 cfu/g) remained at low levels.
- Notified cases of verotoxigenic *Escherichia coli* (VTEC) in humans have increased in EU since 2007. Most of these cases are caused by serogroup O157. As in previous years, the notification rate was highest in young children. The number of cases (242) reported with haemolytic uremic syndrome (HUS) increased by 65.8 % in 2009 compared to 2008. In animals, the VTEC O157 serogroup was mostly reported from cattle and bovine meat.
- Notification of yersiniosis cases in humans has been decreasing with a statistically significant trend in EU since 2005, even though the disease still remained the third most frequently reported zoonosis included in the report. *Y. enterocolitica* was the species isolated in the majority of human cases. In animals and food, *Y. enterocolitica* was mainly found from pigs and pig meat.
- The number of reported human cases due to *Mycobacterium bovis* increased in 2008 (no data for 2009 available) compared with 2007, however three MSs accounted for the majority of these cases. The prevalence of bovine tuberculosis in EU decreased slightly in 2009.
- The statistically significant decreasing trend in the notification of brucellosis cases in humans continued in 2009. The prevalence of brucellosis in cattle and particularly in sheep and goats herds was also steadily decreasing in EU.
- The notified human trichinellosis cases increased in 2009 compared to 2008 and two MSs accounted for the majority of cases. *Trichinella* was very rarely reported from pigs and farmed wild boar, but relatively more often from hunted wild boar. The parasite was more prevalent in wildlife species. The main sources of human infections are most likely due to be pig and wild boar meat that was not tested for *Trichinella*.

- Reported cases of echinococcosis in humans decreased in 2009 compared to the previous year and *Echinococcus granulosus* accounted for the majority of cases in EU. A remarkable increase in the reporting of *E. multilocularis* was noted in one MS. Most MSs reported no or very few findings of *Echinococcus* in farm animals and pets, while some eastern and southern European MSs found the parasite more frequently and in increasing numbers in 2009. *E. multilocularis* was commonly detected in foxes by several central European MSs.
- Most notified toxoplasmosis cases in humans occurred in 24-44 year old women, most likely as a result of screening for the infection in pregnant women. In animals, the highest proportions of positive findings in 2009 were reported for sheep and goats.
- In 2009, the reported number of Q fever cases continued to increase, mainly due to a large outbreak in one MS since 2007. In 2009, all 17 MSs providing data reported Q fever cases in cattle, sheep or goats, the proportion of positive animals being highest in goats and sheep.
- A human case of rabies acquired in EU was reported from one MS. Rabies was still found in domestic animals and wildlife in the Baltic and some eastern and southern European MSs. Most of these MSs have reported a marked decrease in animal cases as a result of vaccination programmes. No cases of infected imported animals were reported in EU in 2009.
- The number of reported food-borne outbreaks in 2009 was at the same level as in the previous year. *Salmonella* was the most frequently reported cause of these outbreaks followed by viruses and bacterial toxins. The main food vehicles in the reported food-borne outbreaks were eggs and egg products, mixed or buffet meals and pig meat.
- Based on the reported fatality rates and the total numbers of reported confirmed cases, it is estimated that in 2009 there were approximately 270 human deaths due to listeriosis, 90 deaths due to salmonellosis and 40 deaths due to campylobacteriosis in EU.

2.2 Zoonoses and item-specific summaries

The importance of a zoonosis as a human infection is not dependent on incidence in the population alone. The severity of the disease and case fatality are also important factors affecting the relevance of the disease. For instance, despite the relatively low number of cases caused by VTEC, *Listeria, Echinococcus, Trichinella* and *Lyssavirus* (rabies), compared to the number of human campylobacteriosis and salmonellosis cases, these infections are considered important due to the severity of the illness and higher case fatality rate.

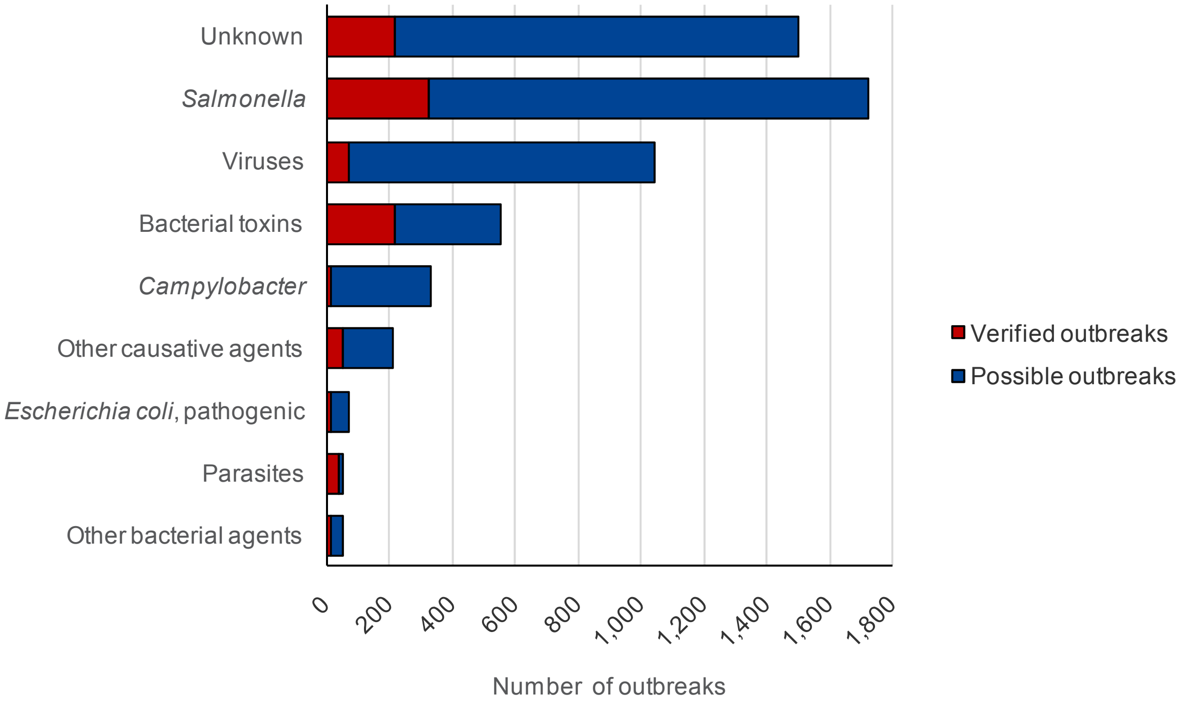
Figure SU1. Reported notification rates of zoonoses in confirmed human cases in EU, 2009



Note: Total number of confirmed cases is indicated at the end each column.

* Data from 2008

Figure SU2. Distribution of food-borne outbreaks (possible and verified) per causative agent in EU, 2009



Note: Food-borne viruses include calicivirus, hepatitis A virus and other unspecified food-borne viruses. Bacterial toxins include toxins produced by *Bacillus, Clostridium* and *Staphylococcus.* Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins, wax esters and other unspecified agents. Parasites include primarily *Trichinella,* but also *Anisakis.* Other bacterial agents include *Brucella*, *Listeria*, *Shigella, Yersinia* and *Vibrio.*

Salmonella

Humans

In 2009, a total of 108,614 confirmed cases of human salmonellosis (TESSy) were reported in EU. This represents a sharp decrease of 17.4 % over the last year. EU notification rate for confirmed cases was 23.7 cases per 100,000 population, ranging from 2.1 in Portugal to 100.1 per 100,000 population in the Czech Republic, Germany, the United Kingdom, and Poland accounted for half of all confirmed cases (56.0 %) in 2009. The decreasing trend of salmonellosis over the past five years is statistically significant, representing an average reduction of 12.0 % per year. As in previous years, *S.* Enteritidis and *S*. Typhimurium were the most frequently reported serovars (52.3 % and 23.3 % respectively of all known serovars in human cases). The case fatality was 0.08% among 53,167 confirmed cases for which information was reported. Using the total number of confirmed cases of salmonellosis in 2009, this would approximately correspond to 90 human deaths in EU due to salmonellosis.

As in previous years, the highest notification rate for human cases was for age groups 0 to 4 years and 5 to 14 years. A seasonal peak in the number of cases during the late summer and early autumn was again observed in many MSs for both *S.* Enteritids and *S.* Typhimurium serovars. In 2009, the proportion of cases reported as domestic remained at the same level, 62.4 %, as in 2008 (63.6 %), although for some countries imported cases represented the majority of all salmonellosis cases.

It is assumed that the observed reduction of salmonellosis cases in humans is mainly due to successful *Salmonella* control programmes in fowl (*Gallus gallus*) populations that are in place in EU MSs and that have particularly resulted in a lower occurrence of *Salmonella* in eggs. However, other control measures taken all along the food production chain may also have contributed to the decline of salmonellosis in humans.

Foodstuffs

Information on *Salmonella* was reported from a wide range of foodstuff categories in 2009, but the majority of data was from various types of meat and products thereof. The highest proportions of *Salmonella*-positive units were reported for fresh broiler meat and fresh turkey meat, on average at levels of 5.4 % and 8.7 %, respectively. In fresh pig meat, 0.7 % of tested units were found positive for *Salmonella* in the reporting MS group and in the case of fresh bovine meat 0.2 % of units were positive.

Salmonella was only found in a very a low proportion of table eggs and egg products, at levels of 0.5 % and 0.6 %, respectively. This was the case for vegetables and fruit, as well, where 0.6 % of units tested positive. However, a higher occurrence was reported for herbs and spices by some MSs.

Non-compliance with EU *Salmonella* criteria was most often observed in food categories of meat origin where up to 8.7 % of the samples were positive for *Salmonella*. In addition, live bivalve molluscs showed relatively high levels of non-compliance with 3.4 % positive units. In the case of minced meat, meat preparations and meat products intended to be eaten raw, *Salmonella* was detected in 1.2 % to 1.7 % of single samples, which indicates a direct risk for consumers. The proportion of egg products (single samples) not in compliance with *Salmonella* criteria (0.2 %) decreased compared to 2008 (2.8 %). In other food categories, the proportion of units in non-compliance with the criteria was very low.

Animals

All MSs reported data from the mandatory *Salmonella* control programmes in fowl (*Gallus gallus*) population and also from other domestic animals and wildlife species. MSs had to meet EU *Salmonella* reduction target of ≤1 % of breeding flocks of *Gallus gallus* infected with the five target serovars (*S.* Enteritidis, *S.* Typhimurium, *S.* Hadar, *S.* Infantis, *S.* Virchow) by the end of 2009. Together, 18 MSs (compared to 20 MSs in 2008) met this target in 2009. Overall, 1.2 % (compared to 1.3 % in 2008) of breeding flocks in EU were positive for the five target serovars during the production period. The seven MSs, not meeting the target, reported prevalence of the five target serovars from 1.2 % to 7.0 %. Together 2.7 % of the breeding flocks in EU were positive for *Salmonella* spp.

Similarly, 17 MSs (compared to 21 MSs in 2008) met their relative reduction target for *S.* Enteritidis and *S.* Typhimurium in laying hen flocks of *Gallus gallus* set for 2009, while eight MSs (compared to two MSs in 2008) did not meet their target. Overall, during the production period, 6.7 % and 3.2 % (5.9 % and 3.5 % in 2008) of laying hen flocks in EU were positive for *Salmonella* (all serovars) and *S.* Enteritidis and/or *S.* Typhimurium in 2009, respectively.

2009 was the first year for MSs to implement the mandatory control programmes in broiler flocks, and already 18 MSs met the *Salmonella* reduction target of ≤1 % for *S.* Enteritidis and/or *S*. Typhimurium, which is to be achieved by the end of 2011. In total, 5.0 % and 0.7 % of broiler flocks in EU were positive for *Salmonella* (all serovars) and *S.* Enteritidis and/or *S.* Typhimurium, respectively.

Concerning other animal species, 7.1 % of turkey flocks were found positive at reporting MS level, and positive findings were reported also from other poultry species, pigs and cattle.

Feedingstuffs

On average, 1 % or less of compound feedingstuffs units tested was reported positive for *Salmonella*. Meat and bone meal and oil seeds and products thereof were the feed materials most often reported *Salmonella*-positive, and 1.4 % and 1.3 % of tested units for feed material categories tested positive, respectively.

Campylobacter

Humans

Campylobacteriosis remained the most frequently reported zoonotic disease in humans. In total, 198,252 confirmed cases of campylobacteriosis were reported by 25 MSs, which represents an increase of 4.0 % compared to 2008. The United Kingdom and Hungary accounted for 75.3 % of the total increase in the reported number of confirmed cases. As in previous years, children under the age of five had the highest notification rate 128.0 per 100,000 population. In other age groups, the notification rates ranged from 35.4 per 100,000 population (>65 years) to 50.7 cases per 100,000 population (age group 15-24 years). The case fatality was 0.02% among 107,169 confirmed cases for which information was reported. Using the total number of confirmed cases of campylobacteriosis in 2009, this would approximately correspond to 40 human deaths in EU due to campylobacteriosis.

Foodstuffs

For 2009, most of the information on *Campylobacter* in foodstuffs was reported for broiler meat and products thereof. In the annual reporting, the occurrence of *Campylobacter* was 31.0 % in fresh broiler meat in EU and varying at retail from 10.8 % to 90.0 % between reporting MSs. In fresh turkey meat, 15.1 % of units were found positive for *Campylobacter*. In samples of fresh pig meat and bovine meat, *Campylobacter* was detected less frequently, at levels of 0.6 % and 0.5 %, respectively. In other foodstuffs *Campylobacter* was detected only occasionally, including some findings from cheese made from goat's or sheep's milk.

Animals

In 2009, the majority of data on *Campylobacter* in animals were from investigations of broilers, but data from pigs and cattle were also reported. The proportion of *Campylobacter*-positive broiler flocks at reporting MS level was 20.5 % ranging from 0 % to 78.4 % in MSs. For pigs and cattle, less MSs provided data, however the prevalence in reporting MSs was generally high for pig herds (43.9 % and 67.6 %) and moderate for cattle herds (0.6 % to 41.5 %), which is similar to findings in previous years.

Listeria

Humans

The number of reported listeriosis cases in humans increased by 19.1 % in EU in 2009 after a decreasing number in the two previous consecutive years. As in previous years, elderly persons were especially affected by the disease and, overall, a high case fatality rate of 16.6 % was recorded among those cases where information was available, showing a slight decrease compared to 2008. A total of 1,645 confirmed cases of listeriosis was reported by 26 MSs in 2009. EU notification rate was 0.4 per 100,000 population. The highest notification rates were observed in Denmark, Spain and Sweden. Listeriosis occurred mainly among elderly people, with 58.5 % of cases occurring in individuals over the age of 65 (a notification rate of 1.1 per 100,000 population). Of 78 cases in small children under five years of age, 88.5 % were infants (<1 year). The overall case fatality rate for human listeriosis was 16.6 % (N=757) and it was highest among adults over 45 years. Using the reported fatality rate and the total number of confirmed cases of listeriosis in 2009, this would approximately correspond to 270 human deaths in EU due to listeriosis.

Foodstuffs

MSs provided information on numerous investigations of *L. monocytogenes* in different categories of ready-to-eat (RTE) food in 2009. In the case of RTE products at retail, very low proportions of samples were generally found to be non-compliant with EU criterion of ≤100 cfu/g. However at processing, higher proportions of RTE products tested did not meet the criterion of absence of *L. monocytogenes*. Similar to previous years, the highest levels of non-compliance at retail were found in RTE fishery products (1.0 % of single samples), cheese (especially, soft and semi-soft with 1.1 % of single samples) and RTE products of meat origin (0.3 %), followed by 'other RTE products'.

Animals

In 2009, some findings of *L. monocytogenes* in various animal species, including cattle, sheep, goats and pigs, were reported by MSs.

VTEC

Humans

In 2009, a total of 3,573 confirmed human VTEC cases were reported from 24 MSs, which is slightly more (an increase of 13.1 %) than in 2008 (N=3,159). EU notification rate was 0.75 per 100,000 population. The most commonly identified VTEC serogroup was O157 (51.7 %). The notification rate was highest in 0 to 4 year old children (7.2 cases per 100,000 population) and this group also accounted for almost (63.2 %) of the 242 Haemolytic Uremic Syndrome (HUS) cases with information on age; these cases were mainly associated with VTEC O157 infections.

Foodstuffs and animals

Data was mostly reported on VTEC and the VTEC O157 serogroup in food and animals. Overall, 2.3 % and 0.7 % of fresh bovine meat units were positive with VTEC and VTEC O157, respectively. VTEC O157 was also reported from cow's milk. In animals, VTEC and VTEC O157 were mostly reported from cattle, at levels of 6.8 % and 2.7 %, in animal samples respectively. Some VTEC O157 findings were also made from sheep.

Yersinia

Humans

In 2009, 7,595 confirmed human yersiniosis cases were reported in EU, which is slightly less (9.0 %) than in 2008 (N=8,346). The number of yersiniosis cases has been declined with a statistically significant trend since 2005 in EU. *Yersinia enterocolitica* was the most common species reported in human cases and was isolated from 93.7 % of all confirmed cases.

Foodstuffs and animals

Findings of *Y. enterocolitica* were mainly reported from pigs and pig meat. On average, 4.8 % of pig meat units were found positive for *Y. enterocolitica* in the reporting MS group and a high prevalence was reported by two MSs in slaughter batches of pigs.

Tuberculosis due to *Mycobacterium bovis*

Humans

No information on *Mycobacterium bovis* cases in 2009 was available, thus the 2008 data were included in the report. As in previous years, human infections were rare in EU. In 2008, the total number of confirmed human tuberculosis cases was 115 representing a slight increase of 7.5 % compared to 2007. The highest numbers of confirmed cases were reported by Germany (48 cases), the United Kingdom (21 cases), and the Netherlands (18 cases), accounting for 75.7 % of all confirmed cases. As in previous years, the highest notification rate (0.12 cases per 100,000 population) occurred in individuals aged 65 and over.

Animals

In 2009, 13 MSs, two non-MSs, Scotland (the United Kingdom) as well as some regions and provinces in Italy, were officially bovine tuberculosis-free (OTF). Out of these, five MSs reported very few positive cattle herds in 2009. Six of the 14 non-OTF MSs reported no infected cattle herds in 2009. Of the eight non-OTF MSs reporting positive herds, Ireland and the United Kingdom accounted for the highest prevalence. In most of the non-OTF MSs the prevalence of bovine tuberculosis remained at a level comparable to 2008. However in Northern Ireland, the number of infected herds more than doubled in 2009 compared to 2008. From 2004 to 2009, a statistically significant, slightly decreasing trend was observed in the prevalence of cattle herds tested positive for tuberculosis in three EU co-financed non-OTF MSs: Italy, Portugal and Spain.

Brucella

Humans

In 2009, a total of 401 confirmed human brucellosis cases were reported in EU, representing a decrease of 35.2 % compared to 2008 (N=619). EU notification rate was 0.08 cases per 100,000 population. The highest numbers were reported by Greece, Portugal and Spain, accounting together for 74.8 % of all reported confirmed cases. These MSs are not officially free of bovine and/or ovine and caprine brucellosis. In EU, the highest notification rate of brucellosis was noted for adults between 25 and 44 years of age. A peak in reported cases was observed in early summer (June) followed by a smaller peak of cases occurring in September.

Foodstuffs

Data on the occurrence of *Brucella* in milk and cheese were provided by three MSs. Positive findings were only reported from one investigation of raw cow's milk (0.7 %). No positive samples from cheeses or dairy products were reported by MSs.

Animals

In 2009, 14 MSs were officially free of brucellosis in cattle (OBF) and 16 MSs were officially free of brucellosis in sheep and goats (ObmF). Furthermore, some regions and provinces in Italy, Spain and Portugal as well as Great Britain in the United Kingdom were OBF. In addition, a number of departments in France, some regions and provinces in Italy, Portugal and Spain were ObmF.

At EU level, the prevalence of bovine brucellosis in cattle herds has been steadily decreasing to a very low level during the past five years and in 2009, overall, 0.07 % of the herds were positive. Also in EU non-OBF MSs, a decreasing trend was observed during the past five years, where the prevalence seems to have stabilised at 0.12 % in 2007 to 2009. Similarly, the prevalence of brucellosis in sheep and goat herds continued to decrease both at EU level and in EU non-ObmF MSs; the observed prevalence being 0.3 % and 0.9 % in 2009, respectively.

Trichinella

Humans

Confirmed human trichinellosis cases increased by 11.6 % in 2009 (N=748) compared to 2008 (N=670). As in previous years, two MSs, Bulgaria and Romania, accounted for the majority (89.8 %) of cases. In general, human cases were most likely to be associated with consumption of meat from domestic pigs raised in backyards.

Animals

Trichinella is very rarely detected from pigs in EU. During 2007 to 2009, only eight MSs reported some *Trichinella* findings from pigs and most positive pigs were from Romania. The parasite was more often reported from farmed wild boar, where the overall prevalence was 0.03 % in 2009. Most *Trichinella* findings in MSs were reported in wildlife, and the reported overall prevalence in hunted wild boar was 0.2 % in 2009. The main sources of the human infections appeared to be pig and wild boar meat not tested for *Trichinella*.

Echinococcus

Humans

Reported cases of human echinococcosis decreased by 11.3 % in 2009 (N=790) compared to 2008 (N=891) in EU. *Echinococcus granulosus* accounted for the majority (76.8 %) of human cases with known species. Most human cases (55.4 %) occurred in people aged 45 and over. Alveolar echinococcosis increased significantly in France with 26 *E. multilocularis* cases reported in 2009 compared to five cases reported in 2008.

Animals

In 2009, 18 MSs reported data on *Echinococcus* in farm animals. Most MSs reported no or very few findings of *Echinococcus*, however three MSs reported a higher prevalence. At EU level, the parasite was detected in sheep, goats and cattle, at levels of 3.2 %, 0.5 % and 0.8 %, respectively. *E. multilocularis* was often found from foxes in the central European MSs, and 17.2 % of tested foxes were infected in 2009. *E. multilocularis* seemed to be mostly present in central and southern MSs; whereas *E. granulosus* was more widely distributed and also found in some northern and western MSs. The same distribution pattern for *Echinococcus* species were observed both in human cases and animals.

Toxoplasma

Humans

Seventeen MSs reported data on human toxoplasmosis in 2009. In total, 1,259 confirmed cases were reported with an EU notification rate of 0.65 per 100,000 population. The highest rates were reported in Lithuania, Slovakia and Hungary. Most cases were reported among women aged 24-44 years, most likely as a result of toxoplasmosis screening in pregnant women. However, according to the new EU case definition, only congenital cases should be reported. Most MSs still have to adapt their reporting to this requirement, since only 23 of the 1,259 reported cases were infants (<1 year).

Animals

In 2009, 18 MSs provided information on *Toxoplasma* in animals. The highest proportions of positive samples were reported in sheep and goats (24.4 %), cats (11.0 %) and dogs (15.5 %), while 5.3 % of the tested bovine animals were positive.

Q fever

Humans

In 2009, reported cases of Q fever continued to increase by 24.7 % and 1,987 confirmed human cases were reported in EU. The Netherlands accounted for the majority (81.7 %) of confirmed cases due to an outbreak occurring since 2007. Three deaths due to Q fever were reported among the elderly from Germany (two cases) and the Netherlands (one case).

Animals

In total, 17 MSs provided data on Q fever in farm animals for 2009 and all these MSs reported positive cases in cattle, sheep or goats. Q fever findings were more often made from goats and sheep, where 23.5 % and 9.8 % of tested animals were positive, respectively.

Rabies

Humans

Rabies is a very rare zoonotic disease in Europe. One indigenous human case was reported in a small village in Romania where a woman was bitten by a rabid fox in 2009. As medical care was not sought, the case resulted fatal.

Animals

Nine MSs reported the classical rabies virus in various animal species (other than bats) in 2009, and the total number of rabies cases animals decreased compared to 2008. Most MSs have reported no or very few animals with classical rabies for a number of years. However, rabies is still prevalent in wildlife in the Baltic and some south-eastern European MSs. An increasing number of MSs reported findings of rabies in bats although these are generally rare: in 2009, ten MSs reported positive findings in bats. There were no reports of rabies-positive animals imported into EU in 2009.

Other zoonoses

Animals

Two MSs reported data on *Cysticerci* and had no or very few findings in farm animals. One MS reported testing for *Francisella* in hares but no positive samples were found.

Food-borne outbreaks

A total of 5,550 outbreaks was reported in EU, which is at the same level as in 2008. Overall, 48,964 human cases, 4,356 hospitalisations and 46 deaths were recorded. The total number of verified outbreaks (977) increased and the variation between MSs in the numbers of reported verified outbreaks remained large.

The largest number of reported food-borne outbreaks was caused by *Salmonella* (31.0 % of all outbreaks), followed by viruses (18.8 %), bacterial toxins (10.1 %) and *Campylobacter* (6.0 %).

The most important food vehicles in the outbreaks with known causative agent were eggs and egg products (17.3 %), mixed or buffet meals (8.1 %), pig meat and products thereof (7.8 %). Eggs and egg products, and bakery products were mostly associated with *S.* Enteritidis outbreaks, whereas pig meat was linked to *Trichinella* and *Salmonella* outbreaks. The virus outbreaks were mainly associated with fruit, berries, vegetables and juices and other products thereof. The number of reported *Salmonella* outbreaks has decreased over the past three years, while the outbreaks caused by bacterial toxins increased in 2009.

In 2009, 15 waterborne outbreaks were reported in EU, and the main causative agents were *Campylobacter*, caliciviruses and *E. coli.* The largest outbreaks, involving a substantial number of human cases, were caused by the contamination of public water sources.

3. INFORMATION ON SPECIFIC ZOONOSES

3.1 *Salmonella*

Salmonella has long been recognised as an important zoonotic pathogen of economic significance in animals and humans. The genus *Salmonella* is currently divided into two species*:* *S. enterica* and *S. bongori*. *S. enterica* is further divided into six sub-species and most *Salmonella* belong to the subspecies *S. enterica* subsp. *enterica*. Members of this subspecies have usually been named based on where the serovar or serotype was first isolated. In the following text, the organisms are identified by genus followed by serovar, e.g. *S.* Typhimurium. More than 2,500 serovars of zoonotic *Salmonella* exist and the prevalence of the different serovars changes over time.

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

The common reservoir of *Salmonella* is the intestinal tract of a wide range of domestic and wild animals which result in a variety of foodstuffs covering both food of animal and plant origin as sources of infections. Transmission often occurs when organisms are introduced in food preparation areas and are allowed to multiply in food, e.g. due to inadequate storage temperatures, inadequate cooking or cross contamination of ready-to-eat (RTE) food. The organism may also be transmitted through direct contact with infected animals or humans or faecally contaminated environments.

In EU, *S.* Enteritidis and *S.* Typhimurium are the serovars most frequently associated with human illness. Human *S.* Enteritidis cases are most commonly associated with the consumption of contaminated eggs and poultry meat, while *S.* Typhimurium cases are mostly associated with the consumption of contaminated pig, poultry and bovine meat.

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

Table SA1 presents the countries reporting data for 2009.

Table SA1. Overview of countries reporting data for* Salmonella*, 2009

Data	Total number of MSs reporting	Countries
Human	27	**All MSs** **Non-MS**: CH, IS, NO
Food	25	**All MSs** except CY, MT **Non-MSs**: CH, NO
Animal	27	**All MSs** **Non-MSs**: CH, NO
Feed	24	**All MSs** except CY, LU, MT **Non-MSs**: CH, NO
Serovars (food and animals)	27	**All MSs** **Non-MSs**: CH, NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP or own control are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis.

3.1.1 Salmonellosis in humans

In 2009, the number of human *Salmonella* cases continued to decrease as a total of 109,844 cases were reported from 27 EU Member States (Table SA2). Of these, 108,614 were confirmed cases (EU notification rate: 23.7 cases per 100,000 population). The number of confirmed human salmonellosis cases thereby decreased by 17.4 % (22,854 cases) compared to 2008 (N=131,468).

Germany accounted for 45.7 % of the reduction in the reported number of confirmed cases. Despite of decreases in several countries, four MSs reported more *Salmonella* cases in 2009 than in 2008 (Table SA2). Italy accounted for 39.5 % of the total increase of confirmed cases as were reported by the four MSs. The highest proportional increase by 77.1 % in confirmed case numbers was reported by Romania (1,105 reported cases in 2009 versus 624 in 2008). This may reflect improvements in the Romanian surveillance system as 2009 was also the first year that Romania was able to report a case-based dataset for *Salmonella*.

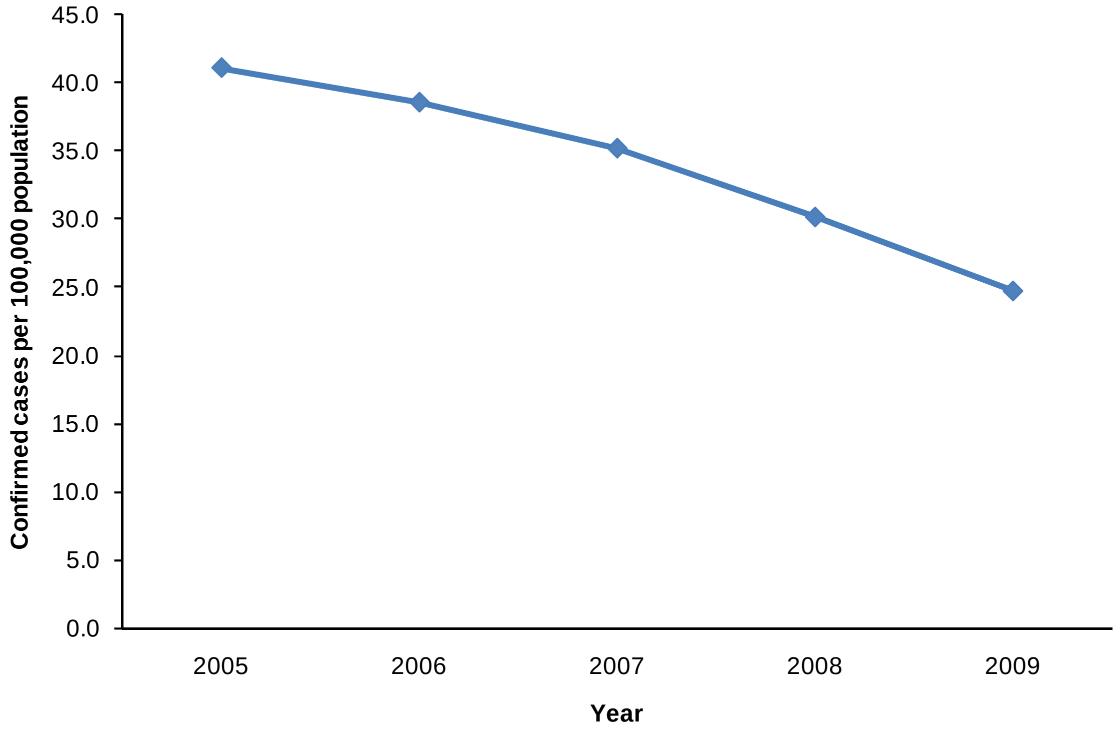
The five-year EU-trend (2005-2009) showed a statistically significant decrease (Figure SA1). However, there were country-specific variations in trend. Although ten countries showed a significant decreasing trend, there was still one MS, Malta that showed a significant increasing trend (Figure SA2). Trends were not significant in the rest of the 14 countries that reported data on *Salmonella* for the five consecutive years. Within the five-year period, the greatest average annual decline of 28.0 % was observed in the Czech Republic whereas the highest average annual rise in case numbers, 24 %, was observed in Malta.

Table SA2. Reported human salmonellosis cases in 2005-2009 and notification rates for 2009

Country	Report Type[1]	2009			2008	2007	2006	2005
		Cases	Confirmed Cases	Confirmed cases/ 100,000	Confirmed cases			
Austria[2]	C	2,775	2,775	33.2	2,310	3,375	4,787	5,164
Belgium	C	3,113	3,113	29.2	3,831	3,973	3,693	4,916
Bulgaria[3]	A	1,315	1,247	16.4	1,516	1,136	-	-
Cyprus	C	134	134	16.8	169	158	99	59
Czech Republic	C	10,670	10,480	100.1	10,707	17,655	24,186	32,860
Denmark	C	2,130	2,130	38.6	3,669	1,662	1,662	1,798
Estonia	C	261	261	19.5	647	430	453	312
Finland	C	2,329	2,329	43.7	3,126	2,737	2,574	2,478
France	C	7,153	7,153	11.1	7,186	5,510	6,008	5,877
Germany	C	31,395	31,395	38.3	42,909	55,400	52,575	52,245
Greece	C	409	403	3.6	1039	706	825	1,234
Hungary	C	6,029	5,873	58.2	6,637	6,578	9,389	7,820
Ireland	C	336	335	7.5	447	440	420	348
Italy	C	4,156	4,156	6.9	3,232	4,499	5,164	5,004
Latvia	C	816	795	35.2	1229	619	781	615
Lithuania	C	2,063	2,063	61.6	3,308	2,270	3,479	2,348
Luxembourg	C	162	162	32.8	202	163	308	211
Malta	C	124	124	30.0	161	85	63	66
Netherlands[4]	C	1,205	1,205	11.4	1,627	1,245	1,667	1,388
Poland	A	8,964	8,521	22.3	9,149	11,155	12,502	15,048
Portugal	C	222	220	2.1	332	482	387	468
Romania[3]	C	1115	1105	5.1	624	620	-	-
Slovakia	C	4,515	4,182	77.3	6,849	8,367	8,242	10,766
Slovenia	C	616	616	30.3	1,033	1,346	1,519	1,519
Spain[5]	C	4,304	4,304	37.6	3,833	3,658	5,117	6,048
Sweden	C	3,054	3,054	33.0	4,185	3,930	4,056	3,168
United Kingdom	C	10,479	10,479	17.0	11,511	13,802	14,055	12,784
EU Total		**109,844**	**108,614**	**23.7**	**131,468**	**152,001**	**164,011**	**174,544**
Iceland	C	35	35	11.0	134	93	116	86
Liechtenstein	C	-	-	-	0	1	14	
Norway	C	1,235	1,235	25.7	1,941	1,649	1,813	1,482
Switzerland	C	1,325	1,325	17.2	2,051	1,802	1,798	1,877

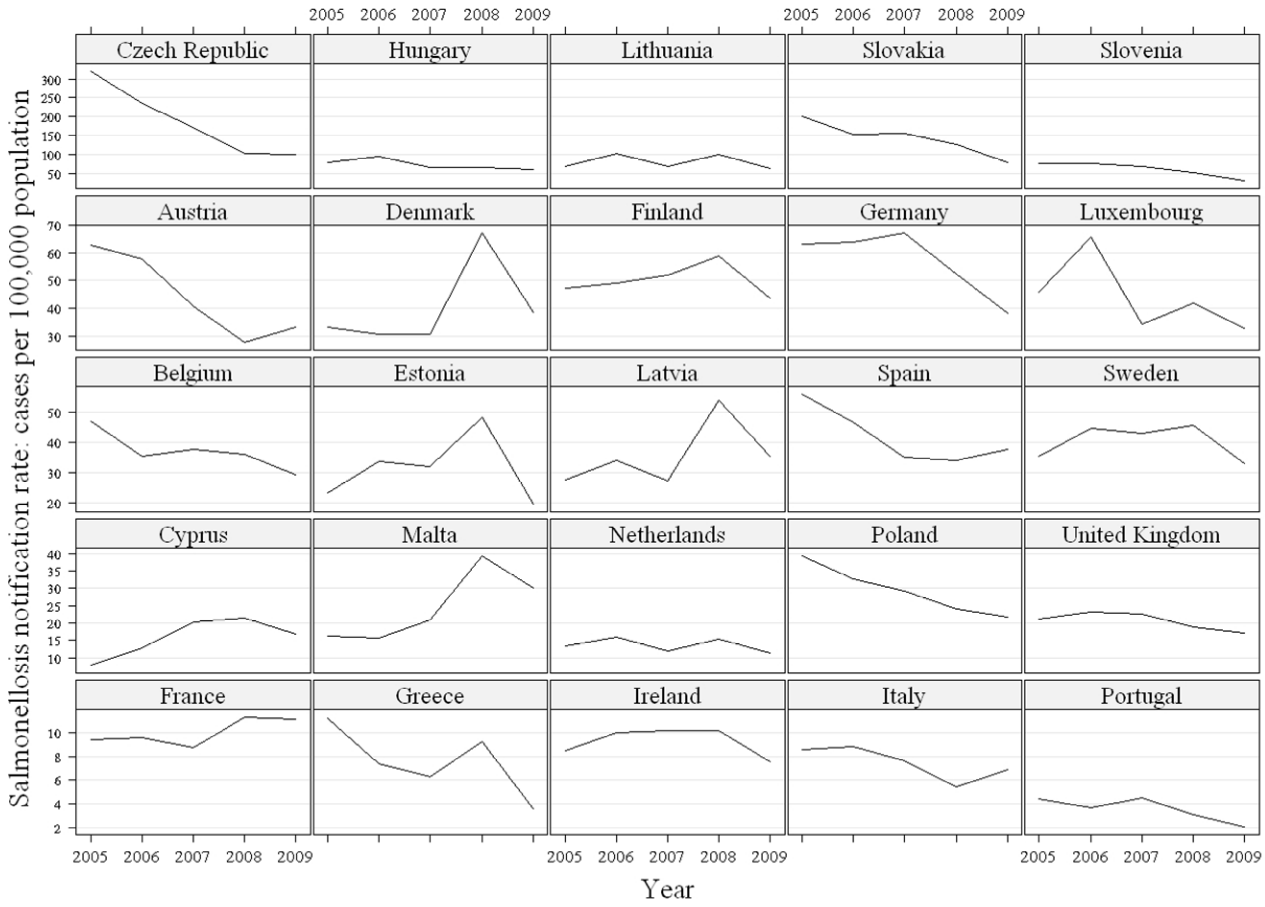
1. A: aggregated data report; C: case-based report.
2. New electronic reporting system in place since 2009.
3. EU membership began in 2007.
4. Sentinel system; notification rates calculated with estimated population coverage of 64 %.
5. Notification rates calculated with an estimated population coverage of 25 %.

Figure SA1. Notification rate of reported confirmed cases of human salmonellosis in EU (25 MSs), 2005-2009



Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Figure SA2. Salmonellosis notification rates in humans (cases per 100,000 population) in MSs, 2005-2009

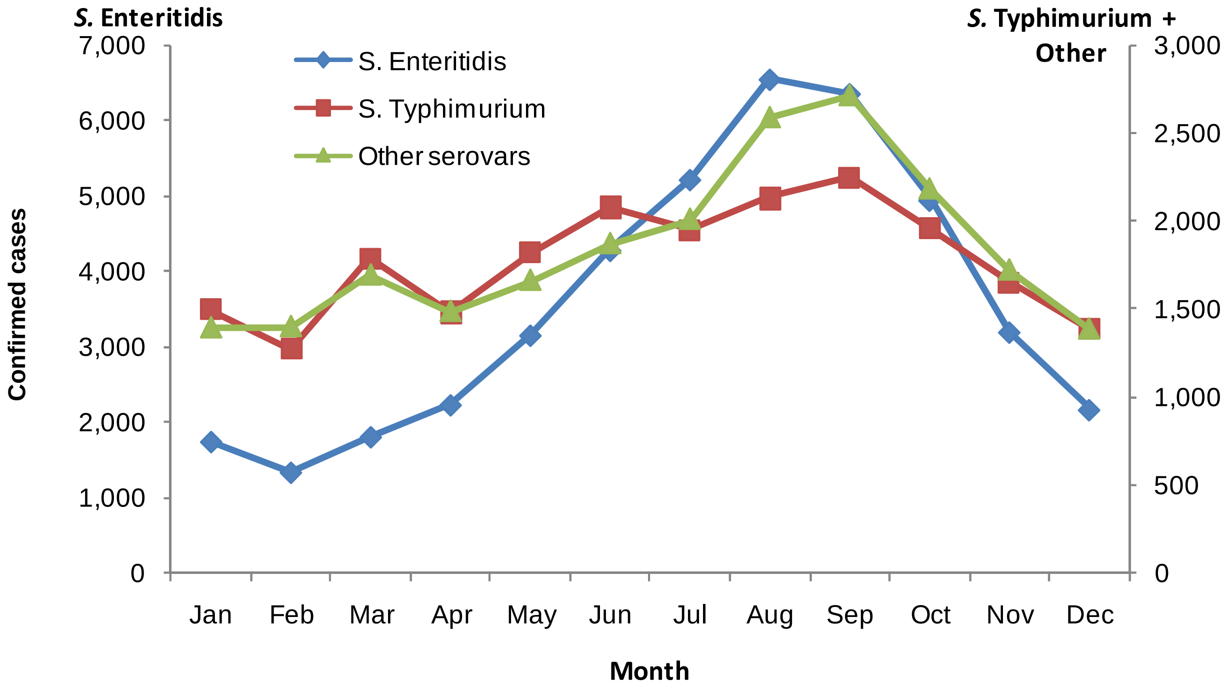


Note: MSs have been ranked according to the maximum value of the notification rate. A unique scale is used for MSs shown in the same row but scales differ among rows. In each row MSs have been presented in alphabetical order.

Of 108,614 reported confirmed cases, age data were available for 93.3 % of cases. The notification rate was highest in small children in the age group of 0-4 years (112.4 per 100,000 population) as has been seen in previous years although it declined slightly from the previous year 2008 (118.8 per 100,000 population). Younger children still have a notification rate three times higher than 5 to 14 year olds and six to nine times higher rate than those aged 15 and over. The case fatality was 0.08 % among 53,167 confirmed cases for which this information was reported.

A peak in the number of reported *Salmonella* cases normally occurs in the summer and autumn, with a rapid decline in winter months (Figure SA3). This pattern supports the influence of temperature and behaviour (i.e. food consumption habits such as barbequed food) on *Salmonella* notification rates. The seasonal variation is more prominent for *S.* Enteritidis than for *S.* Typhimurium (please notice the different scales used).

Figure SA3. Number of confirmed salmonellosis cases in humans by month and serotype, TESSy data for 23 MSs, 2009



Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom (N = 86,971).

The proportion of salmonellosis cases that were reported as domestically acquired in MSs and EEA countries remained at the same level in 2009 as in 2008 (62.4 % versus 63.6 %) (Table SA3). A similar observation was made for the proportion of imported cases or those acquired while travelling abroad, which in 2009 was 10.5 % compared to 7.8 % in 2008. The proportion of confirmed cases with an unknown origin represented slightly less (27.1 %) in 2009 compared to the previous year (28.6 %). As already detected in previous years, three of the four Nordic countries: Finland, Sweden, and Norway, continued to have the highest proportions of imported cases of salmonellosis (83.3 %, 78.9 % and 73.5 %, respectively) whereas the infections seem to be mainly domestically acquired in the majority of other countries. As in previous years, Ireland and the United Kingdom showed ratios close to 1:1 between domestically and imported cases, which was not seen in other reporting countries (Table SA3). Although data on domestic/imported cases are often incomplete and may not provide a true picture of the distribution between domestic and imported cases the continuous repetitive results may indicate common cultural features in some geographical areas.

Table SA3. Distribution of confirmed salmonellosis cases in humans by reporting countries and origin of case (domestic/imported) in 2009, TESSy data.

Country	Domestic (%)	Imported (%)	Unknown (%)	Total (n)
Austria	97.6	2.4	0	2,775
Belgium	0	0	100.0	3,113
Bulgaria	0	0	100.0	1,315
Cyprus	95.5	4.5	0	134
Czech Republic	98.3	1.7	0	10,480
Denmark	50.7	22.9	26.4	2,130
Estonia	90.0	10.0	0	261
Finland	13.3	83.3	3.4	2,329
France	0.0	0.0	100	7,153
Germany	89.7	5.3	5.0	31,395
Greece	93.8	1.2	5.0	403
Hungary	99.9	0.1	0	5,873
Ireland	24.2	25.7	50.1	335
Italy	0	0	100.0	4,156
Latvia	0	0	100.0	816
Lithuania	0	0	100.0	2,063
Luxembourg	84.0	14.8	1.2	162
Malta	99.2	0.8	0	124
Netherlands	90.6	9.4	0	1,205
Poland	100.0	0	0	8,964
Portugal	0.0	0	100.0	220
Romania	0.0	0	100.0	1,105
Slovakia	99.4	0.6	0	4,182
Slovenia	0	0	100.0	616
Spain	100.0	0	0	4,304
Sweden	19.4	78.9	1.7	3,054
United Kingdom	20.1	23.7	56.2	10,479
EU Total	**62.4**	**10.5**	**27.1**	**109,146**
Iceland	37.1	57.1	5.7	35
Liechtenstein	-	-	-	-
Norway	17.9	73.5	8.6	1,235

3.1.2 *Salmonella* in food

Most MSs and non-MSs provided data on *Salmonella* in various foodstuffs (Table SA4). In the report, only results based on 25 or more units tested are presented. Results from industry own-check programmes and Hazard Analysis and Critical Control Point (HACCP) sampling as well as specified import control, suspect sampling and clinical investigations have been excluded due to difficulties in interpretation of data. However, these data are presented in the Level 3 tables, whereas the details on the monitoring schemes applied in MSs are summarised in Appendix tables SA7b (broiler meat), SA10 (turkey meat), SA16 (pig meat) and SA17 (bovine meat).

Table SA4. Overview of countries reporting data for* Salmonella *in food, 2009

Data	Total number of MSs reporting	Countries
Broiler meat	24	**All MSs** except CY, MT, UK **Non-MS:** CH
Turkey meat	18	**MSs:** AT, BE, BG, CZ, DE, EE, FI, HU, IE, IT, LT, LU, LV, PL, PT, RO, SI, SK **Non-MS:** CH
Eggs and egg products	19	**MSs:** AT, BE, BG, CZ, DE, EE, ES, GR, HU, IE, IT, LT, LU, LV, NL, PL, PT, RO, SK
Pig meat	23	**All MSs** except CY, FR, MT, UK **Non-MS:** NO
Bovine meat	22	**All MSs** except BE, CY, FR, MT, UK **Non-MS:** NO
Milk and dairy products	19	**MSs:** AT, BE, BG, CZ, DE, EE, ES, GR, HU, IE, IT, LT, LV, NL, PL, PT, RO, SI, SK **Non-MS:** CH
Fruit and vegetables	21	**All MSs** except CY, DK, FI, FR, MT, SE
Fish and other fishery products[1]	20	**All MSs** except CY, DK, FI, FR, MT, SE, UK **Non-MS:** NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP or own control are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis.

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

Compliance with microbiological criteria

The *Salmonella* criteria laid down by Regulation (EC) No 2073/2005[11] were applied from 1 January 2006. The criteria were modified by Regulation (EC) No 1441/2007[12], entering into force in December 2007. The Regulations prescribe rules for sampling and testing, and set limits for the presence of *Salmonella* in specific food categories and in samples from food processing. The food safety *Salmonella* criteria apply to products placed on the market during their shelf life. According to the criteria, *Salmonella* must be absent in the food categories mentioned in Table SA5. Absence is defined by testing five or thirty samples of 25 g per batch depending of the food category. In official controls, often only single samples are taken to verify compliance with the criteria.

In 2009, as in 2008, the highest levels of non-compliance with *Salmonella* criteria generally occurred in foods of meat origin (Figure SA4). Minced meat and meat preparations from poultry intended to be eaten cooked had the highest level of non-compliance (category 1.5; 8.7 % of single samples), but live bivalve molluscs and live echinoderms, tunicates and gastropods (category 1.17) come second with 3.4 % of single samples being positive for *Salmonella*. For this category, the majority of samples and positives was from live bivalve molluscs from Spain (N=358, pos=14), resulting in an increased proportion of non-compliance units when compared to 2008. Minced meat and meat preparations from other animal species than poultry intended to be eaten cooked, also had a relatively high level of non-compliance (category 1.6; 2.9 % of single samples). Of particular risk to human health are the *Salmonella* findings from the meat categories intended to be eaten raw (food categories 1.4 and 1.8 in Table SA5). Respectively, 1.2 % to 1.7 % of these units contained *Salmonella*.

In case of the batch-based data, the highest levels of non-compliance were also found in minced or mechanically separated meat as well as in meat preparations and products.

In all categories of meat origin, except minced meat and meat preparation to be eaten raw, the proportion of batches containing *Salmonella* decreased in 2009 compared to 2008. This trend was not observed for single samples, where the level of non-compliance actually increased in three out of six food categories of meat origin.

The proportion of non-compliant samples from egg products has fallen from 2.8 % to 0.2 % in single samples and from 0.3 % to less than 0.1 % in batches, compared to 2008.

In the other food categories, the level of non-compliance was generally very low, and overall the level of non-compliance in 2009 was comparable to the findings in 2008 (Figure SA4).

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

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

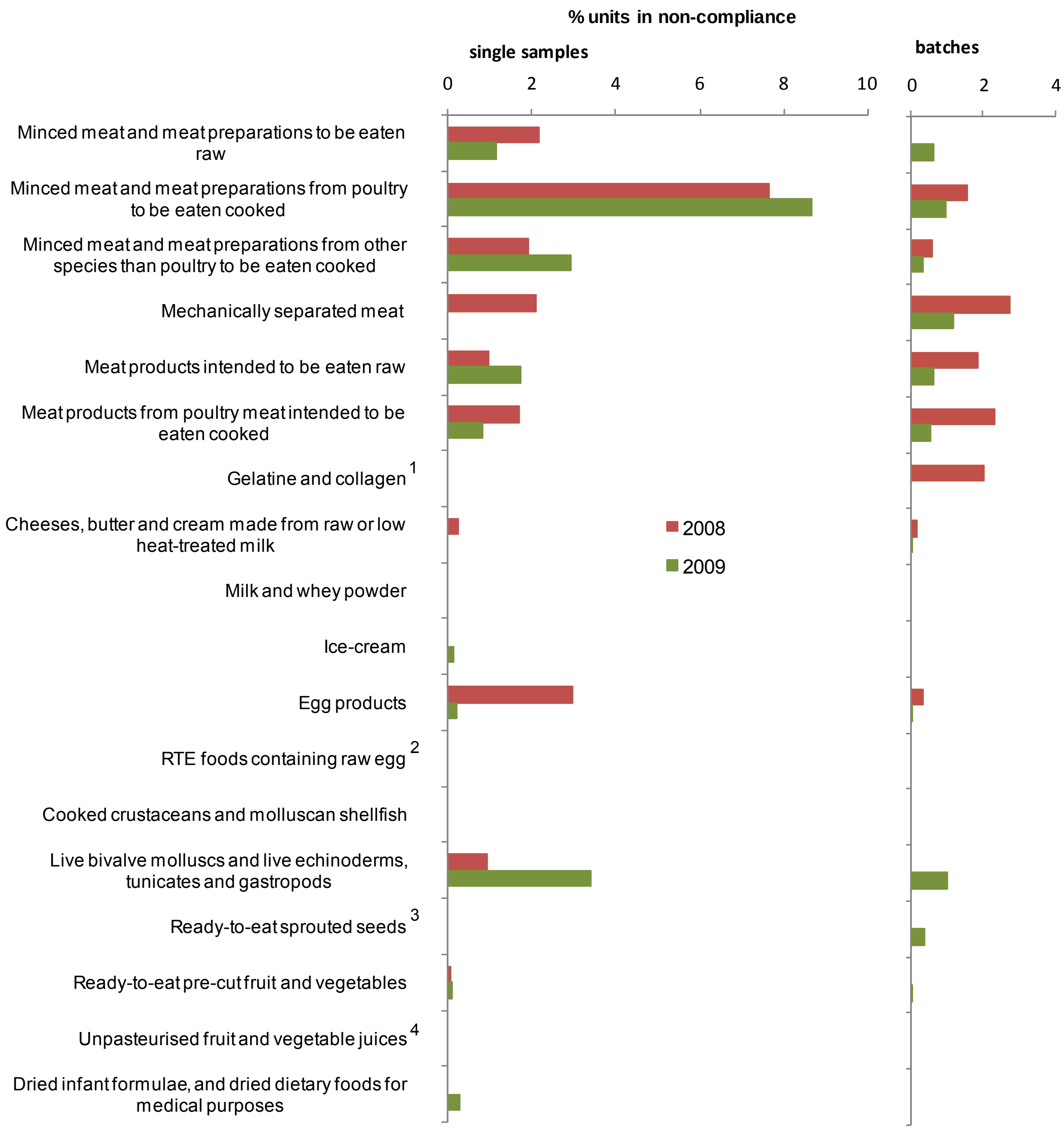
Table SA5. Compliance with the food safety* Salmonella *criteria laid down by EU Regulations 2073/2005 and 1441/2007, 2009

Food categories[1]		Total single samples			Total batches		
		Sample weight	N	% non-compliant	Sample weight	N	% non-compliant
1.4	Minced meat and meat preparations to be eaten raw	25 g	3,043	1.2	10 g or 25g or 200 g or not stated	7,132	0.6
1.5	Minced meat and meat preparations from poultry to be eaten cooked	10 g or 25 g or not stated	1,870	8.7	10 g or 25 g or 200 g or not stated	11,949	1.0
1.6	Minced meat and meat preparations from other species than poultry to be eaten cooked	10 g or 25 g or not stated	9,522	2.9	10 g or 25 g or 200 g or not stated	45,161	0.4
1.7	Mechanically separated meat	25 g or 250 g	156	0	10 g or 25 g or 100 g or 200 g or not stated	2,516	1.2
1.8	Meat products intended to be eaten raw	25 g	1,263	1.7	25 g	159	0.6
1.9	Meat products from poultry meat intended to be eaten cooked	10 g or 25 g or not stated	3,781	0.8	10 g or 25 g or not stated	9,269	0.5
1.10	Gelatine and collagen	25 g	73	0	-	-	-
1.11	Cheeses, butter and cream made from raw or low heat-treated milk	25 g	2,370	0	25 g or not stated	4,247	<0.1
1.12	Milk and whey powder	25 g	582	0	25 g or not stated	4,160	0
1.13	Ice-cream	25 g	10,433	0.1	25 g or not stated	3,837	0
1.14	Egg products	25 g	963	0.2	25 g or not stated	4,633	<0.1
1.15	RTE foods containing raw egg	-	-	-	-	-	-
1.16	Cooked crustaceans and molluscan shellfish	25 g	102	0	25 g or not stated	505	0
1.17	Live bivalve molluscs and live echinoderms, tunicates and gastropods	25 g	499	3.4	25 g or not stated	294	1.0
1.18	Sprouted seeds (RTE)	2.5 g or 25 g	56	0	2.5 g or 25 g	230	0.4
1.19	Pre-cut fruit and vegetables (RTE)	25 g	3,487	0.1	25 g or not stated	4,796	<0.1
1.20	Unpasteurised fruits, vegetables and juices (RTE)	25 g	50	0	25 g	205	0
1.22-23	Dried infant formulae, and dried dietary foods for medical purposes[2] and dried follow-on formulae	25 g	342	0.3	25 g or 750 g	220	0

Note: RTE: ready-to-eat products. Data are only presented for sample size ≥25.

1. Numbers before food categories refer to Annex 1, chapter 1 of Regulation (EC) No 1441/2007. See this for full description of food categories.
2. Intended for infants below six months of age.

Figure SA4. Proportion of units in non-compliance with EU Salmonella criteria, 2008-2009



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

1. No investigations with more than 25 samples of gelatine and collagen in 2008 and batches in 2009.
2. No investigations with more than 25 samples of RTE foods containing raw egg in 2008 and 2009, or batches in 2009.
3. No investigations with more than 25 batches of RTE sprouted seeds in 2009.
4. No investigations with more than 25 samples of unpasteurised fruit and vegetable juices in 2008.

Broiler meat and products thereof

The occurrence of *Salmonella* in fresh broiler meat at different levels of the production chain is presented in Table SA6. Overall, 5.4 % of the tested samples were positive for *Salmonella* within EU. This is a small increase from 5.1 % in 2008. Generally, the years may not be directly comparable due to variations in reporting MSs and meat categories covered over the years.

Salmonella was detected in most of the reported investigations. Seven out of 19 MSs, however, reported less than one percent positive samples in one or more investigations at some stage during the production. The highest proportions of positive samples (>20 %) were reported from Hungary and Spain (Table SA6). These results are generally in line with the findings from EU-wide baseline survey on *Salmonella* on broiler carcasses, the results of which are presented later in this chapter.

At slaughter, the reported proportion of positive samples varied among MSs from 0 % to 60.8 %, and at processing *Salmonella* was detected in 0 % to 31.1 % of the samples. At retail level, the range was from 0 % to 36.1 %. Hungary reported a very high proportion of positive single samples at slaughter and also reported a high proportion at processing and retail. Data from the MSs reporting investigations at different sampling stages, showed that sample tested at slaughter were found to be more contaminated than samples tested later in the food chain (Table SA6).

The monitoring data from Sweden included samples from all poultry species, and the results are therefore not included in Tables SA6 and SA7. However, the proportion of positive poultry meat samples in Sweden has been very low for the last 15 years. In 2009, Sweden did not detect *Salmonella* in any of the samples.

In 2009, 19 MSs reported *Salmonella* findings in non-ready-to-eat (non-RTE) broiler meat products (meat products, meat preparations and minced meat). Sixteen of these MSs reported data with 25 samples or more. Among these, the proportion of *Salmonella*-positive samples varied between 0 % and 38.2 %, but on average only 1.3 % of the samples were positive. The highest contamination levels were reported by Hungary and Belgium in non-RTE meat preparations at retail, where 38.2 % of single samples and 28.3 % of batches were positive, respectively. Data without indication whether the food was RTE or non-RTE have been assumed to be originating from non-RTE materials. Please refer to Level 3 tables for the data.

Thirteen MSs reported data for RTE broiler meat products with a sample size of 25 or more. Most MSs reported no positive findings; Spain and Austria were significant exceptions with 3.5 % and 1.6 % of single samples being positive, respectively (Table SA7).

Table SA6. Salmonella in fresh broiler meat at slaughter, processing/cutting level and retail, 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
At slaughter								
Belgium[1]	Single	1 g	422	5.9	285	14.4	58	10.3
Czech Republic[1]	Batch	25 g	708	3.0	1,367	4.2	1,697	1.8
Denmark[2,3]	Batch	25 g/50 g/60 g	-	-	518	0.6	828	1.2
Estonia	Batch	25 g	48	0	-	-	-	-
Germany	Single	25 g	248	1.6	55	12.7	-	-
Greece	Single	25 g	-	-	76	6.6	-	-
Hungary	Single	25 g	653	60.8	-	-	232	43.5
Ireland[1]	Single	Approx. 25 g	250	14.0	-	-	-	-
Latvia[1,4]	Single	10 g/25 g	-	-	50	22.0	100	15.0
Poland[5]	Single	25 g	-	-	-	-	1,340	7.5
	Batch	25 g	8,664	5.5	-	-	-	-
Romania[6]	Single	25 g	-	-	-	-	7,698	1.0
	Batch	25 g	1,167	0.9	2,027	0.6	-	-
Spain[7]	Single	25 g	90	26.7	465	15.1	184	22.3
Switzerland[8]	Single	25 g	-	-	-	-	-	-
	Batch	10 g/25 g	-	-	-	-	-	-
At processing/cutting plant								
Austria[8]	Single	25 g	39	2.6	64	0	67	7.5
Belgium	Single	25 g	415	8.2	568	7.0	-	-
	Batch	25 g	-	-	-	-	170	6.5
Estonia	Batch	25 g	48	0	48	0	94	1.1
Finland	Single	25 g	802	0	768	0	757	0
Germany	Single	25 g	60	6.7	79	5.1	36	11.1
Greece	Single	25 g	-	-	77	15.6	27	55.6
Hungary	Single	25 g	302	31.1	-	-	-	-
Ireland[9]	Single	Various	116	2.6	-	-	387	9.6
	Batch	Various	-	-	219	15.1	261	11.5
Poland	Batch	200 g/500 g	70	0	-	-	-	-
Romania	Batch	25 g	153	0	294	0.7	-	-
Slovenia	Single	25 g	96	0	-	-	187	0.5
Spain	Single	25 g	105	5.7	91	15.4	144	2.8
Switzerland	Batch	10 g/25 g	-	-	-	-	-	-
	Single	25 g	-	-	-	-	-	-

Table continued overleaf.

Table SA6 (contd.). Salmonella in fresh broiler meat at slaughter, processing/cutting level and retail, 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
At retail								
Austria[8]	Single	25 g	51	0	295	7.8	86	5.8
Belgium[10]	Single	25 g	119	5.9	88	11.4	276	8.0
Bulgaria	Batch	25 g	8,414	0.1	4,046	0.3	-	-
Czech Republic	Single	27 g	240	1.7	-	-	-	-
France[11]	Single	25 g	361	3.6	-	-	-	-
Germany[12]	Single	25 g	599	6.2	993	10.8	714	8.5
Germany[13]	Single	25 g	449	7.6	-	-	-	-
Greece	Single	25 g	-	-	64	15.6	69	11.6
Hungary	Single	25 g	97	36.1	-	-	-	-
Latvia	Single	10 g	-	-	85	8.2	200	3.0
Lithuania	Single	25 g	71	1.4	136	16.2	-	-
Luxembourg	Single	25 g	81	3.7	101	5.9	254	6.7
Netherlands	Single	25 g	615	7.6	-	-	1,418	8.1
	-	25 g	-	-	1,408	7.7	-	-
Romania	Single	25 g	149	0	-	-	-	-
	Batch	25 g	-	-	295	2.4	-	-
Slovakia	Single	25 g	35	2.9	-	-	-	-
Slovenia	Single	25 g	106	1.9	315	0.6	343	2.3
Spain	Single	25 g	167	13.8	195	3.6	206	10.2
Switzerland[14]	Single	25 g	-	-	-	-	415	6.5
Sampling level not stated								
Austria[8,15]	Single	25 g	212	4.7	-	-	54	5.6
Belgium	Single	1 g	-	-	-	-	-	-
Czech Republic	Batch	25 g	-	-	-	-	-	-
Germany	Single	25 g	-	-	-	-	-	-
Hungary	Batch	25 g	-	-	188	75.5	-	-
Italy	Batch	25 g	-	-	38	2.6	206	4.9
	Batch	-	-	-	25	0	-	-
	Single	25 g	-	-	-	-	736	2.4
	Single	-	369	16.5	-	-	-	-
Poland	Batch	10 g/25 g/300 g	-	-	-	-	4,421	12.0
Portugal	Single	25 g	-	-	-	-	-	-
Slovakia	Batch	25 g	-	-	32	12.5	-	-
	Single	25 g	-	-	-	-	258	0.4
Total (19 MSs in 2009)			**26,591**	**5.4**	**15,355**	**5.1**	**23,508**	**5.6**

Note: Data are only presented for sample size ≥25. Carcass swabs are included in fresh meat.

1. Carcass (neck skin).
2. 60 g in 2008, 25 g/50 g in 2007.
3. Carcass (neck skin) in 2008.
4. 10 g in 2008, 25 g in 2007.
5. Carcass (neck skin) in 2007.
6. 266 of the 2009 samples were from carcasses (neck skin) (8 positive).
7. 389 of the 2008 samples were from carcasses (58 positive).
8. 10 g/25 g in 2007.
9. Single samples were 25 g in 2007.
10. Carcass in 2008.
11. 120 of the 2009 samples were from carcass (9 positive).
12. Surveillance in 2009.
13. Monitoring in 2009.
14. In Switzerland in 2007, from the 415 samples 245 originated from Switzerland (0. 4% positive), 168 were imported (14.8 % positive) and for two samples the origin was unknown.
15. Carcass in 2009

Table SA7. **Salmonella** *in ready-to-eat broiler meat product samples, 2009*

Country	Sample unit	Sample weight	N	% pos
At processing plant				
Czech Republic	Batch	25 g	249	0
Hungary	Single	25 g	293	0
Ireland	Single	25 g	114	0
Poland	Batch	25 g	874	0.1
Romania	Batch	25 g	130	0
Slovakia	Batch	25 g	33	0
Switzerland	Batch	25 g	-	-
At retail				
Bulgaria	Batch	-	403	0
Czech Republic	Single	25 g	36	0
Estonia	Single	10 g	25	0
Germany	Single	25 g	181	0.6
Hungary	Single	25 g	170	0.6
Ireland	Single	25 g	433	0
Lithuania	Single	25 g	26	0
Portugal	Batch	25 g	32	0
Slovakia	Batch	25 g	40	0
Spain	Single	25 g	57	3.5
Sampling level not stated				
Austria	Single	25 g	188	1.6
Total (13 MSs)			**3,284**	**0.2**

Note: Data are only presented for sample size ≥25. Only meat product samples presented.

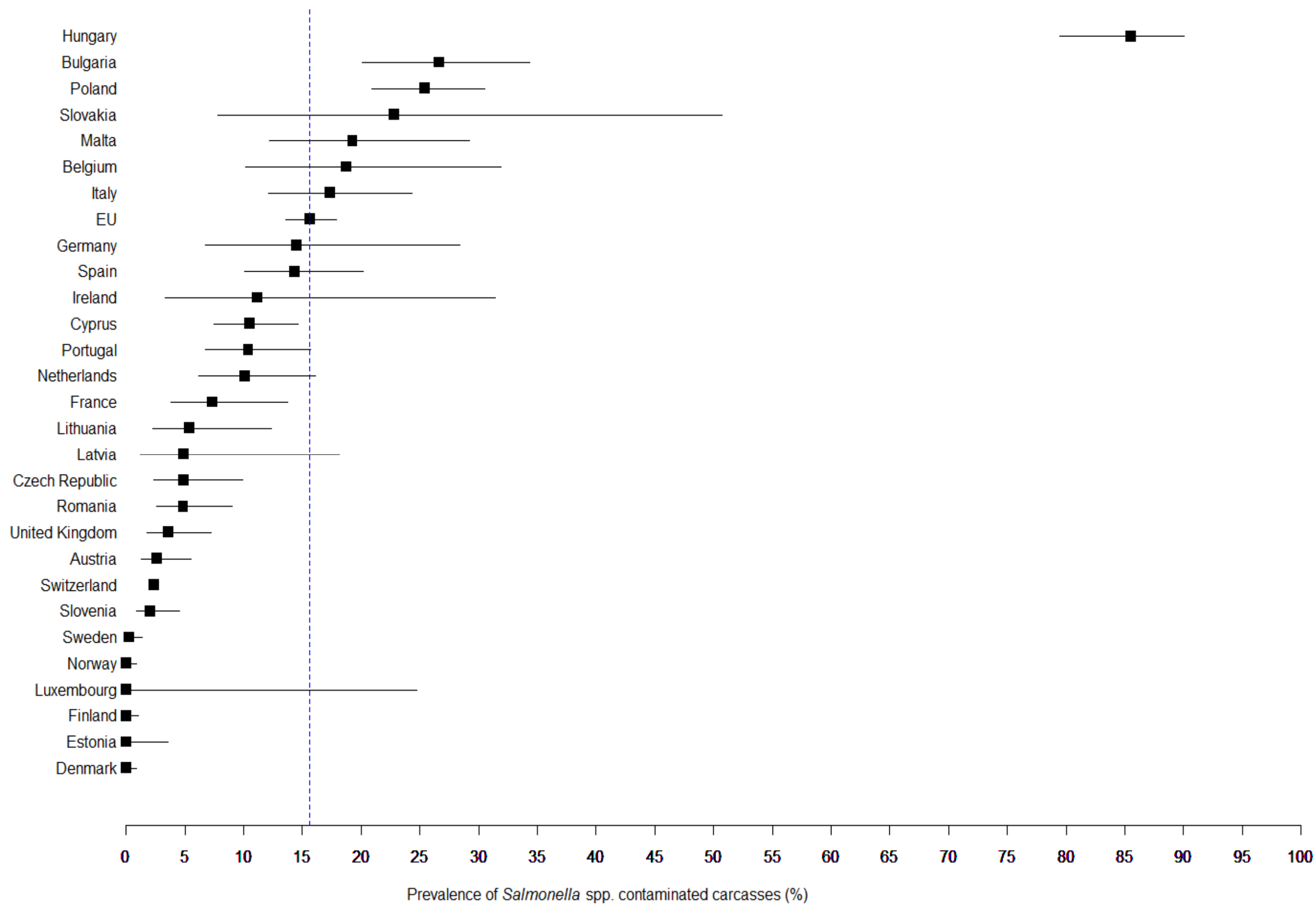
Broiler carcasses: EU-wide baseline survey, 2008

From January to December 2008, an EU-wide fully harmonised *Salmonella* baseline survey was conducted on broiler carcasses. Twenty-six MSs and two non-MSs (Norway and Switzerland) participated in the survey. Greece did not carry out the survey. The objective of the survey was to obtain comparable data for all MSs through harmonised sampling schemes.

The cleaned dataset contained data from 10,132 broiler batches sampled from 561 slaughterhouses. The sampling of broiler batches was based on a random selection of slaughterhouses, and batches were sampled each month. From each randomly selected batch one whole carcass was collected immediately after chilling but before freezing, cutting or packaging, for the detection of *Salmonella.*

Salmonella was detected on broiler carcasses in all participating countries with the exception of Denmark, Estonia, Finland and Luxembourg and of the non-MS Norway. EU prevalence was 15.6 % (95 % CI: 13.6-17.9). MS prevalence ranged from 0 % to 26.6 %, with the exception of a very high prevalence of 85.6 % in Hungary. The prevalence of *Salmonella*-contaminated broiler carcasses is presented in Figure SA5, which shows that seven MSs have a prevalence higher than EU prevalence.

Figure SA5. Prevalence[1] of* Salmonella*-contaminated broiler carcasses in EU[2], baseline survey 2008



1. Horizontal lines represent 95 % confidence intervals. The dashed lines indicate EU mean prevalence of 26 participants.

2. Greece did not participate in the baseline survey and two non-MSs, Norway and Switzerland, participated.

Salmonella Enteritidis and/or *Salmonella* Typhimurium were detected on broiler carcasses in 17 MSs and in one non-MS. EU prevalence was 3.6 % (95 % CI: 2.8-4.6). Prevalence in EU ranged from 0 % (Cyprus, Denmark, Estonia, Finland, Ireland, Luxembourg, Malta, Sweden and the United Kingdom) to 9.6 % (Poland).

At least one isolate from each positive sample was typed according to the White-Kaufmann-Le Minor-scheme. Isolates from 1,225 *Salmonella*-positive carcasses from the 10,035 carcasses sampled were serotyped. Two different *Salmonella* serovars were isolated from 29 *Salmonella*-positive carcasses and from one carcass three different serovars were reported.

The frequency distributions of the ten most common *Salmonella* serovars on contaminated broiler carcasses in EU and two non-MSs are listed in decreasing order in Table SA8. The serovar frequency distribution, overall as well as for each MS, was based on the serovar-specific number of typed isolates per total number of *Salmonella*-contaminated carcasses, including untypeable isolates. Overall, there were 56 different *Salmonella* serovars identified in the survey. *S.* Infantis was the most frequently reported serovar on broiler carcasses in EU found in 29.2 % of the *Salmonella*-contaminated carcasses. The two next most frequently isolated serovars were *S.* Enteritidis and *S.* Kentucky (13.6 % and 6.2 %, respectively). *S.* Typhimurium was ranked fourth followed closely by *S.* Bredeney (4.3 %) and *S.* Virchow (4.1 %). Serovar distribution varied substantially among MSs. Despite being the most frequently isolated serovar in EU, *S.* Infantis was the dominant serovar in only two of the 22 MSs reporting *Salmonella* findings (Hungary and Slovenia, 97.8 % (N=275) and 57.1 % (N=7) of isolates, respectively) and in Switzerland (40 % of the isolates, N=10). *S.* Enteritidis was the most commonly detected serovar in five MSs (Latvia, Poland, Portugal, Slovakia and Spain) and *S.* Kentucky in two MSs (Ireland and the United Kingdom). *S.* Typhimurium was not reported as the most commonly detected serovar in any country.

Table SA8. Distribution of the ten most common* Salmonella *serovars on broiler carcasses[1], baseline survey 2008.

Countries	Total of *Salmonella* contaminated carcasses	% of contaminated broiler carcasses										
		S. Infantis	*S*. Enteritidis	*S*. Kentucky	*S*. Typhimurium	*S*. Bredeney	*S*. Virchow	*S*. Hadar	*S*. Paratyphi B var. Java	*S*. Agona	*S*. Indiana	Other serovars and non-typeable
Austria	10	10	20	10	10	-	-	-	-	-	-	50
Belgium	77	9.1	-	-	14.3	-	23.4	1.3	9.1	6.5	1.3	35.1
Bulgaria	85	15.3	21.2	-	-	-	5.9	-	-	-	-	41.2
Cyprus	38	7.9	-	-	-	-	-	23.7	-	-	-	57.9
Czech Republic	23	4.4	17.4	8.7	-	-	-	-	-	52.2	-	17.4
France	32	-	3.1	-	-	-	-	3.1	-	6.3	37.5	62.5
Germany	76	7.9	-	-	26.3	10.5	-	1.3	11.8	-	5.3	54
Hungary	275	97.8	4.7	-	0.4	-	-	-	-	-	0.7	1.5
Ireland	39	-	-	100	-	-	-	-	-	-	-	-
Italy	66	1.5	1.5	-	-	1.5	1.5	27.3	-	-	-	42.4
Latvia	6	-	100	-	-	-	-	-	-	-	-	-
Lithuania	26	-	3.9	-	-	-	-	-	-	11.5	-	69.2
Malta	77	3.9	-	19.5	-	36.4	-	2.6	-	-	-	37.7
Netherlands	43	7	-	-	2.3	-	-	2.3	69.8	2.3	2.3	14
Poland	107	24.3	28	-	9.4	-	10.3	7.5	-	3.7	0.9	15.9
Portugal	47	-	80.9	-	-	-	-	-	-	-	-	19.1
Romania	17	-	11.8	-	5.9	17.7	47.1	-	-	-	-	17.6
Slovakia	91	16.5	29.7	15.4	-	-	-	-	-	7.7	15.4	15.4
Slovenia	7	57.1	28.6	-	-	-	-	-	-	-	-	14.3
Spain	58	3.5	36.2	-	8.6	1.7	12.1	10.3	-	-	-	27.6
Sweden	1	-	-	-	-	-	-	-	-	100	-	-
United Kingdom	14	-	-	35.7	-	7.1	-	-	-	7.1	-	50
Switzerland	10	40	-	-	30	-	-	-	-	10	-	20
Total no of contaminated carcasses	**1,225**	**358**	**166**	**76**	**54**	**53**	**50**	**47**	**46**	**37**	**35**	**335**
Proportion (%) of contaminated carcasses		29.2	13.6	6.2	4.4	4.3	4.1	3.8	3.8	3	2.9	27.3

1. The serovar distribution (% of carcasses with serovars) was based on the number of *Salmonella*-contaminated carcasses. Ranking was based on the sum of all reported serovars. In some carcasses more than one serovar was isolated. Each serovar was counted only once per carcass.

More information on the analysis of this survey's results can be found in the EFSA report[13].

13 EFSA (European Food Safety Authority), 2010. Report of Task Force on Zoonoses Data Collection on the analysis of the baseline survey on the prevalence of *Campylobacter* in broiler batches and of *Salmonella* on broiler carcasses in EU, 2008, Part A: *Campylobacter* and *Salmonella* prevalence estimates. EFSA Journal, 8(03):1503, 99 pp.

Turkey meat and products thereof

The occurrence of *Salmonella* in fresh turkey meat and RTE products thereof at different stages of the food chain in 2009 is presented in Tables SA9 and SA10. Overall, in fresh meat, 8.7 % of the tested samples were positive for *Salmonella* in EU, ranging from 0 % up to 30.2 % in single samples from Italy. The overall level of contamination in RTE products from turkey meat was, however, very low (0.8 %), but findings up to 6.7 % positive were reported by Germany in single samples.

Sixteen MSs reported *Salmonella* findings in non-RTE turkey meat products (meat products, meat preparations and minced meat), and eight of these MSs reported data with more than 25 samples. The proportion of *Salmonella*-positive samples varied between 0 % and 16.2 % with an average of 3.6 %. Data without indication of RTE or non-RTE have been assumed to be originating from non-RTE materials. Please refer to Level 3 tables for the data.

Table SA9. **Salmonella** ***in fresh turkey meat, 2009***

Country	Sample unit	Sample weight	N	%pos
At slaughter				
Czech Republic[1]	Batch	25 g	168	2.4
Hungary	Single	25 g	463	20.7
Poland	Batch	27 g	125	0
Switzerland	Batch	10 g/25 g	-	-
Cutting and processing plant				
Finland	Single	25 g	325	0
Germany	Single	25 g	43	4.7
Hungary	Single	25 g	255	19.2
Poland	Batch	10 g/25 g	1,398	6.9
Slovenia	Single	25 g	26	0
Switzerland	Batch	10 g	-	-
At retail				
Austria	Single	25 g	34	11.8
Bulgaria	Batch	-	52	0
Germany[2]	Single	25 g	433	8.5
Germany[3]	Single	25 g	434	5.8
Hungary	Single	10 g/25 g	83	4.8
Slovenia	Single	25 g	28	3.6
Sampling level not stated				
Italy	Single	-	86	30.2
Total (9 MSs)			**3,953**	**8.7**

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

1. Neck skin.

2. Surveillance.

3. Monitoring.

***Table SA10.* Salmonella *in ready-to-eat turkey meat products, 2009*[1]**

Country	Sample unit	Sample weight	N	% pos
Cutting and processing plant				
Germany	Single	25 g	30	6.7
Hungary	Single	25 g	239	0
Ireland	Single	25 g	61	0
Poland	Batch	10 g	1,422	1.1
At retail				
Germany	Single	25 g	86	1.2
Hungary	Single	25 g	104	0
Ireland	Single	25 g	99	0
Portugal	Batch	25 g	130	0
Total (5 MSs)			**2,171**	**0.8**

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

1. All data from 2009 were from meat products.

Eggs and egg products

According to EU legislation, starting from 1 January 2009, eggs shall not be used for direct human consumption as table eggs unless they originate from a commercial flock of laying hens subject to a national *Salmonella* control programme. Eggs originating from flocks with unknown health status, that are suspected of being infected with *S.* Enteritidis or *S.* Typhimurium or from infected flocks may be used for human consumption only if treated in a manner that guarantees the elimination of all *Salmonella* serotypes with public health significance and marked in a way which easily distinguishes them from table eggs before being placed on the market (Regulation (EC) No 1237/2007)[14].

Fourteen MSs reported data from investigations of table eggs and the findings are presented in Table SA11. In 2009, a total of 0.5 % of the tested samples was positive for *Salmonella*, which was the same proportion as found in 2008. Germany and Bulgaria reported the majority of the investigations at retail (78.2 %) where 0.3 % and 0 % of the samples were positive, respectively.

Six MSs have reported results on *Salmonella* in table eggs for the last three years. In Austria, the Czech Republic, Germany and Poland, the proportion of tables eggs contaminated with *S.* Enteritidis has decreased since 2007 (Figure SA6). There were no positive table eggs reported from Greece during the three-year period, whereas the occurrence of *S.* Enteritidis varied considerably in Spain, ranging from 0 % to 6.3 %.

Seven MSs reported results of investigations of egg products and eggs other than table eggs at retail level (or level not stated) with 25 samples or more. Only 0.6 % of 3,765 units tested were found positive with a maximum of 2.4 % in egg products from Italy. Please refer to Level 3 tables for the data.

14 Commission Regulation (EC) No 1237/2007 amending Regulation (EC) No 2160/2003 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.

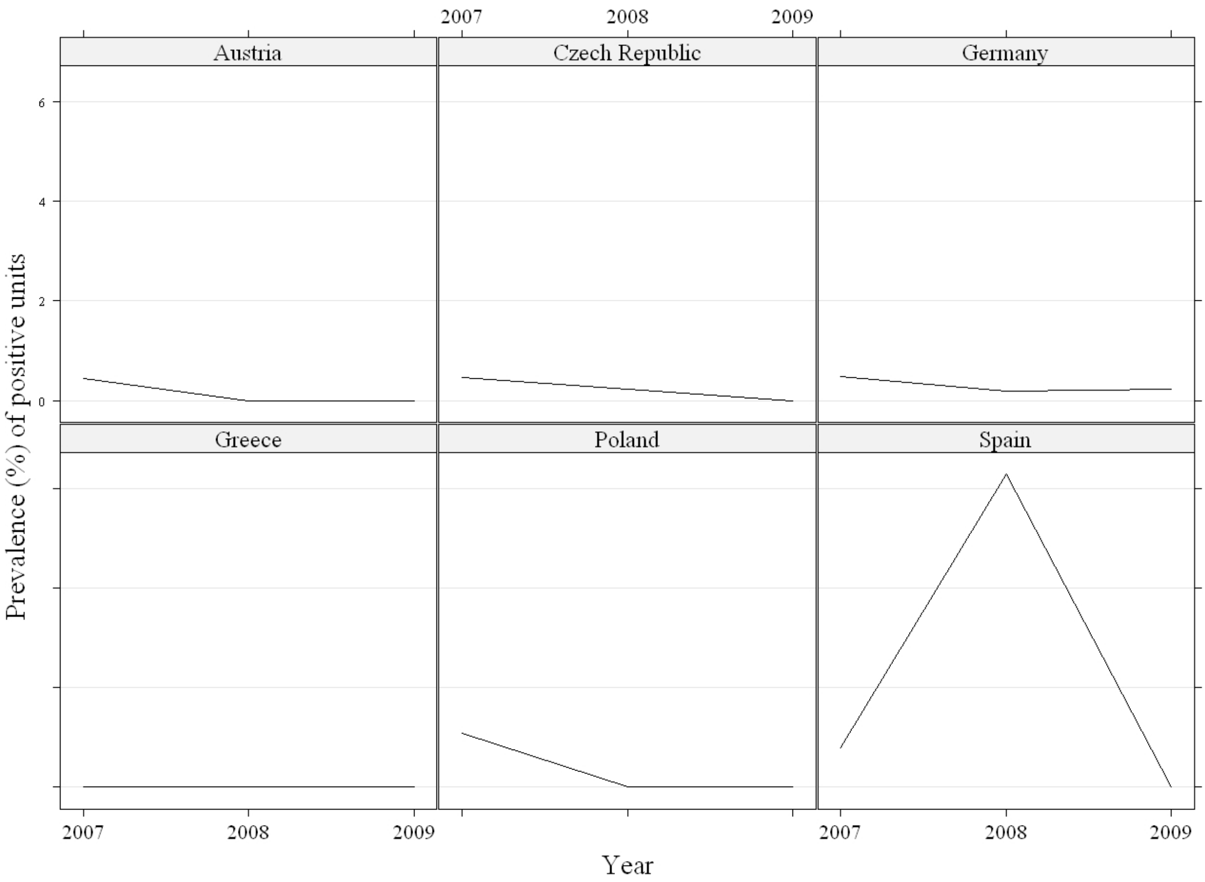
Table SA11. Salmonella *in table egg samples, 2007-2009*

Country	Sample unit	Sample weight	2009 N	2009 % pos	2008 N	2008 % pos	2007 N	2007 % pos
At farm								
Romania	Batch	25 g	94	1.1	-	-	-	-
At packing centre/processing plant								
Austria	Single	25 g	25	0	-	-	-	-
Bulgaria	Batch	-	3,239	0	-	-	-	-
Czech Republic	Batch	25 g	330	0	451	0.4	428	0.5
Germany	Single	25 g	536	0.4	1,352	0.1	795	0.6
Greece	Single	25 g	85	0	26	0	128	0
Estonia	Single	25 g	-	-	-	-	68	0
Ireland	Single	25 g	-	-	-	-	88	1.1
Italy[1]	Batch	25 g	-	-	29	0	155	5.8
	Single	25 g	-	-	46	0	186	2.2
Latvia	Single	25 g	-	-	-	-	102	0
Poland	Batch	25 g	363	0	-	-	605	1.2
Portugal	Single	25 g	40	0	-	-	-	-
Romania	Batch	25 g	224	0	29	0	-	-
	Single	25 g	-	-	-	-	2,970	0
Slovakia	Batch	25 g	-	-	81	3.7	95	1.1
Spain	Single	25 g	1,947	0.2	207	6.3	1,653	2.8
At retail								
Austria	Single	25 g	30	0	57	0	225	0.4
Belgium	Batch	25 g	118	0	3,267	0	-	-
	Single	25 g	-	-	109	0	117	0
Bulgaria	Batch	-	1,847	0	-	-	-	-
Czech Republic	Batch	25 g	-	-	-	-	120	0
	Single	25 g	48	2.1	-	-	-	-
Germany	Single	25 g	4,587	0.3	6,003	0.3	5,521	0.7
Greece	Single	25 g	96	0	178	0	101	0
Hungary	Batch	Shells of 10 eggs + 25 ml egg yolk from 5 eggs	672	0	846	0.4	158	0
Ireland	Single	25 g	-	-	115	0.9	-	-
Italy[1]	Batch	25 g	-	-	224	0.4	-	-
	Single	25 g	-	-	73	4.1	160	0.6
Latvia	Single	25 g	-	-	128	2.3	-	-
Lithuania	Single	25 g	26	0	45	4.4	-	-
Luxembourg	Single	25 g	-	-	-	-	258	0.4
Netherlands	Batch	25 g	-	-	-	-	975	0
Poland	Batch	25 g	84	3.6	286	0	277	1.8
Romania	Batch	25 g	-	-	54	0	-	-
	Single	25 g	63	0	-	-	1,043	0
Slovakia	Batch	25 g	-	-	53	22.6	133	1.5
	Single	25 g	99	1.0	-	-	-	-
Spain	Single	25 g	555	5.4	-	-	-	-
Sampling level not stated								
Germany	Single	25 g	-	-	-	-	66	0
Italy[1]	Batch	-	858	2.4	-	-	-	-
	Single	25 g	-	-	-	-	60	1.7
Spain	Single	25 g	-	-	-	-	41	2.4
Total (14 MSs in 2009)			**15,966**	**0.5**	**13,659**	**0.5**	**16,528**	**0.8**

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

1: For Italy in 2009, it is not stated whether samples were table eggs.

Figure SA6. **Salmonella *Enteritidis in table eggs from six MSs, 2007-2009***



Pig meat and products thereof

Many of the national monitoring programmes on *Salmonella* in pig meat and products thereof are based on sampling at the slaughterhouse and meat cutting plants. At the slaughterhouse, sampling is carried out through carcass swabbing or sampling of meat. The MS monitoring programmes for *Salmonella* in pig meat are described in Appendix Table SA16.

The occurrence of *Salmonella* in fresh pig meat at different stages of the production line from 2007 to 2009 is presented in Table SA12. Overall, 0.7 % of the tested samples were positive for *Salmonella* in 2009, which was at the same level as in 2008 (0.8 %) and slightly lower than in 2007 (1.2 %). The proportion of *Salmonella*-positive samples at slaughterhouse ranged from 0 % to 13.7 % with Belgium reporting the highest proportion of positives. However, Belgium used a sensitive sampling method in the investigation. Finland, Sweden and Norway reported no positive samples at slaughter, and very low levels were recorded by the Czech Republic, Germany, Hungary, Poland and Romania. At processing and cutting plants, *Salmonella* was found in up to 5.5 % in fresh pig meat samples. Greece reported the highest proportion of positive samples. At retail, *Salmonella* was reported in up to 3.5 % of samples, which is much lower than the highest value reported in 2008. Likewise, the overall fraction of positive samples at retail was 0.7 % while it was 1.4 % in 2008. Austria, Greece and Hungary reported no positive samples of fresh pig meat at retail.

Sweden reported the testing of 3,888 samples of fresh meat from cutting plants (reported as crushed meat) during 2009. No separation was made between meat from pigs and bovine animals, and the data are not presented in Table SA12. However, none of the samples were positive for *Salmonella*. Likewise, Sweden reported analyses of 1,514 samples from retail containing both fresh meat and meat products from pigs and bovine animals. One of these samples was positive. Spain also reported 14.3 % positive samples of fresh "meat from other animal species or unspecified" at retail (N=35).

In 2009, 18 MSs reported *Salmonella* findings in non-RTE pig meat products (meat products, meat preparations and minced meat). Sixteen of these MSs reported data with more than 25 samples, reaching a total amount of almost 50,000 samples. In particular, Bulgaria performed many analyses within this category, reaching a total of 20,482 tested units. On average only 0.7 % of the units were positive at the reporting MS level, but a contamination level up to 17.6 % was reported (Portugal, meat preparations intended to be eaten cooked, sampled at the processing plant). Data without indication of RTE or non-RTE have been assumed to be originating from non-RTE materials. Please refer to Level 3 tables for the data.

In RTE products of pig meat, *Salmonella* was detected in 17 of the 32 investigations with <0.1 % to 12.3 % positive findings and overall 0.4 % of the tested samples were positive (Table SA13). The highest proportion of positive samples at retail was reported by Germany for minced meat intended to be eaten raw (4.3 %). Hungary found *Salmonella* in fermented sausages from pig meat, both at processing and at retail, 2.3 % and 2.4 % of samples testing positive, respectively.

Table SA12. Salmonella in fresh pig meat, at slaughter, cutting/processing level and retail, 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
At slaughterhouse								
Belgium[1]	Single	600 cm^2	840	13.7	281	14.6	293	16.0
	Single	100 cm^2	-	-	-	-	386	19.4
Czech Republic[1]	Batch	100 cm^2	5,262	0.2	5,625	0.6	6,979	0.7
Denmark[1,2]	Single	300 cm^2	24,505	1.1	27,189	1.3	27,543	1.1
Estonia[1,3]	Single	1400 cm^2	713	1.5	520	0.2	636	0
Finland[1,4]	Single	1400 cm^2	6,479	0	6,447	<0.1	6,363	0
Germany[5]	Single	10 g	4,761	0.6	5,726	1.3	5,233	3.8
Hungary[6]	Single	25 g	-	-	-	-	178	3.4
	Single	-	860	0.2	-	-	-	-
Latvia[1]	Single	-	-	-	2,150	0.7	3,500	0.2
Lithuania	Batch	25 g	-	-	-	-	480	1.9
Poland[7]	Batch	100 cm^2	-	-	33,225	0.1	-	-
	Batch	400 cm^2	20,146	0.1	-	-	-	-
Portugal[1]	Single	100 cm^2	-	-	105	23.8	-	-
	Batch	-	125	2.4	-	-	-	-
Romania[8]	Batch	25 g	633	0.3	1,438	<0.1	-	-
	Batch	400 cm^2	824	1.2	1,491	1.0	-	-
Slovakia[1]	Single	100 cm^2	-	-	-	-	125	0
Spain	Single	25 g	174	6.9	276	6.2	315	4.8
Sweden[1,9,10]	Single	1,400 cm^2	5,989	0	5,833	<0.1	6,239	<0.1
Norway[1,10]	Single	1,400 cm^2	2,029	0	2,151	0	3,472	0.1
At cutting/processing plants								
Belgium	Single	25 g	239	3.3	122	5.7	537	4.1
Estonia	Single	25 g	373	0	424	0	520	0.4
Finland	Single	25 g	1,838	0	2,058	0	2,329	<0.1
Germany	Single	25 g	432	3.7	348	4.9	304	8.9
Greece	Single	25 g	73	5.5	-	-	-	-
Hungary	Single	25 g	363	1.7	-	-	-	-
Ireland[7]	Single	25 g	28	0	30	0	-	-
	Single	various	-	-	322	0.3	-	-
Lithuania	Single	25 g	31	0	-	-	-	-
Portugal	Single	25 g	61	3.3	-	-	-	-
Romania	Batch	25 g	424	1.7	1,698	0.8	-	-
Slovenia	Single	25 g	322	0.3	281	0	168	0
Spain	Single	25 g	27	3.7	149	4.0	63	7.9

Table continued overleaf

Table SA12 (contd.). Salmonella in fresh pig meat, at slaughter, cutting/processing level and retail, 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
At retail								
Austria[11]	Single	10 g/25 g	46	0	30	0	400	1.0
Bulgaria	Batch	-	3,986	<0.1	4,027	0.2	-	-
Germany[12]	Single	25 g	2,059	1.7	1,902	2.2	1,664	2.8
Germany[13]	Single	25 g	427	1.4	-	-	-	-
Greece	Single	25 g	61	0	-	-	30	0
Hungary	Single	25 g	89	0	-	-	-	-
Italy	Single	25 g	-	-	28	0	-	-
Luxembourg	Single	25 g	-	-	-	-	39	5.1
Netherlands	Single	25 g	313	1.6	319	2.8	277	3.2
Romania	Batch	25 g	-	-	659	3.6	-	-
	Single	25g	124	0.8	-	-	-	-
Slovenia	Single	25 g	-	-	-	-	385	0.3
Spain	Single	25 g	85	3.5	236	12.7	66	6.1
United Kingdom[14]	Single	-	-	-	1,693	0.5	-	-
Sampling level not stated								
Hungary	Batch	25 g	-	-	360	1.7	-	-
Italy	Single	25 g	-	-	1,034	2.3	2,430	2.9
	Single	-	1,085	2.4	-	-	-	-
	Batch	25 g	-	-	2,908	2.9	170	3.5
	Batch	-	-	-	139	0	-	-
Poland	Batch	-	-	-	-	-	9,715	0.4
Slovakia[4]	Single	10 g/25 g	-	-	-	-	2,025	0
	Batch	25 g	-	-	101	0	-	-
Total (18 MSs in 2009)			**83,797**	**0.7**	**109,174**	**0.8**	**79,392**	**1.2**

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

1. Carcass swab.
2. In Denmark, the majority of samples are tested in pools of five carcass swabs. At small slaughterhouses, carcass samples are tested individually. Prevalence of *Salmonella* in single swab samples is estimated from results of a pooled analysis.
3. Sample unit stated as "animal" in 2008 and 2007.
4. Sample unit stated as "animal" in 2008.
5. 25 g in 2008.
6. Surface sample in 2009. Area not indicated.
7. Carcass swabs in 2008.
8. Samples of 400 cm^2 are carcass swabs.
9. Sample unit of 2009 not stated.
10. Sample unit stated as "animal" in 2007.
11. 10 g/25 g in 2009, 25 g in 2008, 10 g in 2007.
12. Surveillance in 2009.
13. Monitoring in 2009.
14. Samples are swab samples of surface of red meat.

Table SA13. ***Salmonella** in ready-to-eat minced meat, meat preparations and meat products from pig meat, 2009*

Country	Description	Sample unit	Sample weight	N	%pos
At processing plant					
Czech Republic	Meat products	Batch	25 g	1,546	<0.1
Estonia	Meat products	Single	25 g	104	0
Germany	Meat products	Single	25 g	78	0
	Minced meat	Single	25 g	212	2.4
Greece	Meat preparation	Single	25 g	128	3.9
Hungary	Meat products	Single	25 g	253	0.8
	Fermented sausages	Single	25 g	528	2.3
Ireland	Meat products	Single	25 g	130	0
Poland	Meat products	Batch	200 g	8,480	<0.1
	Meat preparation	Batch	25 g	3,177	0.2
	Minced meat	Batch	25 g	1,160	1.0
Portugal	Meat products	Single	25 g	57	12.3
Romania	Meat products	Batch	25 g	696	0
Slovakia	Meat products	Batch	25 g	338	0
At retail					
Austria	Meat products	Single	25 g	68	0
	Meat products	Single	10 g	387	0.3
Bulgaria	Meat products	Batch	-	3,513	0.1
	Meat preparation	Batch	-	215	0
	Minced meat	Batch	-	353	0.3
Czech Republic	Meat products	Single	25 g	60	0
	Meat products	Batch	25 g	77	0
Germany	Meat products	Single	25 g	644	0.2
	Minced meat	Single	25 g	416	4.3
Greece	Meat preparation	Single	25 g	60	0
Hungary	Meat products	Single	25 g	188	0.5
	Fermented sausages	Single	25 g	245	2.4
Ireland	Meat products	Single	25 g	343	0
Luxembourg	Meat products	Single	25 g	150	0
Netherlands	Meat products	Single	25 g	334	0.6
Romania	Meat products	Single	25 g	157	0
Slovakia	Meat products	Batch	25 g	187	0
Sampling level not stated					
Hungary	Pâté	Single	25 g	85	0
Total (14 MSs)				**24,369**	**0.4**

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

Bovine meat and products thereof

The occurrence of *Salmonella* in fresh bovine meat at different stages of production from 2007 to 2009 is presented in Table SA14. Corresponding to the previous years, the proportion of *Salmonella*-positive samples was very low (0.2 %) in 2009. In accordance to this, the proportion of positive samples was zero or very low in most reporting countries. The highest level of contamination was reported by Portugal for samples from slaughterhouse level (6.1 %).

The overall proportion of positive samples was 0.5 % for non-RTE minced meat, meat preparations and meat products with values ranging up to 13.6 % (Portugal, meat preparation intended to be eaten cooked, at retail, N=110). Data without indication of RTE or non-RTE have been assumed to be originating from non-RTE materials. Please refer to Level 3 tables for data.

Data on *Salmonella* findings in RTE bovine minced meat, meat preparations and meat products are summarised in Table SA15. Also for these categories, the overall proportion of positive samples was very low (0.4 %). The range of positive samples varied from 0 % to 1.2 % with the highest proportion reported by Poland for minced meat at processing plant level.

Table SA14. Salmonella in fresh bovine meat, at slaughter, cutting/processing level and retail, 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
At slaughterhouse								
Czech Republic[1,]	Batch	100 cm^2	4,410	<0.1	4,505	0.2	4,856	0.3
Denmark[1,3]	Single	300 cm^2	7,270	0.3	8,120	0.2	7,524	0.5
Estonia[1,4]	Single	1,400 cm^2	289	0	324	0.6	334	1.8
Finland[1,5]	Single	1,400 cm^2	3,163	0	3,125	0	3,133	0
Germany[6]	Single	10 g	9,736	0.3	8,479	0.4	8,119	0.7
Hungary[7]	Single	25 g	-	-	-	-	144	0.7
	Single	400 cm^2	186	1.1	-	-	-	-
Latvia[1]	Single	-	-	-	2,350	<0.1	3,000	0.1
Poland[1]	Batch	400 cm^2	7,806	0.2	-	-	-	-
Portugal[1]	Batch	-	180	6.1	-	-	-	-
Romania[7]	Batch	400 cm^2	402	0	925	0	-	-
	Batch	25 g	379	0	1,118	0.3	-	-
Spain	Single	25 g	426	2.1	892	1.9	60	6.7
Sweden[1,4,8]	Single	1,400 cm^2	3,621	0	3,280	0	3,782	<0.1
Norway[1,9]	Single	1,400 cm^2	2,097	0	1,588	0	2,096	0
At processing/cutting plants								
Estonia	Single	25 g	143	0	125	0	177	0.6
Finland	Single	25 g	2,040	0	2,054	0	2,062	0
Germany	Single	25 g	133	0.8	141	0	97	0
Hungary	Single	25 g	280	1.8	-	-	-	-
Ireland	Single	25 g	49	0	40	0	66	0
Poland[1]	Batch	100 cm^2	432	0	-	-	-	-
Romania	Batch	25 g	154	0	699	1.0	-	-
Slovenia	Single	300 cm^2	-	-	-	-	-	-
	Single	25 g	299	0	266	0	160	0
Spain	Single	25 g	104	0	105	3.8	155	1.9

Table continued overleaf

Table SA14 (contd).* Salmonella *in fresh bovine meat, at slaughter, cutting/processing level and retail, 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
At retail								
Austria	Single	10 g/25 g	30	0	-	-	-	-
Belgium			-	-	-	-	-	-
Bulgaria	Batch	-	951	0.1	1,226	0	-	-
Germany[10]	Single	25 g	547	0.7	575	0.7	489	0
Germany[11]	Single	25 g	404	0.5	-	-	-	-
Greece	Single	25 g	-	-	45	0	-	-
Hungary	Single	25 g	71	0	-	-	-	-
Italy	Single	-	-	-	49	0	-	-
Luxembourg	Single	25 g	-	-	-	-	27	0
Netherlands	Single	25 g	-	-	265	0	401	0.2
Romania	Batch	25 g	-	-	433	0	-	-
	Single	25 g	38	2.6	-	-	-	-
Slovenia	Single	25 g	135	0.7	-	-	385	0.5
Spain	Single	25 g	161	0	172	1.2	90	2.2
Sweden			-	-	-	-	-	-
United Kingdom[12]	Single	-	-	-	3,249	0.2	-	-
Sampling level not stated								
Hungary	Batch	25 g	-	-	213	2.3	-	-
Italy	Batch	25 g	-	-	425	0.2	-	-
	Single	-	456	0.2	-	-	-	-
	Batch	-	64	1.6	188	0	-	-
	Single	25 g	-	-	799	0	1,543	1.0
Poland			-	-	-	-	-	-
Poland			-	-	-	-	-	-
Poland	Batch	10 g/25 g/100 g	-	-	-	-	3,002	0.5
Poland			-	-	-	-	-	-
Slovakia	Single	10 g/25 g	-	-	-	-	1,639	0
	Batch	25 g	-	-	53	0	-	-
Total (15 MSs in 2009)			**44,359**	**0.2**	**44,240**	**0.2**	**41,245**	**0.4**

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

1. Carcass swab.
2. The 2007 data also include pools of four samples of muscle tissue.
3. In Denmark, the majority of samples are tested in pools of five carcass swabs. At small slaughterhouses, carcass samples are tested individually. Prevalence of Salmonella in single swab samples is estimated from results of a pooled analysis.
4. Sample unit stated as "animal" in 2008 and 2007.
5. Sample unit stated as "animal" in 2008.
6. 25 g in 2008.
7. Samples of 400 cm2 are carcass swabs.
8. Sample unit of 2009 not stated.
9. Sample unit stated as "animal" in 2007.
10. Surveillance in 2009.
11. Monitoring in 2009.
12. Swab samples of surface of red meat.

Table SA15.* Salmonella *in ready-to-eat minced meat, meat preparations and meat products from bovine meat, 2009

Country	Description	Sample unit	Sample weight	N	%pos
At processing plant					
Czech Republic	Meat products	Batch	25 g	467	0.2
Germany	Minced meat	Single	25 g	90	0
Hungary	Meat products	Single	25 g	63	0
Ireland	Meat products	Single	25 g	115	0
Poland	Meat products	Batch	10 g	63	0
	Meat preparation	Batch	10 g	411	0.5
	Minced meat	Batch	200 g	1,031	1.2
Romania	Meat products	Batch	25 g	29	0
At retail					
Bulgaria	Meat products	Batch	-	68	0
	Minced meat	Batch	-	43	0
Germany	Meat products	Single	25 g	185	0
	Minced meat	Single	25 g	596	0.7
Hungary	Meat products	Single	25 g	38	0
Ireland	Meat products	Single	25 g	207	0
Luxembourg	Minced meat	Single	25 g	124	0
Netherlands	Meat products	Single	25 g	37	0
	Meat preparation	Single	25 g	1,328	0.2
Romania	Meat products	Single	25 g	26	0
Total (9 MSs)				**4,921**	**0.4**

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

In several cases data are reported without the exact indication of animal species. These data are not presented above, even though some MSs have tested substantial numbers of samples and may have found remarkably high levels of *Salmonella* contamination. For instance, in Belgium *Salmonella* was found at retail level in eight of 240 samples of minced meat intended to be eaten raw from “bovine animals and pigs”. Similarly, 5.4 % of samples of meat preparations and minced meat intended to be eaten cooked, originating from “bovines, pigs, goats, sheep, horses, donkeys, bison and water buffalo” were reported by Spain to contain *Salmonella* (N=1,718).

Milk and dairy products

As in previous years, very few *Salmonella* findings were reported from cow's milk in 2009. Data from investigations of raw milk intended for direct human consumption (25 samples or more) were reported by three MSs: Austria (71 single samples), Germany (173 single samples) and Hungary (50 single samples). *Salmonella* was not detected in any of these samples. Seven MSs reported data from investigations of pasteurised or UHT-treated cow's milk: Austria (30 single samples), Bulgaria (30 batches), the Czech Republic (135 batches), Germany (980 single samples), Greece (26 single samples), Hungary (85 single samples), and Romania (57 batches). None of these were positive. Italy reported three positive samples of cow's milk out of 928 single samples and five positive samples of milk from other animal species/unspecified out of 5,799 single samples. No further information was given about these samples.

Nineteen MSs reported *Salmonella* investigations of cheeses, and 15 of these reported data with 25 samples or more, in total 23,023 samples. The number of MSs and number of investigated samples varied considerably depending on: animal species, type of cheese and intensity of heat treatment of the milk (if any). The vast majority of the investigations was negative – the only positive samples were from Spain (four positive out of 524 samples of soft and semi-soft cheese, animal species not stated, heat treatment not stated), Portugal (from sheep's milk at retail; two positive out of 181 samples from soft and semi-soft cheese made from raw or low heat-treated milk, and two from 181 samples with no further information) and from Italy (two positive out of 1,879 samples with no further information).

Seven MSs reported investigations on butter with 25 samples or more. No samples were positive.

The only other dairy product contributing to findings of *Salmonella* from investigations with 25 samples or more was ice-cream. Spain, Hungary and Germany reported *Salmonella* in 13 of 305 ice-cream samples, one of 140 samples and one of 2,626 samples at processing plant, respectively.

For additional information on *Salmonella* in milk and dairy products please refer to Level 3 tables.

Vegetables, fruit and herbs

Most MSs reported data on investigations of different kinds of plant products: fruit, vegetables and herbs. In particular, Slovakia and the Netherlands carried out large investigations. Results from the investigations are summarised (Table SA16). *Salmonella* was detected in only seven MSs and generally at low levels.

Of most interest for the consumers is contamination of RTE products at retail level. The Netherlands reported one *Salmonella*-positive sample (0.6 %) out of 174 samples of RTE sprouts and Luxembourg reported one positive (0.1 %) out of 840 samples of pre-cut fruit and vegetables sold in bakeries. Similarly the Netherlands reported 63 *Salmonella*-positive samples (3.4 %) from dry spices (N=1,857) and 14 (1.8 %) from fresh herbs (N=768), both at retail. The only report of *Salmonella* in RTE salads were two positive samples from Spain (N=248) while six other MSs did not find *Salmonella* in any of a total of 4,251 RTE salad samples tested.

In several cases information was incomplete regarding level of sampling or whether the objects are RTE products.

Sweden found one *Salmonella*-positive among 403 samples of fruit and vegetables. No more information is given, and the investigation is not included in Table SA16. No investigations of fruit or mushrooms with 25 samples or more were reported from 2009 and only very few investigations of dried seeds, coconut, and nuts and nut products were reported with sufficient amounts of samples. Among these, *Salmonella* was only found in one sample of coconut from Hungary (N=71, Table SA16).

Table SA16.* Salmonella *in vegetables, fruit and herbs, 2009

Country	Description	Sample unit	Sample weight	N	% pos
Vegetables					
Czech Republic	At retail	Single	25 g	60	0
	Pre-cut, frozen, at retail	Single	25 g	36	0
Italy	-	Single	-	190	0.5
	Products	Single	-	46	2.2
Spain	-	Single	25 g	126	0
Seeds, dried					
Hungary	-	Single	25 g	183	0
Sprouts					
Germany	Non-RTE	Single	25 g	150	0
Hungary	RTE	Single	25 g	56	0
Netherlands	RTE, at retail	Single	2.5 g/25 g	174	0.6
Fruit and vegetables					
Belgium	Pre-cut, RTE	Batch	25 g	31	0
	Pre-cut	Batch	25 g	60	1.7
Bulgaria	Pre-cut	Batch	-	130	0
Czech Republic	Pre-cut, RTE, at retail	Batch	25 g	32	0
Estonia	Pre-cut, at retail	Single	25 g	37	0
Germany	Pre-cut	Single	25 g	643	0.2
Greece	Pre-cut, RTE	Single	25 g	40	0
Hungary	Pre-cut, RTE	Single	25 g	189	0
Ireland	At retail	Single	25 g	177	0
	Pre-cut, at retail	Single	25 g	71	0
	Products, at retail	Single	25 g	90	0
Luxembourg	Pre-cut, RTE, bakeries	Single	25 g	840	0.1
Portugal	Pre-cut, RTE, at retail	Single	25 g	323	0
	Pre-cut, RTE	Batch	25 g	80	0
Romania	Pre-cut, RTE, at processing plant	Batch	25 g	35	0
	Pre-cut, RTE, at retail	Batch	25 g	794	0
Slovakia	At retail	Batch	25 g	100	0
	Pre-cut, at retail	Batch	25 g	51	0
	Products, at retail	Batch	25 g	256	0
Slovenia	Pre-cut, RTE, non prepacked	Single	25 g	250	0
	Pre-cut, RTE, prepacked	Batch	25 g	50	0
United Kingdom	Pre-cut, RTE, at retail	Single	25 g	88	0

Table continued overleaf

*Table SA16 (contd.).*Salmonella *in vegetables, fruit and herbs, 2009*

Country	Description	Sample unit	Sample weight	N	% pos
Salads					
Austria	RTE, at retail	Single	25 g	32	0
Czech Republic	RTE, at processing plant	Batch	25 g	191	0
	RTE, at retail	Batch	25 g	56	0
Estonia	RTE, at processing plant	Single	25 g	37	0
	RTE, at retail	Single	25 g	59	0
Hungary	RTE, at processing plant	Single	25 g	144	0
	RTE, at retail	Single	25 g	275	0
Slovakia	RTE, at retail	Batch	25 g	3,329	0
Slovenia	RTE, at retail	Single	25 g	128	0
Spain	RTE	Single	25 g	248	0.8
Herbs and spices					
Austria	At retail	Single	25 g	37	0
Hungary	-	Single	25 g	243	0.4
Ireland	At retail	Single	25 g	25	0
Netherlands	Dry spices, at retail	Single	25 g	1,857	3.4
	Fresh herbs, at retail	Single	25 g	768	1.8
Romania	At processing plant	Batch	25 g	295	0
Slovakia	At processing plant	Batch	25 g	108	0
Slovenia	Dried and fresh	Single	25 g	50	0
Nuts and nut products					
Austria	At retail	Single	25 g	47	0
Hungary	Dried, at retail	Single	25 g	78	0
Coconut					
Hungary	Products, at retail	Single	25 g	71	1.4
Total (18 MSs)				**13,466**	**0.6**

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

Fish, fishery products, crustaceans, live bivalve molluscs and molluscan shellfish

Twelve MSs and Norway reported investigations of *Salmonella* in fish and fishery products with 25 samples or more. Three MSs (Germany, Italy and Spain) reported positive samples although generally at a very low level. One exception, however, was Italy who reported one specific investigation with 73 samples of unspecified fishery products, where six samples were positive (8.2 %). An overall percentage of 0.3 % of the tested samples was positive for *Salmonella*, which was at the same level as in 2008.

Concerning molluscan shellfish and live bivalve molluscs, a total of 4,819 samples (from eight MSs) were tested in investigations with 25 samples or more, and 1.1 % of these were positive. Spain found the highest level of contamination with 3.9 % of live bivalve molluscs being positive (N=358). Norway tested 92 samples of raw molluscan shellfish with no positive. Not all reports on molluscan shellfish include information on whether the sampled items were cooked, raw and/or RTE.

Tests on crustaceans were reported by seven MSs (with 25 samples or more). Only one out of a total of 1,437 samples was positive. This was one out of 686 single samples at retail reported by Germany.

Other foodstuffs

In 2009, only a few *Salmonella* findings were reported from other foods. This group includes bakery products, beverages (non-alcoholic), cereals and meals, chocolate and other sweets, cocoa and cocoa preparations, foodstuffs intended for special nutritional uses, infant formula, juice, sauces and dressings and soups. Also some undefined groups such as “other foods”, “other products of animal origin” and “other processed food products and prepared dishes”.

Disregarding investigations with less than 25 samples, a total of 31,888 samples were tested, and 78 of these contained *Salmonella*. The highest proportions of positive samples were found from the category “other processed food products and prepared dishes”, with up to 6.7 % positive samples in an Italian survey. For most of these samples it was not stated if the products were RTE.

Regarding dried infant formulae and dried dietary foods intended for infants below six months of age, a total of 594 samples was tested, including investigations with less than 25 samples, and only Spain reported one positive sample of infant formula (N=102).

For detailed information please refer to Level 3 tables.

3.1.3 *Salmonella* in animals

MSs have *Salmonella* control or surveillance programmes in place for a number of farm animal species (see Appendix Tables SA2-SA18 for further descriptions). An overview of the countries that reported data on *Salmonella* in animals for 2009 is presented in Table SA17.

Table SA17. Overview of countries reporting data for* Salmonella *in animals, 2009

Data	Total number of MSs reporting	Countries
Gallus gallus (no further sampling level)	3	**MSs:** IT, PL, PT **Non-MS:** NO
Breeders of *Gallus gallus*	25	**All MSs** except LU, MT **Non-MSs:** CH, NO
Laying hens	27	**All MSs** **Non-MSs:** CH, NO
Broilers	27	**All MSs** **Non-MSs:** CH, NO
Turkeys	18	**MSs:** AT, BE, CZ, DE, DK, FI, GR, HU, IE, IT, LT, PL, PT, RO, SE, SI, SK, UK **Non-MS:** NO
Ducks	13	**MSs:** AT, BG, DE, DK, HU, IE, IT, NL, PL, PT, SE, SK, UK **Non-MS:** NO
Geese	10	**MSs:** AT, DE, HU, IE, IT, LV, PL, SE, SK, UK **Non-MS:** NO
Other poultry	16	**MSs:** AT, BG, CZ, DE, EE, GR, HU, IE, IT, LV, NL, PL, PT, RO, SK, UK **Non-MS:** NO
Pigs	21	**All MSs** except CY, DK, FR, LT, MT, PL **Non-MSs:** CH, NO
Cattle	20	**All MSs** except CY, DK, FR, LT, LV, MT, SI **Non-MSs:** CH, NO
Sheep and goats	15	**MSs:** AT, BG, CZ, DE, EE, GR, IE, IT, NL, PT, RO, SE, SI, SK, UK **Non-MSs:** CH, NO
Other animal species	20	**All MSs** except BE, CY, FI, FR, LT, LU, MT **Non-MSs:** CH, NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP or own control is not included in the detailed tables, and unless stated otherwise, data from imports, suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting investigations with 25 samples or more have been included for analysis.

To protect human health against *Salmonella* infections transmissible between animals and humans, EU Regulation (EC) No 2160/2003[15] requires MSs to set up national control programmes for *Salmonella* serovars of public health significance in animal species presenting a high potential risk of transmitting *Salmonella*, such as poultry and pigs. The animal populations currently specifically targeted include breeding flocks of *Gallus gallus*, laying hens and broilers. These national control programmes are established to achieve agreed Community reduction targets to reduce *Salmonella* prevalence in animal populations at primary production level. Following EU-wide surveys to establish the baseline for *Salmonella* in the animal populations targeted, Community targets for the reduction of *Salmonella* prevalence in MS animal populations have been set by the EC in consultation with MSs.

Both egg and broiler meat production sectors are based on the basic structure of a breeding pyramid so that genetic improvement, which mainly takes place through selection at the top of the production pyramids, can be rapidly distributed among both commercial poultry populations of laying hens and broilers. The top of the pyramid is occupied by elite flocks, great grandparent flocks and grandparent flocks, followed by parent flocks in the middle, and production flocks at the bottom of the pyramid. Hereafter in this report, elite flocks, great grandparent flocks, grandparent flocks, and parent flocks are generically referred to as breeding flocks.

In poultry, *Salmonella* may be transmitted both horizontally and vertically. The relevance of *Salmonella* infection in breeding flocks is mainly related to the potential for vertical transmission to production flocks, and the vertical route of transmission is amplified by the pyramidal structure of the egg and broiler meat production sectors.

Between 1993 and 2004, Council Directive 92/117/EEC[16] set the minimum level for *Salmonella* control in poultry within EU, mainly focusing on the control of *S*. Enteritidis and *S*. Typhimurium in breeding flocks of *Gallus gallus*. After that the specific *Salmonella* reduction targets were set.

In the case of the breeding flocks, the target had to be met by the end of 2009, for broilers in 2011, whereas for laying hens an annual target has been set. The national control programmes may vary to some extent between MSs due to different circumstances, while aiming to achieve the same goal. Detailed information on the main characteristics of the national control programmes is available in Appendix Tables SA2- SA3, SA5a, SA5b and SA7a. National control programmes have to be approved by the EC. Results of the programmes have to be reported to the EC and EFSA as part of the annual zoonoses report.

Breeding flocks of *Gallus gallus* of the egg and broiler meat production lines

The year 2009 was the third year when MSs were obliged to implement *Salmonella* control programmes in breeding flocks of *Gallus gallus* in accordance with Regulation (EC) No 2160/2003. These control programmes aim to meet the *Salmonella* reduction target set by Regulation (EC) No 1003/2005[17], where the *Salmonella* reduction target in breeding flocks covers the following serovars: *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and *S.* Hadar. The target was set for all adult breeding flocks, during the production period, comprising at least 250 birds. The target was to reduce the maximum percentage of flocks remaining positive to 1 % or less, and MSs had to meet the target by 31 December 2009. However, for MSs with fewer than 100 breeding flocks, the target is met if only one adult breeding flock remained positive.

The minimum requirements for *Salmonella* detection in breeding flocks laid down in the Regulation include sampling three times during the rearing period and every two weeks during the production period. Therefore, flocks can be found positive at different stages and ages, e.g. as day-old chicks, at the end of the rearing period (before movement to production) or during the production period (i.e. the laying period). Test results have to be reported, as well as any relevant additional information, on a yearly basis to the EC and EFSA as part of the annual report on trends and sources of zoonoses and zoonotic agents. A flock is reported positive if one or more of the samples have been found positive. Each flock should only be reported once. Sampling

15 Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Regulation (EC) No 1003/2005 regarding the control and testing of *Salmonella* in breeding flocks of *Gallus gallus* and turkeys. OJ L 73, 19.3.2009, p. 5–11.

16 Council Directive 92/117/EEC of 17 December 1992 concerning measures for protection against specified zoonoses and specified zoonotic agents in animals and products of animal origin in order to prevent outbreaks of food-borne infections and intoxications. OJ L 62, 15.3.1993, p. 38–48.

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

required by the Regulation is more intensive than the requirements set out in the former Directive 92/117/EC that obliged MSs to run control programmes in breeding flocks for *S.* Enteritidis and *S.* Typhimurium, only.

In 2009, control programmes approved by the Commission were implemented in all MSs and Norway. For more detailed information see Appendix Table SA2. In total, 25 MSs and two non-MSs reported 2009 data within the framework of the programme. The following results from the sampling of breeding flocks include both broiler and egg production lines, in most cases reported at flock level.

The total *Salmonella* prevalence in *Gallus gallus* breeding flocks during the production period in 2009 are presented in Table SA18. Overall during 2009, *Salmonella* was found in 2.7 % of breeding flocks in EU at some stage during the production period which is the same proportion as in 2008.

The prevalence of the five serovars (*S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and *S.* Hadar) targeted in the control programmes in *Gallus gallus* breeding flocks during the production period in 2009 are presented in Table SA18 and Figures SA7, SA8, SA9 and SA10. In total, 18 MSs and the two non-MSs met the target in 2009, compared to 20 MSs in 2008. Two MSs, Luxemburg and Malta, do not have breeding flocks. Seventeen MSs reported prevalences of the five target serovars that were lower than or equal to EU reduction target limit of 1 %, and one MS, Cyprus, also met the target as there were less than 100 adult breeding flocks in the MS and only one flock was found positive with the targeted serovars. Eight MSs reported a prevalence of more than 1 % of the five targeted serovars, highest prevalence being 7.0 % for Greece.

Twenty five MSs and two non-MSs reported data for all the three years the programme has been running. For most MSs the prevalence has been below or very close to the target during all three years (Figure SA8). In the Czech Republic and Portugal a sharp decrease in the prevalence of positive flocks was experienced, whereas in Hungary, Slovakia and Spain the prevalence increased during these years. In Greece strong fluctuation in the prevalence is obvious. The geographical distribution of the targeted serovars shows that the Nordic and Baltic countries, except Denmark and Lithuania, did not find any of the targeted serovars in 2009 (Figure SA10).

The prevalence of the five targeted *Salmonella* serovars in adult breeding flocks tested under the mandatory *Salmonella* control programmes decreased in 2009 (1.2 %) compared to 2008 (1.3 %) and 2007 (1.4 %) at EU level (Figure SA7). However, the figures may not always be fully comparable between the years, as it appears that for some MSs the number of flocks differed substantially between the two years.

The most common of the targeted serovars in breeding flocks was *S.* Enteritidis, but there are differences between MSs as *S.* Hadar was the most common target serovar in Greece and *S*. Infantis was predominant in Hungary. A total of 17 MSs reported findings of serovars other than five target ones, however at low levels. Italy reported the highest prevalence (5.1 %) of flocks positive with serovars other than the targeted ones (Table SA18).

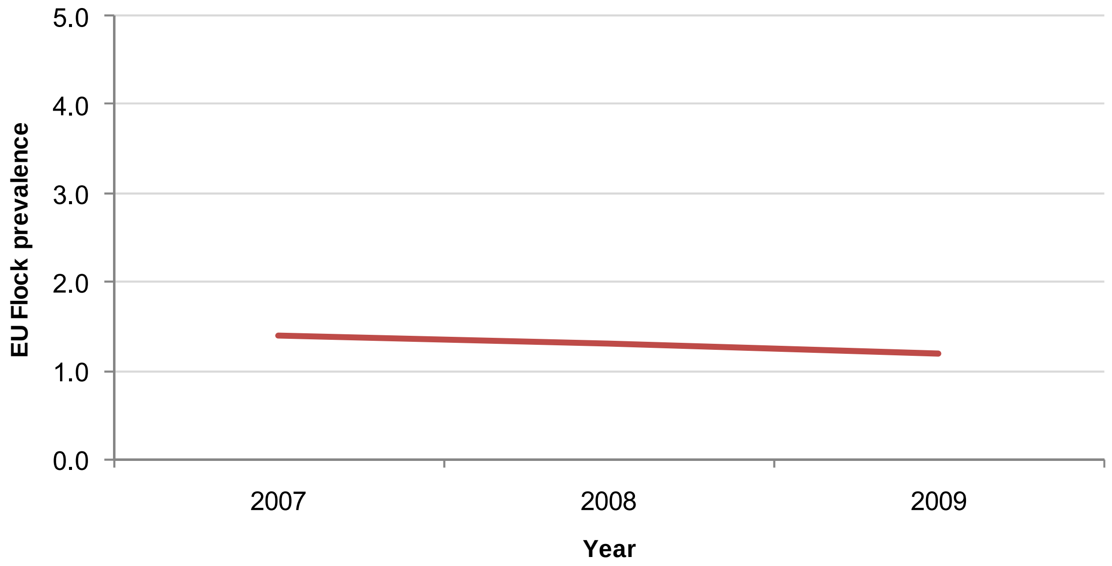
Table SA18. ***Salmonella** in breeding flocks of **Gallus gallus** during the production period (all types of breeding flocks, flock-based data) in countries running control programmes in accordance with Regulation (EC) No 2160/2003, 2008-2009*

Country	2009									2008		
	Breeding flocks (elite, grandparent and parent)											
	N	% positive								N	% positive	
		pos (all)	5 target serovars[1]	S. Enteritidis	S. Typhimurium	S. Infantis	S. Virchow	S. Hadar	Other serovars, non-typeable, and unspecified		pos (all)	5 target serovars[1]
Austria[2]	120	1.7	0.8	0.8	0	0	0	0	1.7	52	0	0
Belgium	526	3.0	0	0	0	0	0	0	3.0	550	8.2	0.9
Bulgaria	2,193	1.2	0.9	0.5	0.1	0.3	0.1	0	0.3	85	0	0
Cyprus[3,4]	55	1.8	1.8	1.8	0	0	0	0	0	35	0	0
Czech Republic	620	1.5	1.0	0.8	0.2	0	0	0	0.5	557	1.8	1.1
Denmark	249	1.6	1.2	0.8	0.4	0	0	0	0.4	317	0.6	0.6
Estonia	3	0	0	0	0	0	0	0	0	6	0	0
Finland	172	0	0	0	0	0	0	0	0	175	0	0
France	1,480	1.4	0.2	0.2	0	0	0	0	1.2	1,103	0.9	0.5
Germany[5]	1,041	1.9	0.9	0.7	0.2	0	0	0	1.0	612	1.5	0.7
Greece	272	10.3	7.0	1.8	0.4	0	0	4.8	3.3	72	1.4	0
Hungary	714	6.3	2.7	0.6	0	2.1	0	0	3.6	2,204	2.5	0.5
Ireland	129	0	0	0	0	0	0	0	0	203	2.0	0.5
Italy	512	6.6	1.6	0.4	0.4	0.2	0.2	0.4	5.1	429	9.1	2.6
Latvia[6]	25	0	0	0	0	0	0	0	0	26	0	0
Lithuania	73	0	0	0	0	0	0	0	0	108	0	0
Netherlands	850	0.6	0.5	0.4	0.1	0	0	0	0.1	1,164	0.6	0.6
Poland	1,056	3.5	2.7	1.7	0.5	0.1	0.4	0.1	0.8	1,069	6.3	5.4
Portugal	219	4.1	0.5	0.5	0	0	0	0	3.7	209	6.7	5.7
Romania	325	1.5	0.6	0.6	0	0	0	0	0.9	35	2.9	2.9
Slovakia	129	3.1	2.3	2.3	0	0	0	0	0.8	249	0	0
Slovenia	155	0	0	0	0	0	0	0	0	151	0.7	0.7
Spain[2]	1,266	6.6	3.3	1.9	0.1	0	0.1	1.3	3.3	1,304	3.6	2.5
Sweden	162	0	0	0	0	0	0	0	0	148	0	0
United Kingdom	1,637	1.3	0.1	0	0.1	0	0	0	1.2	1,636	1.3	0.5
EU Total	**13,983**	**2.7**	**1.2**	**0.7**	**0.1**	**0.2**	**0**	**0.2**	**1.4**	**12,499**	**2.7**	**1.3**
Norway	187	0	0	0	0	0	0	0	0	182	0	0
Switzerland	93	0	0	0	0	0	0	0	0	119	0	0

Note: Luxembourg and Malta do not have breeding flocks.

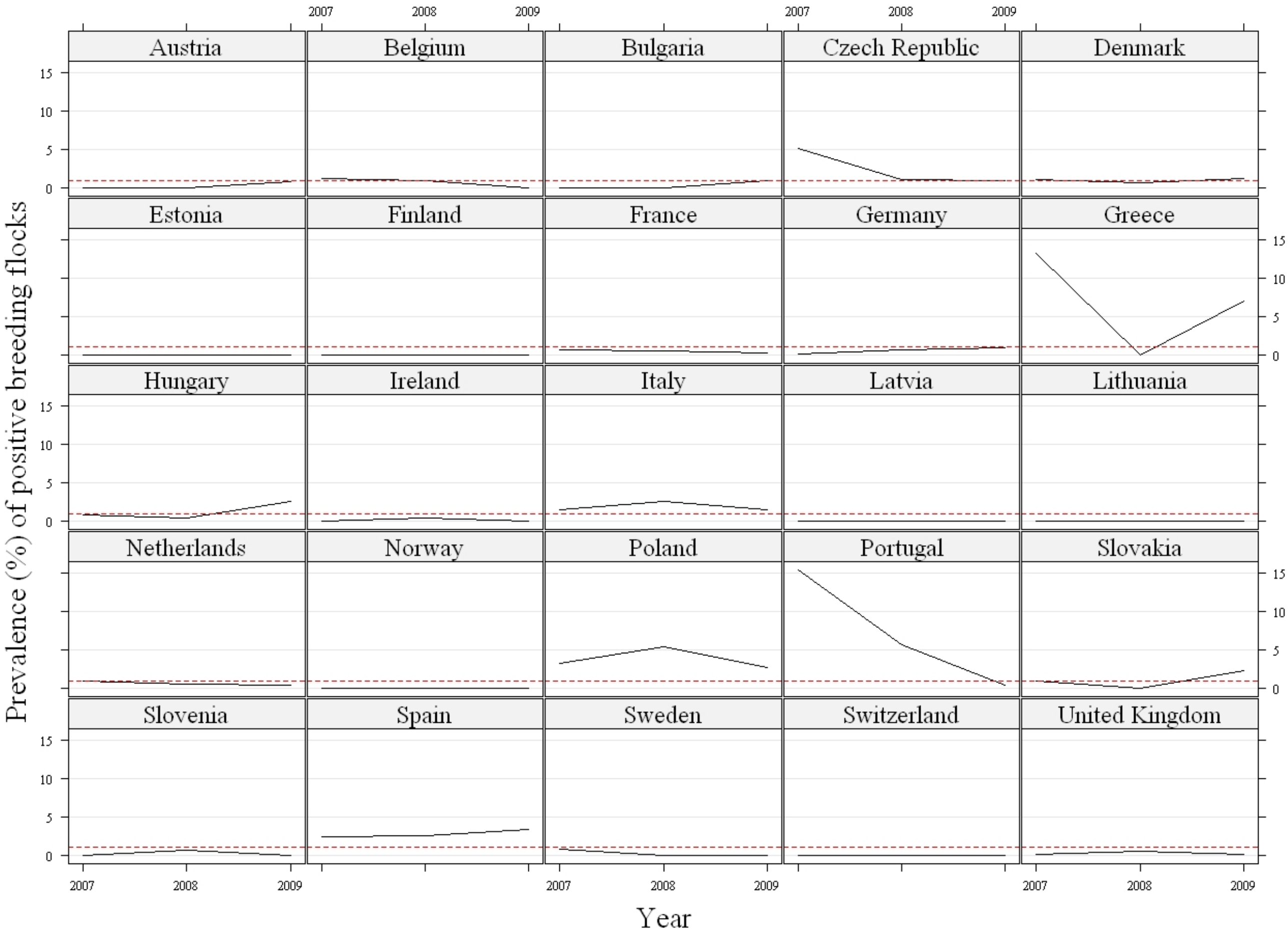
1. *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow, *S.* Hadar.
2. Two serovars in one flock.
3. One positive flock.
4. Cyprus meet the target as there were less than 100 adult breeding flocks in the MS and only one flock was found positive with the targeted serovars.
5. Data for Germany were corrected for the year 2008.
6. Latvia reported data as surveillance programme, not as control programme in 2008.

Figure SA7. Prevalence of* S. *Enteritidis,* S. *Typhimurium,* S. *Infantis,* S. *Virchow and* S. *Hadar in* Gallus gallus *breeding flocks during the production period (flock-based data) in EU*[1]*, proportion of positive flocks, 2007-2009



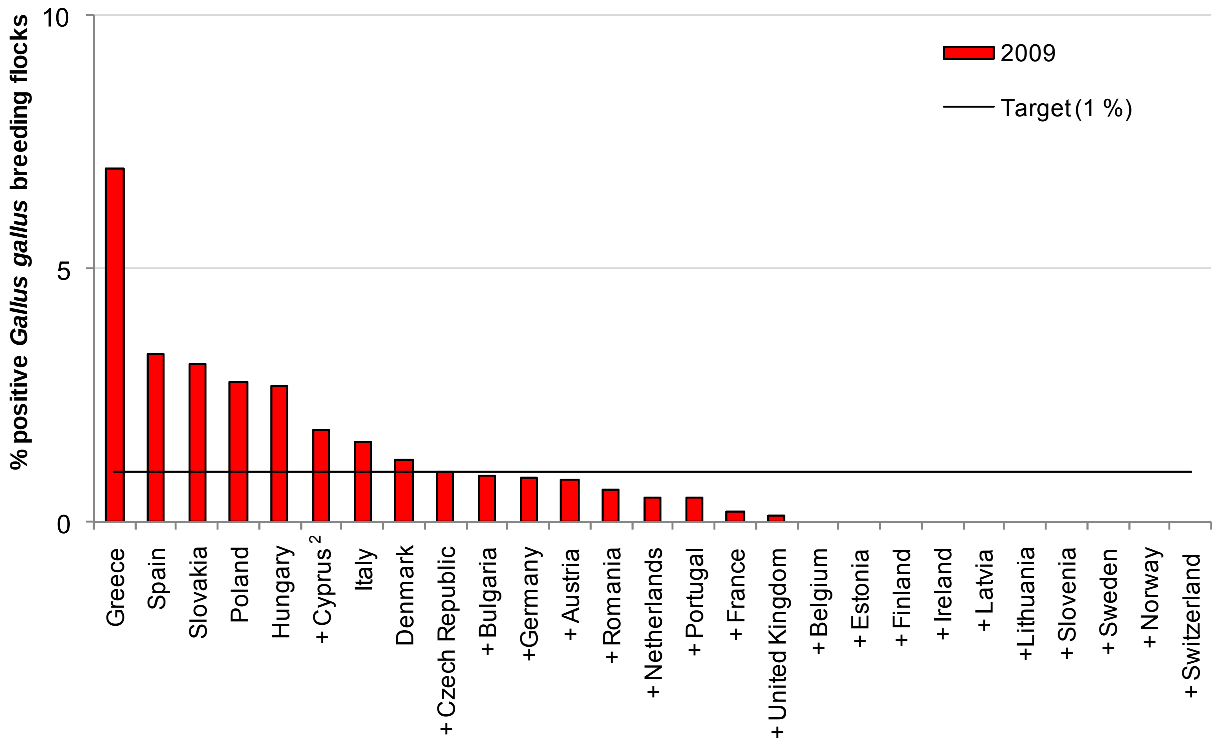
1. No data from Luxembourg and Malta as they have no breeding flocks.

Figure SA8. Prevalence of* S. *Enteritidis,* S. *Typhimurium,* S. *Infantis,* S. *Virchow and* S. *Hadar in* Gallus gallus *breeding flocks during the production period (flock-based data) in 23 MSs[1] and Norway and Switzerland, 2007-2009



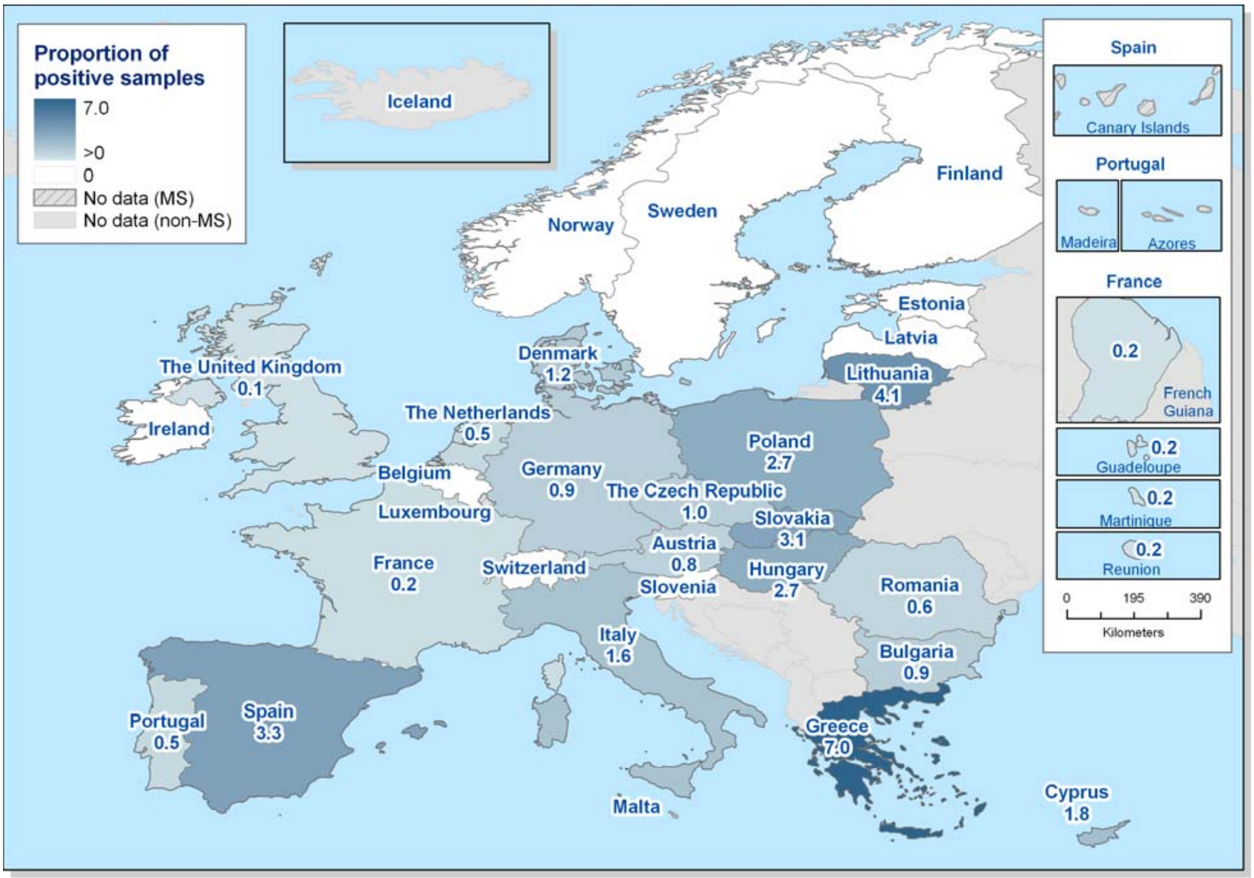
1. No data from Luxembourg and Malta as they have no breeding flocks. Cyprus and Romania were not included because for some years they tested less than 100 adult breeding flocks and reported only one positive flock leading to a proportion positive higher than 1 %. Based on the Commission Regulation No 1003/2005 (Art. 1, point 1), these MSs met EU target in all three years. Specifically, Cyprus tested less than 100 breeding flocks and reported one positive flock in all three years, while this was the same for Romania only in 2007 and 2008. In 2009, Romania tested 325 adult breeding flocks and out of them only two were positive (0.62 %).

Figure SA9. Prevalence of* S. *Enteritidis,* S. *Typhimurium,* S. *Infantis,* S. *Virchow and* S. *Hadar in* Gallus gallus *breeding flocks during the production period (flock-based data) in EU[1] and Norway and Switzerland, 2009



1. No data from Luxembourg and Malta as they have no breeding flocks. 18 MSs and two non-MSs met the target in 2009, indicated with a '+'.
2. Cyprus met the target as there are less than 100 adult breeding flocks in the MS and only one flock was found positive with the targeted serovars.

Figure SA10. Prevalence of the five targeted serovars (*S. *Enteritidis, *S. *Typhimurium, *S. *Infantis, *S. *Virchow and *S. *Hadar) in* Gallus gallus *breeding flocks during the production period, 2009



Note: Prevalence for France has been calculated including overseas departments where the monitoring programme is identical.

The production of elite breeding flocks is concentrated in a limited number of MSs. During the production period no elite flocks tested positive for *Salmonella* in 2009 (Table SA19).

The production of grandparent breeding flocks is also taking place in a limited number of MSs (Table SA19). Generally, the occurrence of *Salmonella* in grandparent flocks was very rare. France reported six grandparent flocks positive with other *Salmonella* serovars than the five targeted at rearing stage (out of 223 flocks in rearing phase) and one flock positive with *S.* Enteritidis at production stage. Hungary reported four flocks positive with *S.* Enteritidis but the sampling stage was not specified.

Data on *Salmonella* in parent breeding flocks are divided into breeding flocks for the egg production line and meat production line and are presented separately in the following chapters.

Table SA19. *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, 2008-2009

Country	2009									2008		
	N	% positive								N	% positive	
		pos (all)	5 target serovars[1]	S. Enteritidis	S. Typhimurium	S. Infantis	S. Virchow	S. Hadar	Other serovars, non-typeable, and unspecified		pos (all)	5 target serovars[1]
Elite breeding flocks												
Belgium	-	-	-	-	-	-	-	-	-	3	0	0
Czech Republic	7	0	0	0	0	0	0	0	0	5	0	0
Hungary[2]	12	0	0	0	0	0	0	0	0	0	-	-
United Kingdom	-	-	-	-	-	-	-	-	-	101	0	0
Total elite flocks (2 MSs)	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**109**	**0**	**0**
Grandparent breeding flocks												
Belgium[2]	4	0	0	0	0	0	0	0	0	-	-	-
Czech Republic	3	0	0	0	0	0	0	0	0	8	25	25
Denmark	18	0	0	0	0	0	0	0	0	18	0	0
Finland	7	0	0	0	0	0	0	0	0	7	0	0
France[3]	199	0.5	0.5	0.5	0	0	0	0	0	167	1	0
Hungary[2]	61	6.6	6.6	6.6	0	0	0	0	0	-	-	-
Ireland	12	0	0	0	0	0	0	0	0	11	0	0
Lithuania	-	-	-	-	-	-	-	-	-	108	0	0
Netherlands[2]	129	0	0	0	0	0	0	0	0	278	0	0
Poland	17	0	0	0	0	0	0	0	0	24	0	0
Sweden	20	0	0	0	0	0	0	0	0	13	0	0
United Kingdom	-	-	-	-	-	-	-	-	-	179	4	3
Total grandparent flocks (10 MSs)	**470**	**1.1**	**1.1**	**1.1**	**0**	**0**	**0**	**0**	**0**	**813**	**1.4**	**1.0**
Norway[2]	6	0	0	0	0	0	0	0	0	4	0	0

1. *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow, *S.* Hadar.
2. Period of sampling unspecified.
3. In France, elite and grandparent flocks are reported together.

Egg production line of Gallus gallus

Parent breeding flocks

Seventeen MSs and two non-MSs reported *Salmonella* data specifically for parent breeding flocks in the egg production line for 2009 (Table SA20). Data from Germany also include elite and grandparent breeding flocks. The proportion of *Salmonella*-positive flocks in 2009 (1.7 %) was slighty higher than the findings in 2008 (1.2 %). Eight MSs and two non-MSs reported no infected parent breeding flocks, while nine MSs reported one to eight parent breeding flocks positive for *Salmonella*; Bulgaria and Spain were the only MSs to report more than one flock positive in 2009, eight and three, respectively. Four MSs reported flocks positive with *S.* Enteritidis or *S.* Typhimurium; the other MSs reported serovars other than the five targeted.

Table SA20. **Salmonella** ***in 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, 2008-2009***

Country	2009									2008		
	N	pos (all)	5 target serovars[1]	*S.* Enteritidis	*S.* Typhimurium	*S.* Infantis	*S.* Virchow	*S.* Hadar	Other serovars, non typeable, and unspecified	N	pos (all)	5 target serovars[1]
Austria[2]	30	3.3	0	0	0	0	0	0	3.3	17	0	0
Bulgaria	255	3.1	2.0	2.0	0	0	0	0	1.2	442	0.7	0.7
Cyprus[2]	5	20.0	20.0	20.0	0	0	0	0	0	2	0	0
Czech Republic[2]	95	1.1	1.1	0	1.1	0	0	0	0	59	0	0
Denmark	6	0	0	0	0	0	0	0	0	6	0	0
Estonia	-	-	-	-	-	-	-	-	-	6	0	0
Finland	20	0	0	0	0	0	0	0	0	24	0	0
France	101	0	0	0	0	0	0	0	0	67	0	0
Germany[2,3]	254	0.4	0	0	0	0	0	0	0.4	-	-	-
Greece[2]	17	5.9	0	0	0	0	0	0	5.9	16	0	0
Latvia	-	-	-	-	-	-	-	-	-	8	0	0
Netherlands	59	0	0	0	0	0	0	0	0	183	0	0
Poland	103	1.0	1.0	1.0	0	0	0	0	0	340	3.5	2.6
Portugal	15	0	0	0	0	0	0	0	0	-	-	-
Slovakia	52	0	0	0	0	0	0	0	0	53	0	0
Slovenia	6	0	0	0	0	0	0	0	0	4	0	0
Spain	105	2.9	0	0	0	0	0	0	2.9	-	-	-
Sweden	19	0	0	0	0	0	0	0	0	19	0	0
United Kingdom	90	4.4	0	0	0	0	0	0	4.4	117	0.9	0
Total (17 MSs in 2009	**1,232**	**1.7**	**0.6**	**0.6**	**0.1**	**0**	**0**	**0**	**1.1**	**1,363**	**1.2**	**0.9**
Norway	24	0	0	0	0	0	0	0	0	30	0	0
Switzerland	39	0	0	0	0	0	0	0	0	42	0	0

1. *S*. Enteritidis, *S*. Typhimurium, *S*. Infantis, *S*. Virchow, *S*. Hadar.

2. One positive flock.

3. All breeding flocks, since data from Germany also include elite and grandparent breeding flocks.

Laying hen flocks

Starting from 2008, MSs have implemented *Salmonella* control programmes in laying hen flocks of *Gallus gallus* providing eggs intended for human consumption in accordance with Regulation (EC) No 2160/2003. The control programmes consist of proper and effective measures of prevention, detection, and control of *Salmonella* at all relevant stages of the egg production line, particularly at the level of primary production, in order to reduce *Salmonella* prevalence and the risk to public health. All MSs had control programmes approved by the EC in 2009. For more detailed information see Appendix Table SA5a.

Minimum detection requirements laid down in the Regulation include sampling flocks twice during the rearing period (day-old chicks and at the end of the rearing period before moving to the laying unit), as well as sampling every fifteenth week during the production period; starting at the latest when the animals are 26 weeks old. Test results have to be reported, as well as any relevant additional information, on a yearly basis to the EC and EFSA as part of the annual report on trends and sources of zoonoses and zoonotic agents. As flocks may test positive at different stages and ages of their lifespan, positive flocks have to be counted and reported once only during the production period, irrespective of the number of sampling and testing operations.

The Community target in laying hens referred to in Regulation (EC) No 2160/2003 is defined in Regulation (EC) No 1168/2006[18] as an annual minimum percentage of reduction in the number of adult laying hen flocks (i.e. in the production period) remaining positive by the end of the previous year. The annual targets are proportionate depending on the prevalence in the preceding year. The MS prevalence assessed in the framework of EU-wide baseline survey[19] in laying hens in 2004-2005 was used as the reference prevalence for the 2008 targets. The second annual targets were to be achieved in 2009 based on the control programme results of the year 2008. For the most advanced MSs, the Community target is defined as a maximum percentage of flock remaining positive of 2 %. For MSs with less than 50 flocks of adult laying hens, not more than one adult flock may remain positive. The final achievement of the target is to be evaluated based on the results of three consecutive years by 31 December 2010.

The verification of the achievement of the target is based on the results of required testing in adult laying flocks. Based on Regulation (EC) No 1168/2006, the Commission and EFSA recommended that the results of the 2009 *Salmonella* testing programmes in adult laying hens, used for checking the target achievement, are to be reported in accordance with the following four categories:

1. Results from all samples taken under the testing programme (both by food business operators and competent authorities) = **summary**;
2. Results from the census sampling performed by the food business operators (**point 2.1 of the Annex**);
3. Results from the objective sampling performed by the competent authority ("in one flock per year per holding comprising at least 1,000 birds" – **point 2.1.(a) of the Annex**);
4. Results from the sampling carried out by the competent authority in case of positivity suspicion (*Salmonella* found earlier in the same building - **point 2.1.(b)**, suspicion in connection with food-borne outbreaks - **point 2.1.(c)**, *Salmonella* detected in other flocks in the holding - **point 2.1.(d)**, where the competent authority considers it appropriate - **point 2.1.(e)**).

Based on these categories, four indicators, set out in the following box, were established and the reported corresponding results are presented in Table SA21.

18 Commission Regulation (EC) No 1168/2006 of 31 July 2006 implementing Regulation (EC) No 2160/2003 as regards a Community target for the reduction of the prevalence of certain *Salmonella* serotypes in laying hens of *Gallus gallus* and amending Regulation (EC) No 1003/2005. OJ L 211, 1.8.2006, p. 4–8.

19 EFSA (European Food Safety Authority), 2007. Report of the Task Force on Zoonoses Data Collection on the Analysis of the baseline study on the prevalence of *Salmonella* in holdings of laying hen flocks of *Gallus gallus.* The EFSA Journal, 97,1-85.

Description of the four indicators

1. Summary Indicator

The following combined sampling of adult laying hen flocks under the control programme conducted by industry (all holdings) and the competent authority (holdings comprising at least 1,000 birds) are needed to calculate the Summary Indicator ❶. Each flock is counted once, irrespective of the number of sampling and testing operations.

- The total number of *Salmonella* spp.-positive laying hen flocks in production (including the results of both official sampling from holdings with at least 1,000 birds and industry sampling of all holdings).
- The total number of *S*. Enteritidis and/or *S*. Typhimurium-positive laying hen flocks in production (including the results of both official sampling from holdings with at least 1,000 birds and industry sampling of all holdings).
- The total number of laying hen flocks under the control programme.

2. Industry Sampling Indicator

The following results of census sampling of adult laying hen flocks under the control programme, performed by industry (each flock being counted <u>once</u>) are necessary to calculate the Industry Sampling Indicator ❷:

- the number of *Salmonella* spp.-positive laying hen flocks in production detected positive by the industry;
- the number of *S*. Enteritidis and/or *S*. Typhimurium-positive laying hen flocks in production detected positive by the industry; and
- the total number of laying hen flocks tested by the industry.

3. Official Objective Sampling Indicator

The following results of objective sampling of flocks in holdings comprising at least 1,000 birds performed by competent authority (each flock being counted <u>once</u>) are needed to calculate the Official Objective Sampling Indicator ❸:

- the number of *Salmonella* spp.-positive laying hen flocks in production detected positive by the competent authority;
- the number of *S*. Enteritidis and/or *S*. Typhimurium-positive laying hen flocks in production detected positive by the competent authority; and
- the total number of laying hen flocks tested by the competent authority in the framework of objective sampling.

4. Official Suspect Sampling Indicator

The following results suspicious sampling, listed in Annex 2.1 (b) to (e) of Commission Regulation (EC) No 1168/2006, performed by the competent authority (each flock being counted <u>once</u>) are necessary to calculate the Official Suspect Sampling Indicator ❹:

- the number of *Salmonella* spp.-positive laying hen flocks in production detected positive by the competent authority;
- the number of *S*. Enteritidis and/or *S*. Typhimurium-positive laying hen flocks in production detected positive by the competent authority; and
- the total number of laying hen flocks tested by the competent authority in case of suspicion.

In total, 27 MSs and two non-MSs reported data within the framework of the laying hen flock programme (Table SA21). All results presented are reported at flock level. A flock was reported as positive if one or more samples were positive during the production period. However, only flocks tested positive for *S.* Typhimurium and/or *S.* Enteritidis during the production period are taken into consideration when assessing whether MSs meet the target.

The prevalence of *Salmonella* spp. and of the two serovars (*S.* Enteritidis and *S.* Typhimurium) targeted in the control programmes for laying hen flocks during the production period are presented for production flocks of laying hens in Table SA22. The prevalence figures derive from indicator ➊ or from other indicators, used as proxy for indicator ➊. For Italy and Lithuania, indicator ➌ was used as surrogate of indicator ➊ for 2009 data. The comparison between the prevalence of *S.* Enteritidis and *S.* Typhimurium and the target in production flocks of laying hens for MSs and non-MSs in 2009 is displayed in Figure SA11 and prevalence in production flocks of laying hens for MSs and non-MSs in 2008-2009 is displayed in Figure SA12. The geographical distribution of MS prevalence is presented in Figure SA13.

In 2009, 17 MSs and two non-MSs met their 2009 targets. In comparison, 21 MSs and one non-MS had met the targets in 2008. Eight MSs had not achieved the reduction in *Salmonella* prevalence required to meet the 2009 target. In 2009, no targets have been set for Malta and Romania, but their *S.* Enteritidis and *S.* Typhimurium prevalence was below the 2 % target set for the most advanced MSs. For these MSs, 2010 targets will be based on the 2009 findings.

However, when comparing the reported *S.* Enteritidis and *S.* Typhimurium prevalence in 2008 and 2009, prevalence had declined in most MSs. Only in seven MSs, Austria, Bulgaria, Cyprus, the Czech Republic, Denmark, Germany and Lithuania, an increase in prevalence (higher than 0.1 %) was observed. This indicated that continuous progress is being made in combating these *Salmonella* serovars, but the control of these serovars in laying hen flocks is not easy and takes time.

Overall, 3.2 % of laying flocks in EU were positive for *S.* Enteritidis and/or *S.* Typhimurium at some stage during the production period in 2009. This is a minor reduction compared to 2008, where 3.5 % of the adult laying hen flocks were positive for *S.* Enteritidis and/or *S.* Typhimurium. The MSs reported between 0 % and 10.9 % samples positive with *S.* Enteritidis and/or *S.* Typhimurium (Table SA22). Overall, 6.7 % of adult laying hen flocks were positive for *Salmonella*, slightly more than reported for 2008 (5.9 %). In 2009, Estonia and Luxembourg were the only MSs reporting no positive flocks, and Ireland and Malta only reported other serovars than the two targeted ones.

In general, more MSs found *Salmonella* spp. in laying hen flocks (6.7 %) compared to breeding flocks (1.7 %) in the egg production line (Tables SA20 and SA22). This may be because of tighter bio-security at breeding flock level and due to the fact that there has been a mandatory control programme in breeding flocks since 1998.

Table SA21. **Salmonella** ***in laying hen flocks*** **(Gallus gallus)** ***during the production period according to sampling context in accordance with Regulation (EC) No 1168/2006, 2009***

Country	Control and eradication programmes							
	Official and industry sampling		Industry sampling Census sampling		Official sampling Objective sampling		Official sampling Suspect sampling	
	N	Pos	N	Pos	N	Pos	N	Pos
Austria	2,578	86	2,254	34	1,501	46	56	18
Belgium	763	54	763	29	292	27	3	2
Bulgaria	101	20	28	7	46	10	19	3
Cyprus	92	16	76	4	82	11	7	2
Czech Republic	467	60	303	11	277	39	63	10
Denmark	454	8	454	4	454	4	21	0
Estonia	48	0	48	0	48	0	-	-
Finland	900	29	900	5	319	2	309	22
France	3,657	175	3,657	143	1,918	24	200	73
Germany[1]	4,399	290	1,637	52	2,056	241	-	-
Greece	327	41	327	0	258	41	-	-
Hungary	887	79	-	-	-	-	-	-
Ireland	375	1	375	0	375	1	1	1
Italy[2]	-	-	-	-	921	165	-	-
Latvia	71	7	71	8	41	7	1	0
Lithuania	-	-	-	-	81	5	-	-
Luxembourg	7	0	-	-	-	-	-	-
Malta	48	20	-	-	-	-	-	-
Netherlands[3]	2,240	33	-	-	-	-	-	-
Poland	1,718	221	1,718	110	864	63	225	47
Portugal	251	46	157	5	152	41	-	-
Romania	420	6	432	39	420	6	-	-
Slovakia	155	13	370	9	-	-	-	-
Slovenia	209	19	209	2	84	13	27	6
Spain	1,511	441	1,511	195	825	246	-	-
Sweden	904	3	904	1	252	1	2	1
United Kingdom[4]	4,466	76	4,466	45	1,504	28	-	3
Norway	1,031	0	1,031	0	469	0	-	-
Switzerland	380	0	325	0	299	0	-	-

1. For Germany, official suspect sampling are included in official objective sampling.
2. Italy not specified as objective or suspect sampling.
3. For the Netherlands, flocks positive for *S.* Enteritidis and/or *S.* Typhimurium were reported only.
4. For the United Kingdom the total number of flocks tested under official suspect sampling category is unknown.

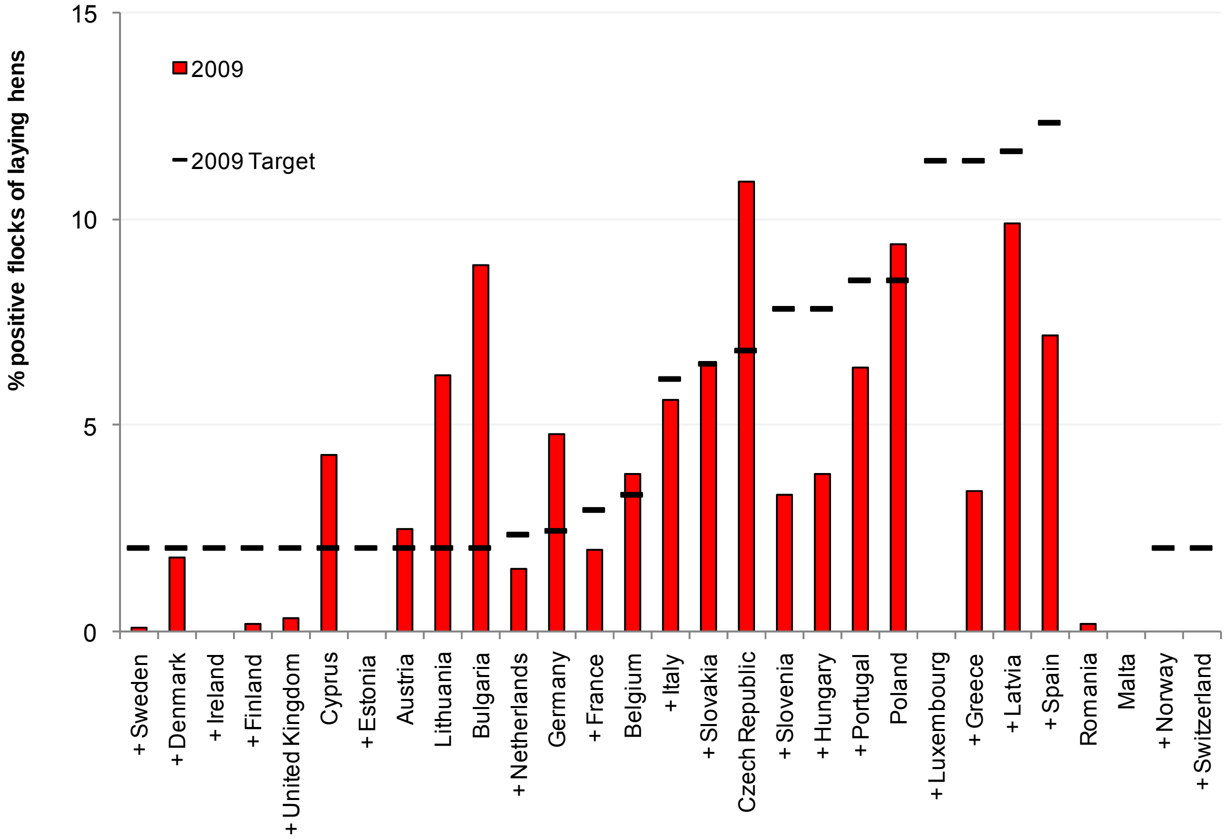
Table SA22.* Salmonella *in laying hen flocks of* Gallus gallus *during the production period (flock-based data) in countries running control programmes, 2008-2009

Country	2009							2008		
	N	Target (production period)	% positive					N	% positive	
			pos (all)	S. Enteritidis and/or S. Typhimurium	S. Enteritidis	S. Typhimurium	Other serovars, non-typeable, and unspecified		pos (all)	S. Enteritidis and/or S. Typhimurium
Austria[1]	2,578	2.0	3.3	2.5	1.8	0.7	1.1	1,966	2.5	1.4
Belgium[2]	763	3.3	7.1	3.8	3.4	0.4	3.8	649	11.7	3.7
Bulgaria[3]	101	2.0	19.8	8.9	8.9	0	10.9	119	0	0
Cyprus	92	2.0	17.4	4.3	4.3	0	13.0	40	12.5	0
Czech Republic	467	6.8	12.8	10.9	10.9	0	1.9	449	8.9	7.6
Denmark	454	2.0	1.8	1.8	1.1	0.7	0	508	0.6	0.4
Estonia[5]	48	2.0	0	0	0	0	0	52	7.7	1.9
Finland	900	2.0	3.2	0.2	0	0.2	3.0	950	0.1	0.1
France	3,657	2.9	4.8	2.0	1.4	0.6	2.8	3,067	6.1	3.2
Germany	4,399	2.4	6.6	4.8	4.5	0.3	1.8	6,304	3.5	2.7
Greece	327	11.4	12.5	3.4	2.4	0.9	9.2	112	31.3	14.3
Hungary	887	7.8	8.9	3.8	3.5	0.3	5.1	866	11.7	8.7
Ireland	375	2.0	0.3	0	0	0	0.3	326	0.9	0.3
Italy[6]	921	6.1	17.9	5.6	5.2	0.4	12.3	821	20.5	6.8
Latvia[4]	71	11.6	9.9	9.9	9.9	0	0	69	20.3	14.5
Lithuania[6]	81	2.0	6.2	6.2	0	0	0	13	0	0
Luxembourg[5]	7	11.4	0	0	0	0	0	7	14.3	14.3
Malta	48	-	41.7	0	0	0	41.7	-	-	-
Netherlands	2,240	2.3	-	1.5	1.3	0.2	-	2,346	2.6	2.6
Poland[5]	1,718	8.5	12.9	9.4	8.5	0.9	3.5	1,533	12.5	10.6
Portugal	251	8.5	18.3	6.4	5.6	0.8	12.0	227	31.7	10.6
Romania	420	-	1.4	0.2	0.2	0	1.2	-	-	-
Slovakia	155	6.5	8.4	6.5	5.8	0.6	1.9	138	7.2	7.2
Slovenia	209	7.8	9.1	3.3	3.3	0	5.7	172	10.5	8.7
Spain	1,511	12.3	29.2	7.2	6.8	0.4	22.0	845	34.9	15.6
Sweden	904	2.0	0.3	0.1	0.0	0.1	0.2	724	0.7	0.4
United Kingdom	4,466	2.0	1.7	0.3	0.3	0.1	1.4	5,523	1.2	1
EU Total	**28,050**		**6.7**	**3.2**	**2.9**	**0.4**	**3.6**	**27,826**	**5.9**	**3.5**
Norway	1,031	2.0	0	0	0	0	0	1,080	0	0
Switzerland	380	2.0	0	0	0	0	0	306	0.7	0.7

Note: Target (production period) is calculated from the prevalence rate reported in 2008.

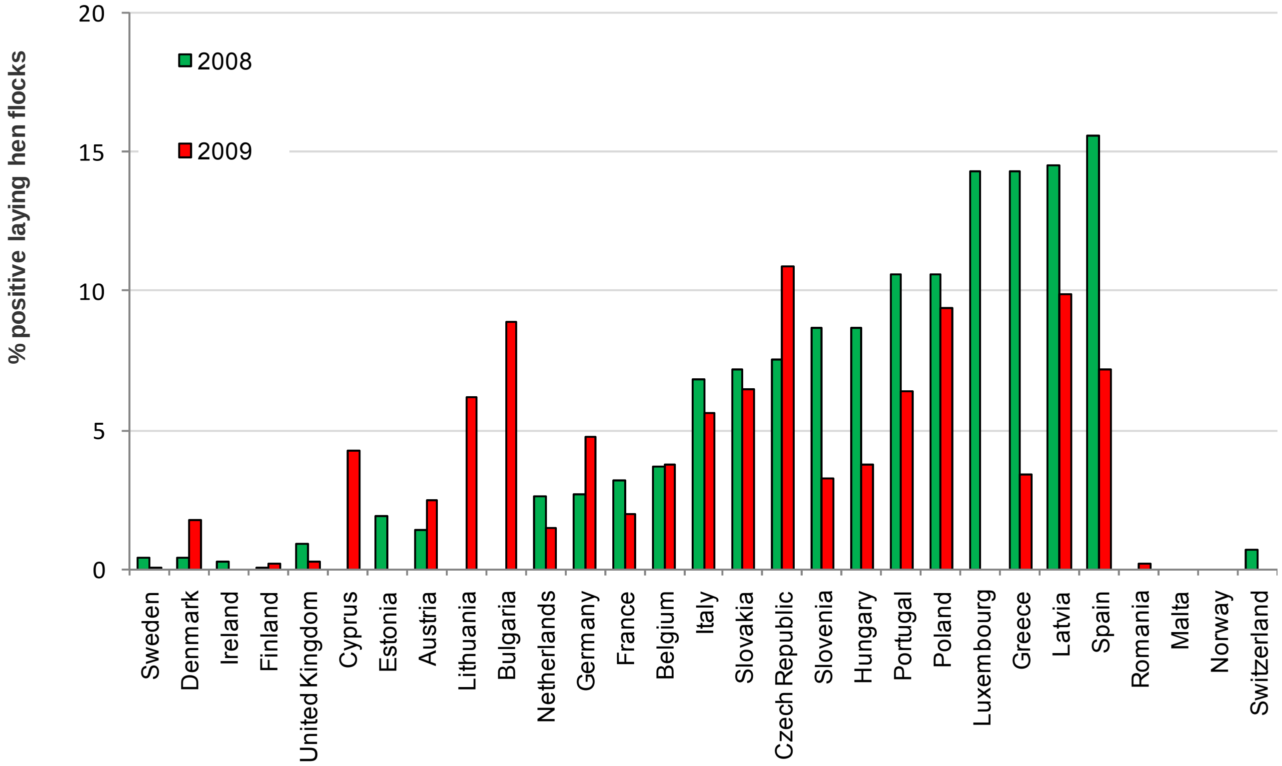
1. Two serovars in six flocks.
2. Two serovars in four flocks.
3. For Bulgaria, sample unit is single.
4. For Latvia, data also account for flocks providing direct supply of small quantities of table eggs to the final consumer. Among the 7 laying hen flocks tested positive for *S*. Enteritidis and *S*. Typhimurium in 2009, four flocks supplied directly small quantities of table eggs to the final consumer.
5. Estonia, Luxembourg and Poland did not provide information on sampling stage in 2008.
6. For Italy and Lithuania, official sampling only.

Figure SA11. Prevalence of* S. *Enteritidis and/or* S. *Typhimurium for laying hen flocks of* Gallus gallus *during the production period (flock-based data) and targets for MSs and Norway and Switzerland, 2009



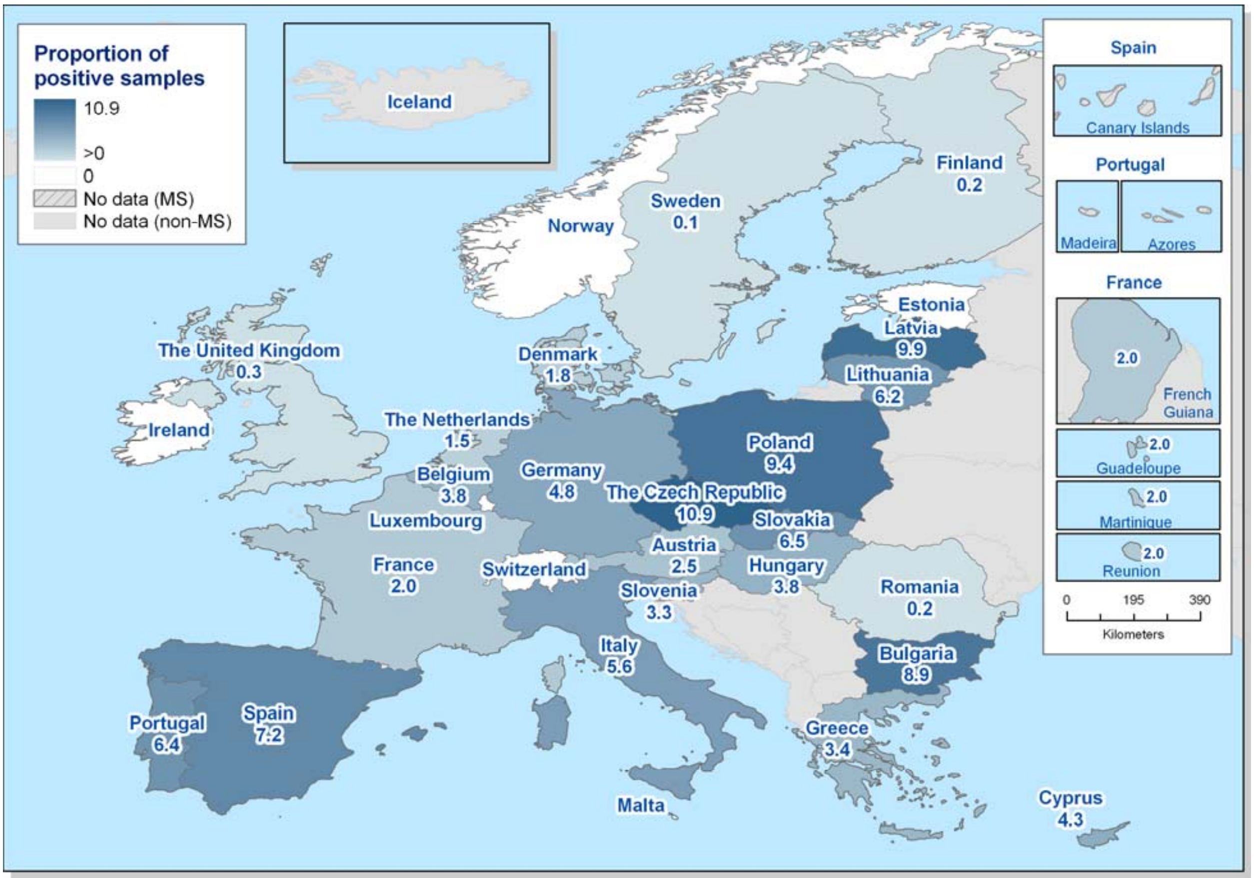
Note: MSs are ordered by target level. The 17 MSs and two non-MSs have met the 2009 targets, indicated with a '+'.

Figure SA12. Prevalence of* S. *Enteritidis and/or* S. *Typhimurium for laying hen flocks of* Gallus gallus *during the production period (flock-based data) for MSs and Norway and Switzerland, 2008-2009



Note: In Luxembourg in 2008, one of seven adult laying hen flocks were found *Salmonella*-positive.

Figure SA13. Prevalence of the two targeted serovars,* S. *Enteritidis and* S. *Typhimurium, in* Gallus gallus *laying hen flocks during the production period, 2009



Note: The prevalence for France has been calculated including overseas departments where the monitoring programme is identical.

Broiler production line of Gallus gallus

<u>Parent breeding flocks</u>

Twenty MSs and one non-MSs reported data on *Salmonella* prevalence in parent breeding flocks in the meat production line in 2009 (Table SA23). Data from Germany also include elite and grandparent breeding flocks. Seven MSs and Norway did not register any positive flocks, whereas the 13 other MSs reported *Salmonella* prevalence between 0.8 % and 10.6 %. In 2009, the total proportion of *Salmonella*-positive flocks observed was 2.4 %, compared to 1.7 % in 2008.

The total proportion of flocks positive for the five target serovars in 2009 was 1.3 % compared to 1.2 % in 2008. *S*. Enteritidis (0.7 %) and *S*. Hadar (0.3 %) were the most frequently isolated serovars; *S*. Enteritidis was reported from all MSs with positive parent breeding flocks, except the United Kingdom.

In 2009, the prevalence of *Salmonella* spp. (including the five target serovars) and the prevalence of the five target serovars were both higher in parent breeding flocks for meat production line (2.4 % and 1.3 %, respectively) (Table SA23) than in parent breeding flocks for egg production line (1.7 % and 0.6 %, respectively) (Table SA20).

Table SA23. *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, 2008-2009

Country	2009									2008		
	N	% positive								N	% positive	
		pos (all)	5 target serovars[1]	*S*. Enteritidis	*S*. Typhimurium	*S*. Infantis	*S*. Virchow	*S*. Hadar	Other serovars, non typeable, and unspecified		pos (all)	5 target serovars[1]
Austria[2]	90	1.1	1.1	1.1	0	0	0	0	1.1	35	0	0
Bulgaria	1,865	0.9	0.8	0.3	0.1	0.3	0.1	0	0.1	135	0	0
Cyprus	50	0	0	0	0	0	0	0	0	33	0	0
Czech Republic	515	1.6	1.0	1.0	0	0	0	0	0.6	485	1.6	0.8
Denmark	225	1.8	1.3	0.9	0.4	0	0	0	0.4	146	0	0
Estonia	3	0	-	-	-	-	-	-	-	-	-	-
Finland	145	0	0	0	0	0	0	0	0	144	0	0
France	1,180	1.7	0.2	0.2	0	0	0	0	1.5	869	1.0	0.7
Germany[3]	647	2.0	0.8	0.8	0	0	0	0	1.2	452	0.7	0.2
Greece	255	10.6	7.5	2.0	0.4	0	0	5.1	3.1	43	0	0
Ireland	117	0	0	0	0	0	0	0	0	192	2.1	0.5
Latvia	25	0	0	0	0	0	0	0	0	18	0	0
Netherlands	662	0.8	0.6	0.5	0.2	0	0	0	0.2	981	0.7	0.7
Poland	925	3.8	2.9	1.7	0.5	0.1	0.4	0.1	0.9	705	7.8	7.0
Portugal	204	4.4	0.5	0.5	0	0	0	0	3.9	-	-	-
Slovakia[4]	151	2.6	0.0	2.0	0	0	0	0	0.7	118	0	0
Slovenia	149	0	0	0	0	0	0	0	0	147	0.7	0.7
Spain[2]	1,161	6.9	3.6	2.1	<0.1	0	<0.1	1.4	3.4	-	-	-
Sweden	123	0	0	0	0	0	0	0	0	104	0	0
United Kingdom	1,547	1.2	0.1	0	0.1	0	0	0	1.0	1,239	1.0	0.2
Total (20 MSs in 2009)	**10,039**	**2.4**	**1.3**	**0.7**	**0.1**	**<0.1**	**<0.1**	**0.3**	**1.1**	**5,846**	**1.7**	**1.2**
Norway	157	0	0	0	0	0	0	0	0	148	0	0
Switzerland	-	-	-	-	-	-	-	-	-	77	0	0

1. *S*. Enteritidis, *S*. Typhimurium, *S*. Infantis, *S*. Virchow, *S*. Hadar.
2. Two serovars in one flock.
3. Data for Germany were corrected for the year 2008. Only breeding flocks known to belong to meat production line.
4. Sampling period unspecified.

Broiler flocks

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

Minimum detection requirements in broiler flocks laid down in the Regulation include the sampling of flocks within three weeks before the birds are moved to the slaughterhouse, taking at least two pairs of boot/sock swabs per flock. Test results have to be reported, as well as any relevant additional information, on a yearly basis to the EC and EFSA as part of the annual report on trends and sources of zoonoses and zoonotic agents. Positive flocks have to be counted and reported once only, irrespective of the number of sampling and testing operations. For more detailed information see Appendix Table SA7a.

The Community target in broiler flocks, referred to in Regulation (EC) No 2160/2003, has been set in Regulation (EC) No 646/2007[20] at a maximum percentage of broiler flocks remaining positive for *S.* Enteritidis and/or *S*. Typhimurium to 1 % or less by 31 December 2011.

The prevalence of *Salmonella* spp. and of the two serovars (*S.* Enteritidis and *S.* Typhimurium) targeted in the national control programmes for broilers are presented in Table SA24; all MSs and the two non-MSs reported data on broiler flocks before slaughter.

In 2009, 18 MSs and two non-MSs had already met the target of 1 % or less of the broiler flocks positive for *S.* Enteritidis and/or *S*. Typhimurium (Figure SA14). Seven MSs reported no findings of the two serovars, while 20 MSs and two non-MSs reported prevalence of the two serovars ranging from <0.1 % to 7.7 %. Slovakia reported the highest prevalence (7.7 %) and in all the other MSs the prevalence was less than 6 %. Estonia and Ireland were the only MSs not to report any positive broiler flocks.

Overall for 2009, 27 MSs reported 5.0 % of the tested broiler flocks *Salmonella*-positive and 0.7 % positive for the two serovars.

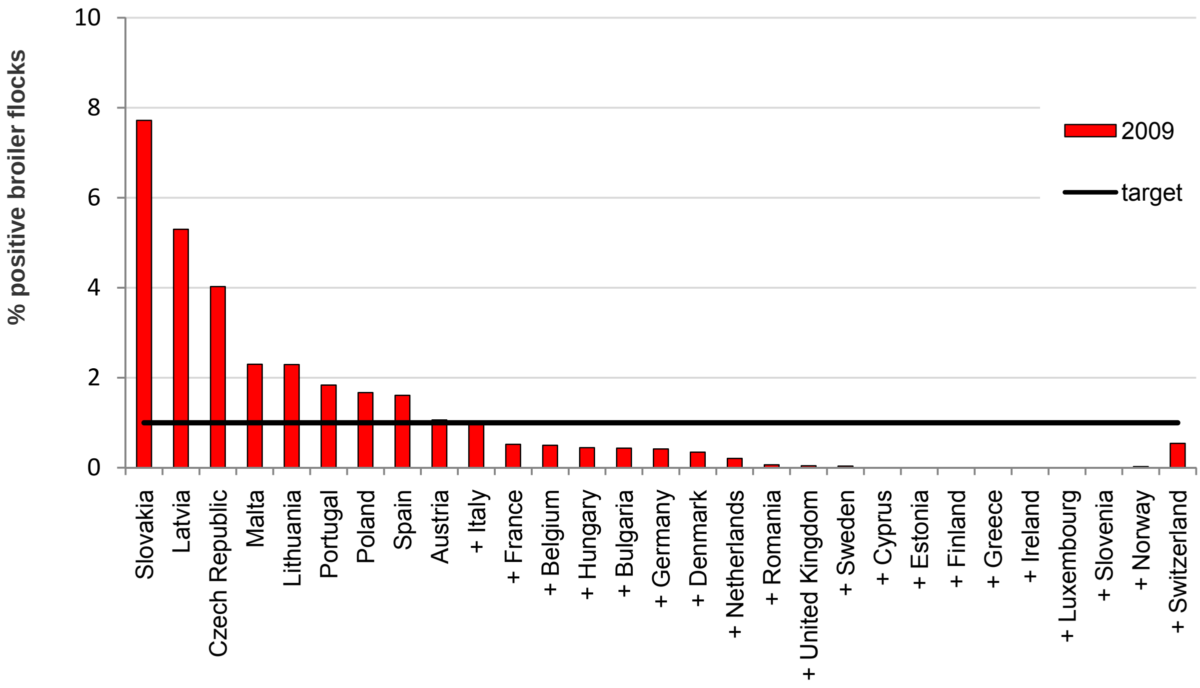
20 Commission Regulation (EC) No 646/2007 of 12 June 2007 implementing Regulation (EC) No 2160/2003 of the European Parliament and of the Council as regards a Community target for the reduction of the prevalence of *Salmonella* enteritidis and *Salmonella* typhimurium in broilers and repealing Regulation (EC) No 1091/2005. OJ L 151, 13.6.2007, p. 21–25.

Table SA24. *Salmonella* in broiler flocks of *Gallus gallus* before slaughter (flock-based data) in countries running control programmes, 2009

Country	N	% positive				
		pos (all)	*S*. Enteriditis and/or *S*. Typhimurium	*S*. Enteritidis	*S*. Typhimurium	Other serovars, non-typeable, and unspecified
Austria	3,302	3.4	1.1	0.7	0.3	2.3
Belgium	8,049	3.1	0.5	0.2	0.3	2.6
Bulgaria[1]	1,152	1.4	0.4	0.4	0	1.0
Cyprus	239	7.9	0	0	0	7.9
Czech Republic	6,035	7.4	4.0	3.9	0.2	3.3
Denmark	3,767	0.9	0.3	0	0.3	0.6
Estonia	414	0	0	0	0	0
Finland	2,972	0.4	0	0	0	0.4
France	35,913	8.1	0.5	0.2	0.3	7.5
Germany	4,339	7.0	0.4	0.3	0.1	6.6
Greece	6,577	0.3	0	0	0	0.3
Hungary	4,491	32.4	0.4	0.3	0.2	32.0
Ireland	665	0	0	0	0	0
Italy	2,072	19.2	1.0	0.7	0.3	18.1
Latvia	566	7.1	5.3	5.3	0	1.8
Lithuania	218	2.3	2.3	2.3	0	0
Luxembourg[2]	4	25.0	0	0	0	25.0
Malta	87	31.0	2.3	0.0	2.3	28.7
Netherlands	29,193	2.7	0.2	0.1	0.1	2.4
Poland	20,665	3.2	1.7	1.6	0.1	1.5
Portugal	654	5.4	1.8	1.2	0.6	3.5
Romania	3,160	4.8	<0.1	<0.1	<0.1	4.7
Slovakia	544	14.0	7.7	7.5	0.2	6.3
Slovenia	3,080	0.7	0	0	0	0.7
Spain	13,620	6.7	1.6	1.5	0.1	5.1
Sweden	2,713	0.1	<0.1	0	<0.1	0.1
United Kingdom[3]	27,780	1.3	<0.1	<0.1	<0.1	1.3
EU Total	**182,271**	**5.0**	**0.7**	**0.6**	**0.1**	**4.2**
Norway[4]	4,243	<0.1	<0.1	0	<0.1	0
Switzerland	740	1.6	0.5	0.3	0.3	1.1

1. For Bulgaria, sample unit is single.
2. For Luxembourg, one positive flock.
3. For the United Kingdom, the number of existing flocks and number of flocks tested is derived from the number of samples submitted to private and Government veterinary laboratories.
4. For Norway, sample unit is slaughter batch.

Figure SA14. Prevalence of S. Enteritidis and/or S. Typhimurium in broiler flocks before slaughter (flock-based data) for MSs and Norway and Switzerland, 2009



Note: In 2009, 18 MSs and two non-MSs met the target, indicated with a '+'.

Turkeys, ducks and geese

The Czech Republic, Finland, Germany, Greece, Ireland, Poland, Slovakia, Sweden and Norway reported data from *Salmonella* testing in turkey breeding flocks in 2009. *Salmonella* was only detected in the Czech Republic (4 flocks) and Poland (13 flocks). In addition, eight MSs and Norway provided data from turkey production flocks. All MSs, except Slovenia, found *Salmonella*-positive flocks at levels of 0.3 % to 11.2 % (Table SA25). Germany, Poland and Sweden reported findings of *S.* Enteritidis and *S.* Typhimurium in turkey production flocks, with prevalence ranging from 0.5 % to 3.5 %.

Bulgaria, Ireland, Poland, Slovakia and Norway reported data from *Salmonella* testing in duck breeding flocks. *Salmonella* was detected in Ireland (two flocks), Poland (three flocks) and Slovakia (one flock). Four MSs provided data on *Salmonella* in production flocks, overall 22.1 % of the tested flocks was positive for *Salmonella*, and 5.6 % positive for *S*. Enteritidis and/or *S*. Typhimurium (Table SA25). As in previous years, Denmark reported the highest proportion of positive flocks (63.5 %); all flocks were positive with serovars other than *S.* Enteritidis and *S*. Typhimurium.

Germany, Poland, Sweden and Norway reported data from *Salmonella* testing in geese breeding flocks. *Salmonella* was detected in Poland (eight flocks) and Sweden (one flock). Germany and Norway did not detect any positive breeding flocks. Only Germany and Poland reported data on *Salmonella* in production flocks of geese with a prevalence of 20.7 % and 10.6 %, respectively (Table SA25). Both Germany and Poland reported flocks positive with *S*. Enteritidis and *S*. Typhimurium, being 20.7 % and 4.6 %, respectively.

For further information of reported data please refer to Level 3 tables.

***Table SA25. Salmonella** in production flocks of turkeys, ducks and geese (all age groups[1], flock-based data), 2007-2009*

Country	2009			2008			2007		
	N	% pos (all)	% S. Enteridis and S. Typhimurium	N	% pos (all)	% S. Enteridis and S. Typhimurium	N	% pos (all)	% S. Enteridis and S. Typhimurium
Turkeys									
Austria	353	7.1	0	325	9.2	0.6	276	5.4	0
Belgium	155	3.9	0	-	-	-	91	7.7	0
Denmark	-	-	-	69	1.4	1.4	-	-	-
Finland	394	0.3	0	466	0.2	0.2	711	0.1	0.1
Germany	62	3.2	1.6	60	6.7	1.7	26	3.8	0
Greece	-	-	-	53	5.7	5.7	29	10.3	3.4
Ireland	-	-	-	-	-	-	27	14.8	0
Italy	-	-	-	-	-	-	46	8.7	6.5
Netherlands	-	-	-	-	-	-	216	1.9	0
Poland	1,358	11.2	3.5	3,279	7.9	2.6	7,150	6.6	1.8
Slovakia	40	2.5	0	-	-	-	151	4.6	0
Slovenia	159	0	0	190	2.6	0	121	3.3	0
Sweden	186	2.2	0.5	251	0.8	0.4	115	0.9	0
Total turkeys (8 MSs in 2009)	**2,707**	**7.1**	**1.8**	**4,693**	**6.5**	**2.0**	**8,959**	**5.8**	**1.5**
Norway[2]	455	0	0	557	0	0	424	0	0
Ducks									
Austria	30	16.7	0	66	22.7	4.5	33	21.2	0
Bulgaria	-	-	-	74	0	0	-	-	-
Denmark	85	63.5	0	61	70.5	6.6	-	-	-
Germany	95	4.2	4.2	-	-	-	25	4.0	4
Poland	148	10.8	10.8	516	15.1	8.3	690	10.3	2.9
Total ducks (4 MSs in 2009)	**358**	**22.1**	**5.6**	**717**	**19.0**	**7.0**	**748**	**10.6**	**2.8**
Norway	68	0	0	-	-	-	85	0	0
Geese									
Austria	-	-	-	62	6.5	3.2	94	11.7	4.3
Germany	29	20.7	20.7	25	8.0	8.0	29	20.7	17.2
Poland	653	10.6	4.6	1,442	9.2	4.6	2,726	9.1	4.1
Total geese (2 MSs in 2009)	**682**	**11.0**	**5.3**	**1,529**	**9.0**	**4.6**	**2,849**	**9.3**	**4.2**

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

1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan.
2. Norway reported for 2008: data including a small amount of ducks and geese.

Pigs

Data on the occurrence of *Salmonella* at farm level from the bacteriological monitoring of pigs (other than the baseline survey) were reported by Estonia (0.9 %) and Norway (0 %) (Table SA26). Three MSs and one non-MS reported data on the occurrence of *Salmonella* from the bacteriological monitoring of lymph nodes at slaughter. Estonia reported the highest prevalence (8.2 %), while the three Nordic countries reported no positive findings or very low occurrences. The Nordic countries reported data from both breeding and fattening pigs. Slovakia reported 5.7 % of breeding animals positive, but did not indicate the sample type. These findings are in line with findings from previous years. The Czech Republic reported 1.1 % to 2.6 % and Italy 6.8 % of positive pigs, however they did not indicate the sampling level.

Two MSs reported survey data on the occurrence of *Salmonella* in pigs. Italy reported a prevalence of 2.0 % at unspecified sample level and Spain reported a prevalence of 39.6 % in fattening pigs (lymph nodes) at slaughter level. For further information of reported data please refer to Level 3 tables.

Table SA26. **Salmonella** ***in pigs from bacteriological monitoring programmes, 2007-2009***

Country	Sample level	Sample unit	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
Estonia	Farm	Animal, faeces	1,372	0.9	810	0	2,255	0
Finland	Farm	Herd (breeding), faeces	-	-	45	0	66	0
Netherlands	Farm	Holding (fattening), faeces	-	-	-	-	228	19.3
Sweden	Farm	Herd (breeding), faeces	-	-	-	-	115	0
	Farm	Herd (fattening), faeces	-	-	-	-	-	-
Norway	Farm	Herd (breeding), faeces	116	0	-	-	122	0
Estonia	Slaughter	Animal (fattening), lymph nodes	146	8.2	146	8.2	-	-
Finland	Slaughter	Animal (breeding), lymph nodes	3,143	0.1	3,040	<0.1	3,066	<0.1
	Slaughter	Animal (fattening), lymph nodes	3,344	<0.1	3,112	<0.1	3,166	<0.1
Slovakia	Slaughter	Animal (breeding)	122	5.7	-	-	-	-
Sweden	Slaughter	Animal (breeding), lymph nodes	2,739	0.1	2,625	0.3	2,890	0.4
	Slaughter	Animal (fattening), lymph nodes	3,415	<0.1	3,187	0.3	3,354	0.3
Norway	Slaughter	Animal (breeding), lymph nodes	859	0	651	0	1,012	0
	Slaughter	Animal (fattening), lymph nodes	1,620	0	1,475	0	2,542	0
Czech Republic	Unspecified	Animal (breeding)	87	1.1	-	-	-	-
	Unspecified	Animal (fattening)	837	2.6	-	-	-	-
	Unspecified	Animal (piglets)	635	1.3	-	-	-	-
Italy[1]	Unspecified	Animal	44	6.8	-	-	-	-

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

1. In Italy, only the Veneto Region has a monitoring programme.

Breeding pigs: EU-wide baseline survey 2008

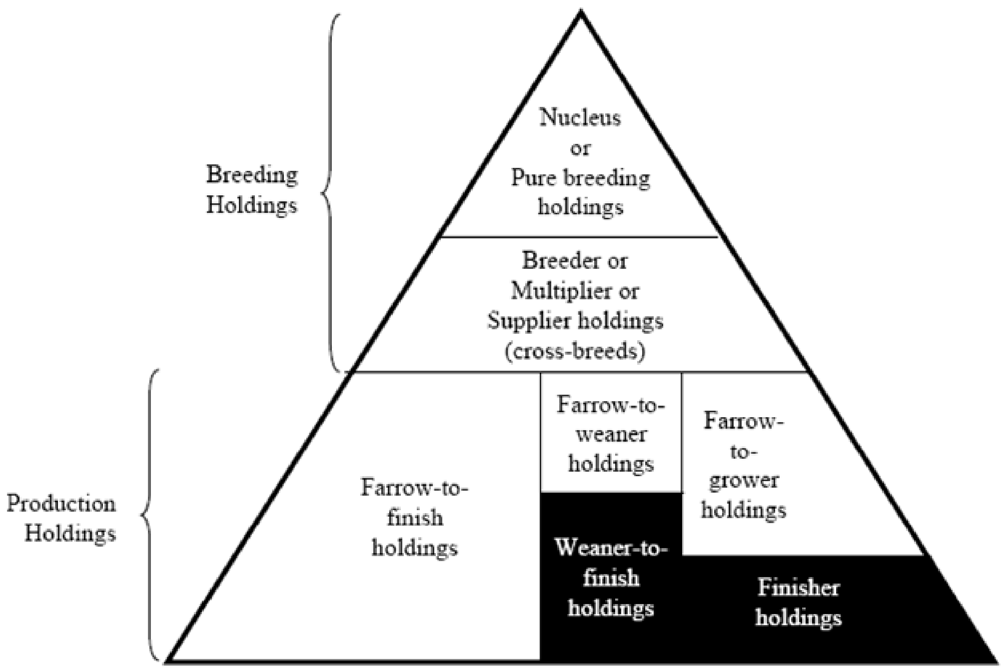
From January to December 2008, an EU-wide fully harmonised *Salmonella* baseline survey was carried out in holdings with breeding pigs. Twenty-four EU MSs conducted the survey, while Greece, Malta and

Romania did not participate. In addition, two non-MSs, Norway and Switzerland, participated in the survey on a voluntary basis. The objective of the survey was to obtain comparable data for all MSs through harmonised sampling schemes.

The survey was carried out in accordance with Regulation (EC) No 2160/2003, which foresees the setting of an EU reduction target for *Salmonella* prevalence in breeding pigs. The holdings were randomly selected from a target population constituting at least 80 % of the breeding pig population in each MS. The survey distinguished between breeding holdings and production holdings with breeding pigs. Breeding holdings sell gilts and/or boars for breeding purposes. Typically, they sell 40 % or more of the gilts that they rear for breeding whilst the remainder are sold for slaughter. In contrast, production holdings mainly sell pigs for fattening or slaughter.

Production holdings may be of farrow-to-weaner, farrow-to-grower or farrow-to-finish types. The weaner-to-finish and finisher pig holdings were not targeted by this survey. Figure SA15 shows the pyramidal structure of the primary pig production sector and shows the breeding and production holding types included in the survey.

Figure SA15. Overview of the pig breeding and production holdings included in EU* Salmonella *EU baseline survey, 2008



Note: Weaner-to-finish and finisher holdings (in black) are not covered by the survey.

In each selected breeding and production holding, fresh voided pooled faecal samples were collected from 10 randomly chosen pens, yards or groups of breeding pigs over six months of age, representing the different stages of production of the breeding herd (maiden gilts, pregnant pigs, farrowing and lactating pigs, pigs in the service area, or mixed). The pooled samples from each holding were tested for the presence of *Salmonella* and the isolates were serotyped. Details on the sampling and testing schemes are described in Annex I of the Commission Decision 2008/55/EC[21].

The cleaned dataset contained data from 1,609 breeding holdings and 3,508 production holdings. Statistical methods used for prevalence estimation at MS and EU level are described in the Report part A on the analysis of the baseline survey on the prevalence of *Salmonella* in holdings with breeding pigs[22].

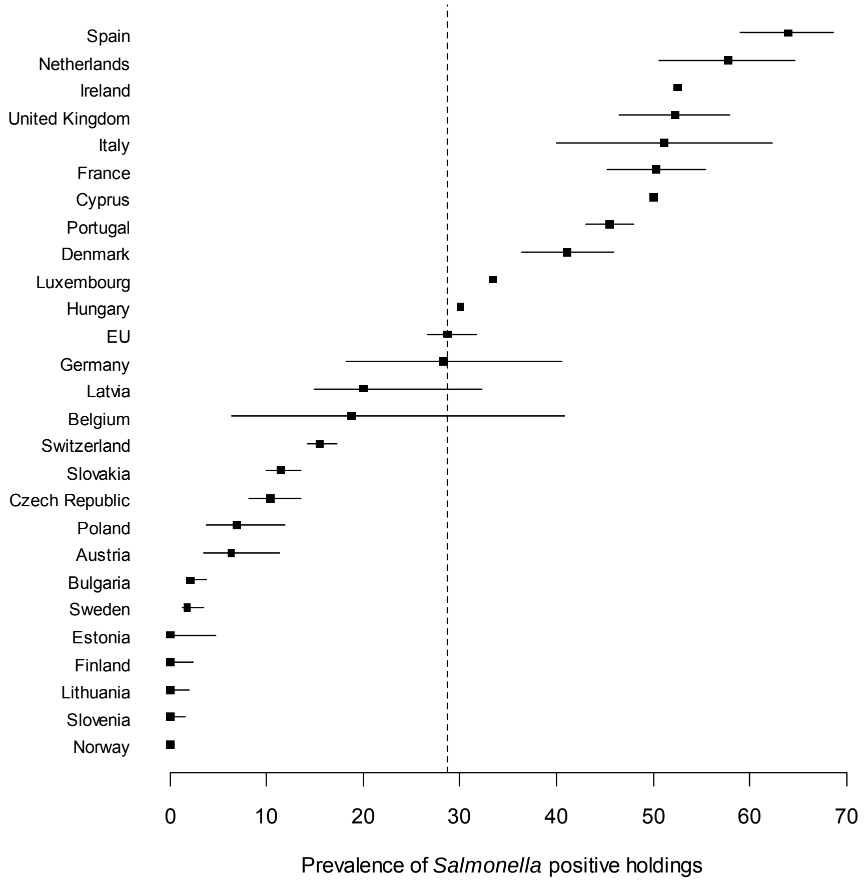
21 Commission Decision 2008/55/EC of 20 December 2007 concerning a financial contribution from the Community towards a survey on the prevalence of *Salmonella* spp. and Methicillin-resistant *Staphylococcus aureus* in herds of breeding pigs to be carried out in the Member States. OJ L 14, 17.1.2008, p. 10–25.

22 EFSA (European Food Safety Authority), 2009. Analysis of the baseline survey on the prevalence of *Salmonella* in holdings with breeding pigs in EU, 2008. Part A: *Salmonella* prevalence estimates. EFSA Journal 7(12):1377, 93 pp.

Salmonella *prevalence in pig breeding holdings*

Twenty of the 24 MSs isolated *Salmonella* in breeding holdings. In four MSs (Estonia, Finland, Lithuania and Slovenia) and in one non-MS (Norway), no sampled breeding holding tested positive. EU weighted prevalence of *Salmonella*-positive breeding holdings was 28.7 % (95 % CI: 26.3; 31.0). This prevalence varied from 0 % to 64.0 % among the MSs. Figure SA16 illustrates the prevalence estimates of *Salmonella*-positive breeding holdings for each MS, as well as at EU level.

Figure SA16. Prevalence[1] of* Salmonella*-positive pig breeding holdings, EU baseline survey 2008[2]



Note. The vertical line indicates EU weighted prevalence of *Salmonella* positive holdings

1. Horizontal bars represent 95 % confidence intervals (CI). As all existing breeding holdings are included in the survey in Cyprus, Hungary, and Luxembourg (census sampling), a 95 % CI based on a finite population approach is equal to the point estimate and therefore no CI is displayed, although the true CI is likely to be larger.
2. Greece, Malta and Romania did not conduct the survey and two non-MSs, Norway and Switzerland, participated.

At least one isolate from each positive sample was to be typed according to the White-Kaufmann-Le Minor scheme. In total, 54 different *Salmonella* serovars were isolated in breeding holdings by 20 MSs and one non-MS reporting positive results in the baseline survey. Together there were 1,303 *Salmonella* isolates originating from 452 *Salmonella*-positive breeding holdings in the survey. Two different *Salmonella* serovars were isolated from 99 *Salmonella*-positive breeding holdings.

The frequency distributions of the ten most common *Salmonella* serovars isolated in positive breeding holdings in EU and one non-MS are listed in decreasing order in Table SA27. In this table, the serovar frequency distribution, overall as well as for each MS, is reported as the percentage of breeding holdings in which the specific serovars were isolated out of the total number of *Salmonella*-positive breeding holdings. *S.* Derby was the most frequently isolated serovar in breeding holdings, and it was detected in 29.6 % of *Salmonella*-positive holdings. The second most commonly isolated serovar in breeding holdings was *S.* Typhimurium accounting for 25.4 % of *Salmonella*-positive holdings. The next most frequently isolated serovars in breeding holdings were *S.* Infantis, *S.* Rissen and *S.* London, accounting for 7.7 %, 7.3 % and 6.4 % of the positive holdings, respectively.

Table SA27. Distribution of the ten most common* Salmonella *serovars in pig breeding holdings, EU baseline survey 2008

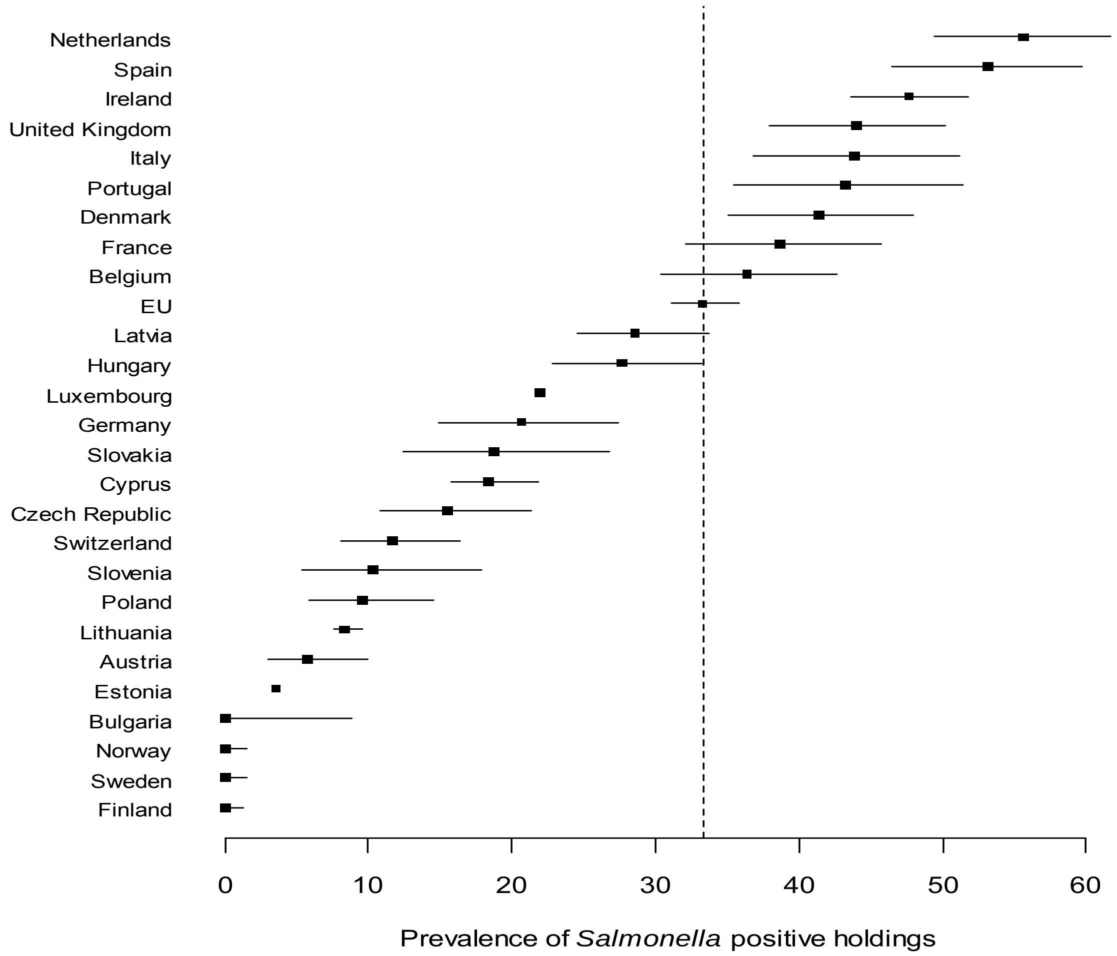
Countries	No of *Salmonella*-positive holdings	% of positive holdings										
		S. Derby	*S.* Typhimurium	*S.* Infantis	*S.* Rissen	*S.* London	*S.* Anatum	*S.* Livingstone	*S.* Kedougou	*S.* Muenchen	*S.* Bredeney	Other serovars and non-typeable
Austria	5	20.0	60.0	-	-	-	-	-	-	20.0	-	-
Belgium	3	33.3	66.7	-	-	-	-	33.3	-	-	-	-
Bulgaria	1	-	-	-	-	-	-	-	-	-	-	100.0
Cyprus	2	50.0	-	-	-	-	-	-	-	-	-	50.0
Czech Republic	11	9.1	36.4	-	-	-	-	-	-	-	-	54.5
Denmark	39	30.8	38.5	15.4	2.6	-	-	20.5	2.6	5.1	-	10.3
France	79	50.6	13.9	24.1	1.3	2.5	3.8	2.5	6.3	1.3	1.3	17.7
Germany	13	38.5	30.8	-	-	-	-	15.4	-	-	-	38.4
Hungary	12	25.0	33.3	16.7	-	16.7	-	-	-	-	8.3	41.7
Ireland	21	38.1	33.3	4.8	-	-	-	9.5	-	-	14.3	14.3
Italy	22	31.8	13.6	4.5	-	4.5	4.5	4.5	-	-	-	81.8
Latvia	1	100.0	-	-	-	-	-	-	-	-	100.0	-
Luxembourg	1	-	-	100.0	-	-	-	-	-	-	-	-
Netherlands	63	31.7	23.8	7.9	-	19.0	3.2	7.9	-	-	-	36.5
Poland	10	20.0	40.0	-	-	-	-	-	-	-	-	50.0
Portugal	15	20.0	20.0	-	40.0	20.0	-	6.7	-	6.7	-	33.3
Slovakia	11	27.3	18.2	-	-	9.1	-	-	-	-	-	45.5
Spain	96	15.6	21.9		25.0	7.3	18.8	1.0	1.0	8.3	6.3	55.2
Sweden	1	-	100.0	-	-	-	-	-	-	-	-	-
United Kingdom	35	28.6	37.1		2.9	2.9	2.9	2.9	22.9		2.9	48.6
Switzerland	11	9.1	27.3	-	-	-	-	9.1	-	9.1	-	45.5
Total no of positive holdings	**452**	**134**	**115**	**35**	**33**	**29**	**25**	**25**	**15**	**14**	**13**	**171**
Proportion (%) of positive holdings		29.6	25.4	7.7	7.3	6.4	5.5	5.5	3.3	3.1	2.9	37.8

Note: One holding can be positive for more than one serovar. The serovar distribution (% of holdings with serovars) was based on the number of *Salmonella* positive holdings. Ranking was based on the sum of all reported serovars in the survey.

Salmonella *prevalence in pig production holdings*

Twenty-one of the 24 MSs isolated *Salmonella* in production holdings. In three MSs (Bulgaria, Finland and Sweden) and in one non-MS (Norway), no sampled production holding tested positive. EU weighted prevalence of *Salmonella*-positive breeding holdings was 33.3 % (95 % CI: 30.9; 35.7). This prevalence varied from 0 % to 55.7 % among MSs. Figure SA17 illustrates the prevalence estimates of *Salmonella*-positive production holdings for each MS, as well as at EU level.

Figure SA17. Prevalence[1] of* Salmonella*-positive pig production holdings, EU baseline survey 2008[2]



Note. The vertical line indicates EU weighted prevalence of *Salmonella* positive holdings

1. Horizontal bars represent 95 % confidence intervals (CI). As all existing production holdings are included in the survey in Estonia and Luxembourg (census sampling), a 95 % CI based on a finite population approach is equal to the point estimate and therefore no CI is displayed, although the true CI is likely to be larger.
2. Greece, Malta and Romania did not conduct the survey and two non-MSs, Norway and Switzerland, participated.

At least one isolate from each positive sample was to be typed according to the White-Kaufmann-Le Minor scheme. In total, 88 different *Salmonella* serovars were isolated in production holdings by 21 MSs and one non-MS reporting positive results in the baseline survey. Together, there were 2,699 *Salmonella*-positive isolates from 950 *Salmonella*-positive production holdings. Two different *Salmonella* serovars were isolated from 196 *Salmonella*-positive production holdings.

The frequency distributions of the ten most common *Salmonella* serovars isolated in positive production holdings in EU and one non-MS are listed in decreasing order in Table SA28. In this table, the serovar frequency distribution, overall as well as for each MS, is reported as the percentage of production holdings in which the specific serovars were isolated out of the total number of *Salmonella*-positive production holdings. As in breeding holdings, *S.* Derby was the most frequently isolated serovar in production holdings, and it was isolated in 28.5 % of *Salmonella*-positive holdings. *S.* Derby was also the serovar most commonly isolated in terms of number of reporting countries; it was reported by 19 of the 21 MSs reporting *Salmonella*-positive production holdings, and in Switzerland. The second most commonly isolated serovar in production holdings was *S.* Typhimurium accounting for 20.1 % of *Salmonella*-positive holdings and reported by 15 MSs and by Switzerland. The next most frequently isolated serovars in production holdings were *S.* London, *S.* Infantis and *S.* Rissen, accounting for 9.5 %, 6.1 % and 5.9 % of positive holdings, respectively.

Table SA28. Distribution of the ten most common* Salmonella *serovars in pig production holdings, EU baseline survey 2008

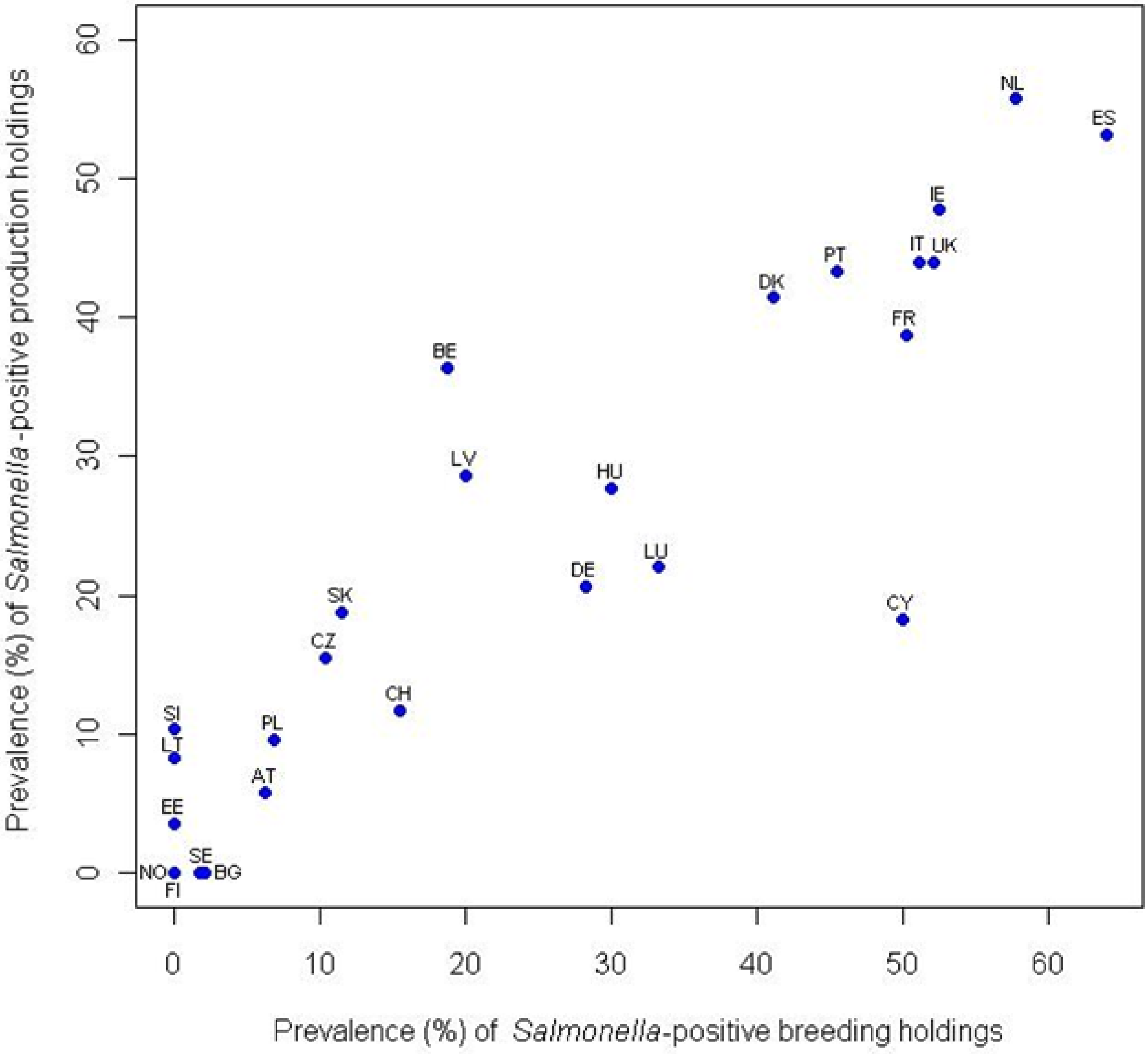
Countries	No of *Salmonella*-positive holdings	% of positive holdings										
		S. Derby	S. Typhimurium	S. London	S. Infantis	S. Rissen	S. Livingstone	S. Anatum	S. Bredeney	S. Goldcoast	S. Bovismorbificans	Other serovars and non-typeable
Austria	10	10.0	-	-	-	-	20.0	-	10.0	-	-	60.0
Belgium	76	27.6	30.3	3.9	5.3	7.9	13.2	6.6	1.3	5.3	1.3	36.8
Cyprus	11	45.5	-	9.1	-	-	-	-	27.3	-	-	27.3
Czech Republic	25	24.0	16.0	4.0	4.0	-	-	-	-	-	-	72.0
Denmark	82	35.4	30.5	3.7	22.0	1.2	8.5	-	-	-	-	14.6
Estonia	1	-	-	-	-	-	-	-	-	-	-	100.0
France	72	52.8	8.3	2.8	13.9	-	5.6	2.8	4.2	2.8	1.4	29.2
Germany	32	40.6	15.6	1.0	1.0	-	9.4	1.0		3.1	6.3	25.0
Hungary	39	46.2	5.1	5.1	2.6	-	5.1	2.6	10.3	-	15.4	20.5
Ireland	71	28.2	36.6	5.6	16.9	-	4.2	1.4	12.7	1.4	-	25.4
Italy	75	28.0	13.3	9.3	1.3	-	1.3	9.3	2.7	-	-	61.3
Latvia	8	12.5	-	12.5	-	-	-	-	25.0	-	-	50.0
Lithuania	6	-	-	16.7	16.7	-	-	-	-	-	-	66.7
Luxembourg	9	77.8	11.1	-	11.1	-	11.1	-	-	-	-	11.1
Netherlands	118	30.5	14.4	16.1	3.4	0.8	11.9	5.9	-	11.9	5.1	45.8
Poland	17	29.4	17.6	-	-	-	-	-	-	5.9	-	58.8
Portugal	58	12.1	31.0	15.5	-	22.4	-	3.4	1.7	1.7	3.4	15.5
Slovakia	18	22.2	16.7	-	-	-	-	-	11.1	5.6	16.7	38.9
Slovenia	9	11.1	-	-	22.2	-	-	-	-	-	-	88.9
Spain	111	12.6	23.4	11.7	1.8	29.7	0.9	12.6	7.2	9.9	1.8	38.7
United Kingdom	84	25.0	22.6	27.4	-	2.4	1.2	3.6	1.2	3.6	9.5	64.3
Switzerland	18	16.7	16.7	-	-	-	5.6	-	16.7	-	-	50.0
Total no of positive holdings	**950**	**271**	**191**	**90**	**58**	**56**	**50**	**43**	**40**	**39**	**31**	**384**
Proportion (%) of positive holdings		28.5	20.1	9.5	6.1	5.9	5.3	4.5	4.2	4.1	3.3	40.4

Note: One holding can be positive for more than one serovar. The serovar distribution (% of holdings with serovars) was based on the number of *Salmonella*-positive holdings. Ranking was based on the sum of all reported serovars in the survey.

Association between Salmonella *prevalence in breeding and production holdings*

The association between *Salmonella* prevalence in pig breeding and in pig production holdings is illustrated graphically in Figure SA18. The scatter diagram shows that the prevalence of *Salmonella*-positive production holdings increases as the prevalence of *Salmonella*-positive breeding holdings increases, meaning that there is a positive correlation. This observation is notably clearer for countries with a prevalence above 5 % for either breeding or production holdings.

Figure SA18. Correlation between the prevalence of* Salmonella*-positive breeding holdings and the prevalence of* Salmonella*-positive production holdings, EU baseline survey 2008



Cattle

Data from the bacteriological monitoring of *Salmonella* in cattle were reported by eight MSs and Norway in 2009 (Table SA29). The Netherlands reported 5.5 % of tested herds positive at farm level, compared to 2.0 % in 2008. Generally, no or a very low occurrence of *Salmonella* in cattle at slaughter were reported. This is similar to reports from previous years. Bulgaria, The Czech Republic and Italy reported 0.6 %, 3.4 % and 1.0 %, respectively, of tested animals positive, but no information on the sample level was provided.

Two MSs reported survey data on the occurrence of *Salmonella* in cattle. Italy reported a prevalence of 1.5 % at unspecified sample level and Spain reported a prevalence of 11.2 % at slaughter level. For further information of reported data please refer to Level 3 tables.

Table SA29. **Salmonella *in cattle from bacteriological monitoring programmes, 2007-2009***

Country	Sample level	Sample unit	2009		2008		2007	
			N	%pos	N	%pos	N	%pos
Estonia[1]	Farm	Animal, faeces	1,550	0.6	1,607	0.2	1,302	0.8
Finland[5]	Farm	Herd, faeces	235	0	246	0.4	281	0.4
Italy[2]	Farm	Animal, faeces	-	-	707	5.4	-	-
Netherlands	Farm	Herd, faeces	330	5.5	1,716	2.0	-	-
Italy[2,3]	Prior to slaughter	Animal, organ/tissue	-	-	89	0	-	-
Slovenia	Prior to slaughter	Animal, faeces	-	-	386	0.3	199	1.0
Finland	Slaughter	Animal, lymph nodes	3,097	0	2,988	<0.1	2,930	<0.1
Italy[2]	Slaughter	Animal	-	-	553	0.4	-	-
Slovakia	Slaughter	Animal	95	0	-	-	-	-
Sweden[4]	Slaughter	Animal, lymph nodes	3,487	0.2	3,320	0.1	3,853	0.1
Bulgaria	Unspecified	Animal	477	0.6	-	-	-	-
Czech Republic	Unspecified	Animal	696	3.4	-	-	-	-
Italy	Unspecified	Animal	1,438	1.0	-	-	-	-
Norway	Slaughter	Animal, lymph nodes	2,441	0	1,831	0	2,218	<0.1

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

1. In Estonia, faecal samples from 5-10 animals were pooled for investigation (2007).
2. In Italy, only the Veneto Region has a monitoring programme.
3. In Italy, faecal samples from 15 animals per batch were examined (2007).
4. In Sweden 23 suspected herds were sampled, *Salmonella* was detected in 13 herds (2007).
5. In Finland, herds producing AI bulls.

Other animal species

Other poultry species, such as guinea fowl, ostriches, partridges, quails and pheasants, as well as wild birds, were tested for *Salmonella* in some countries. Results show that all types of poultry can be infected with *Salmonella* and several serovars may be present.

In several countries, *Salmonella* was detected in sheep (Austria, Estonia, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Romania, Slovenia, Sweden, the United Kingdom, Norway and Switzerland), goats (Greece, Italy and Romania) and solipeds (Germany, Hungary, Ireland, Italy, the Netherlands, Sweden, the United Kingdom, Norway and Switzerland). Data reported on *Salmonella* in sheep, goats and solipeds were primarily results from diagnostic submissions.

Pets, in particular cats and dogs, but also reptiles have been investigated for *Salmonella* and some countries report findings of *Salmonella*. A relatively high proportion of the reported data on *Salmonella* in pets were results from suspected clinical cases. However, Germany reported 502 out of 1,102 reptile samples positive for *Salmonella*, indicating that reptile associated salmonellosis represents an emerging zoonosis.

For further information of reported data please refer to Level 3 tables.

3.1.4. *Salmonella* in feedingstuffs

Data on *Salmonella* in feedingstuffs in MSs derive from different targeted surveillance programmes as well as from unbiased reporting of random sampling of domestic and imported feedingstuffs (Appendix Table SA1). Presentation of single sample and batch-based data from the different monitoring systems were therefore summarised, and include both domestic and imported feedingstuffs. Due to significant differences in monitoring and reporting strategy, data are not necessarily comparable between MSs.

Table SA30 shows EU proportion of *Salmonella*-positive samples in animal and vegetable derived feed materials in 2007 to 2009. The number of reported samples from all types of feed materials declined during 2007-2009 from a total of 42,767 samples in 2007 to 21,730 samples in 2009, despite approximately the same number of MSs and non-MSs reporting.

In 2009, in animal derived feed material, the overall level of *Salmonella* contamination increased slightly in meat and bone meal (1.4 % in 2009 compared to 1.0 % in 2008), while a marked decrease was observed in fish meal (0.7 % in 2009 compared to 2.1 % in 2008), meaning the proportion of positive samples from fish meal now are lower than for samples from meat and bone meal. However, it should be noted that the positive findings in meat and bone meal are not relevant to food-producing animals for which this kind of feed is prohibited.

In 2009, the overall reported *Salmonella* contamination of cereal derived feed material was 0.4 %. As in previous years, the *Salmonella* contamination level of this feed material was low compared to other feed materials.

During the years 2004 to 2009 there has been a general decrease in the reported occurrence of *Salmonella* in feed materials derived from oil seeds and products thereof, from an overall EU proportion of 5.7 % positive samples in 2004 to 1.3 % in 2009.

In compound feedingstuffs, the feed ready to be fed to animals, the proportion of *Salmonella*-positive findings in 2009, ranged from 0 % to 4.9 % in cattle feed, 0 % to 2.9 % in pig feed, and from 0 % up to 18.0 % in poultry feed among the reporting MSs and non-MSs (Table SA31). However, the relatively high percentage of positive samples from poultry feed in Spain (18.0 %), was mainly due to a high proportion of positive samples from process control and not from final products. For pig compound feed the observed ranges of positive samples in 2009 were smaller than recorded in 2008 and 2007. The overall proportion of positive samples in the three types of compound feed in reporting MSs, remained stable during 2007-2009 with an average proportion of 0.4-0.5 % positive samples in cattle feed, 0.6-0.8 % positive samples in pig feed and 0.9-1.0 % positive samples in poultry feed.

The reported percentages of positive single samples/batches might not always be representative of feedingstuffs on the national markets, as it might reflect intensive sampling of high risk products. The national reports include only limited information regarding the sampling strategy.

The occurrence of *S*. Enteritidis and *S*. Typhimurium in feedingstuffs was relatively low, even though *S*. Enteritidis was the single most frequently isolated serovar from compound feedingstuffs for poultry. *S*. Enteritidis was detected in compound feedingstuffs for poultry in Italy (one batch, no information on sampling stage), Poland (one batch, final product), Slovakia (one batch, final products) and Spain (25 samples from process control and one sample from final products) and in compound feedingstuffs for cattle in Poland (one batch, no information on sampling stage). *S*. Enteritidis was also detected in fish meal in Poland (one batch) and poultry offal meal in Slovakia (one batch).

S. Typhimurium was detected in final products of compound feedingstuffs for poultry in Germany (three samples) and Spain (one sample) and in meat and bone meal in Germany (three samples), Slovakia (one batch - imported material) and the United Kingdom (one batch). Findings in feed materials of vegetable origin were reported from materials of cereal or maize origin by France and Sweden (one batch, imported material), from wheat derived material in the United Kingdom (one batch) and in feed materials of oil seed origin in rape seed in Germany (one sample) and soya bean derived material in the United Kingdom (two batches).

The serovar distribution of the reported *Salmonella* findings in feedingstuff is presented in Chapter 3.1.6.

For more information on reported data please refer to Level 3 tables.

Table SA30. **Salmonella** *in animal and vegetable derived feed material, 2007-2009*

EU Totals	2009		2008		2007	
	N	% pos	N	% pos	N	% pos
Fish meal	1,362	0.7	1,688	2.1	3,123	2.9
Meat and bone meal	6,015	1.4	8,399	1.0	11,270	0.7
Cereals	3,633	0.4	5,262	0.2	5,489	0.4
Oil seeds and products	10,720	1.3	18,786	1.8	22,885	2.2

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

Table SA31. **Salmonella** *in compound feedingstuffs, 2007-2009*

Feedingstuff	2009		2008		2007	
	N	% pos	N	% pos	N	% pos
Cattle feed						
Austria	-	-	30	0	-	-
Belgium	38	0	55	3.6	-	-
Bulgaria	-	-	162	0	-	-
Czech Republic	67	0	75	0	54	0
Estonia	86	0	-	-	-	-
Finland	281	0	287	0	374	0
Germany	230	0	412	0	49	0
Hungary	41	4.9	-	-	-	-
Ireland	34	0	46	0	69	0
Italy	-	-	51	0	193	2.1
Luxembourg	-	-	35	0	39	0
Netherlands	2,287	0.1	2,229	0.5	2,428	0.2
Poland	260	3.5	465	0.6	1,011	1.0
Portugal	35	0	53	0	37	2.7
Slovakia	261	0.4	413	0.5	65	0
Slovenia	-	-	-	-	26	3.8
Spain	-	-	77	2.6	25	8.0
Total cattle feed (11 MSs in 2009)	**3,620**	**0.4**	**4,390**	**0.5**	**4,370**	**0.5**
Norway	-	-	-	-	5	0
Switzerland	165	0	119	0	-	-

Table continued overleaf

Table SA31 (contd.).* Salmonella *in compound feedingstuffs, 2007-2009

Feedingstuff	2009		2008		2007	
	N	% pos	N	% pos	N	% pos
Pig feed						
Austria	-	-	63	1.6	-	-
Belgium	79	2.5	56	3.6	-	-
Czech Republic	372	0	446	0	180	0
Finland	834	2.3	231	0	274	0
France	76	1.3	-	-	597	1.0
Germany	219	1.8	412	0.2	107	0
Hungary	210	1.4	159	0	-	-
Italy	-	-	176.0	2.3	121	2.5
Luxembourg	-	-	32	3.1	56	3.6
Netherlands	2,842	0.2	2,543	0.3	2,898	0.1
Poland	577	1.0	851	1.2	1,853	1.6
Portugal	27	0	78	2.6	33	3.0
Romania	-	-	-	-	60	0
Slovakia	208	0	353	0.3	173	0
Slovenia	-	-	-	-	51	5.9
Spain	35	2.9	71	1.4	54	3.7
Total pig feed (11 MSs in 2009)	**5,479**	**0.7**	**5,471**	**0.6**	**6,457**	**0.8**
Norway	-	-	58	0	79	0
Switzerland	31	0	-	-	-	-
Poultry feed						
Austria	64	0	204	0.5	188	0
Belgium	372	2.2	334	2.1	287	0.7
Bulgaria	-	-	25	0	-	-
Czech Republic	1,291	0	699	0.1	587	1.0
Finland	492	4.5	83	0	92	0
France	283	0	4,462	1.2	4,477	1.4
Germany	2,170	1.4	1,611	2.1	51	0
Hungary	279	0.7	200	0.5	-	-
Ireland	-	-	29	0	-	-
Italy	104	4.8	259	1.2	467	2.6
Latvia	52	0	55	5.5	80	1.3
Luxembourg	-	-	29	0	-	-
Netherlands	8,411	0	6,547	0.2	7,397	0.3
Poland	1,169	1.4	1,151	1.1	2,559	2.2
Portugal	35	0	48	0	26	0
Romania	-	-	33	0	314	0
Slovakia	200	3.5	499	2.0	399	1.3
Slovenia	38	10.5	35	2.9	65	0
Spain	289	18.0	36	8.3	99	10.1
Total poultry feed (15 MSs in 2009)	**15,249**	**1.0**	**16,339**	**0.9**	**17,088**	**1.0**
Norway	**100**	0	76	0	190	0
Switzerland	**57**	0	39	0	-	-

Note: Data are only presented for sample size ≥25. Include results from final products, at process control and unspecified.

3.1.5 Evaluation of the impact of *Salmonella* control programmes in fowl (*Gallus gallus*)

EU MSs have been under the legal obligation to implement *Salmonella* control programmes in breeding flocks of *Gallus gallus* since 1993. For the years 1993 to 2006 these mandatory national control programmes targeted two *Salmonella* serovars regarded to be the most important from a public health point of view: *S.* Enteritidis and *S*. Typhimurium. Starting from 2007, three more serovars, *S.* Infantis, *S.* Virchow and *S.* Hadar**,** were added to the programmes. Regulation (EC) No 2160/2003 laid down similar mandatory *Salmonella* control programmes for flocks of laying hens and broilers, which have been implemented since 2008 and 2009, respectively, and they cover the two serovars of *S.* Enteritidis and *S*. Typhimurium. The results from these control programmes have been presented earlier in the Chapter 3.1.3.

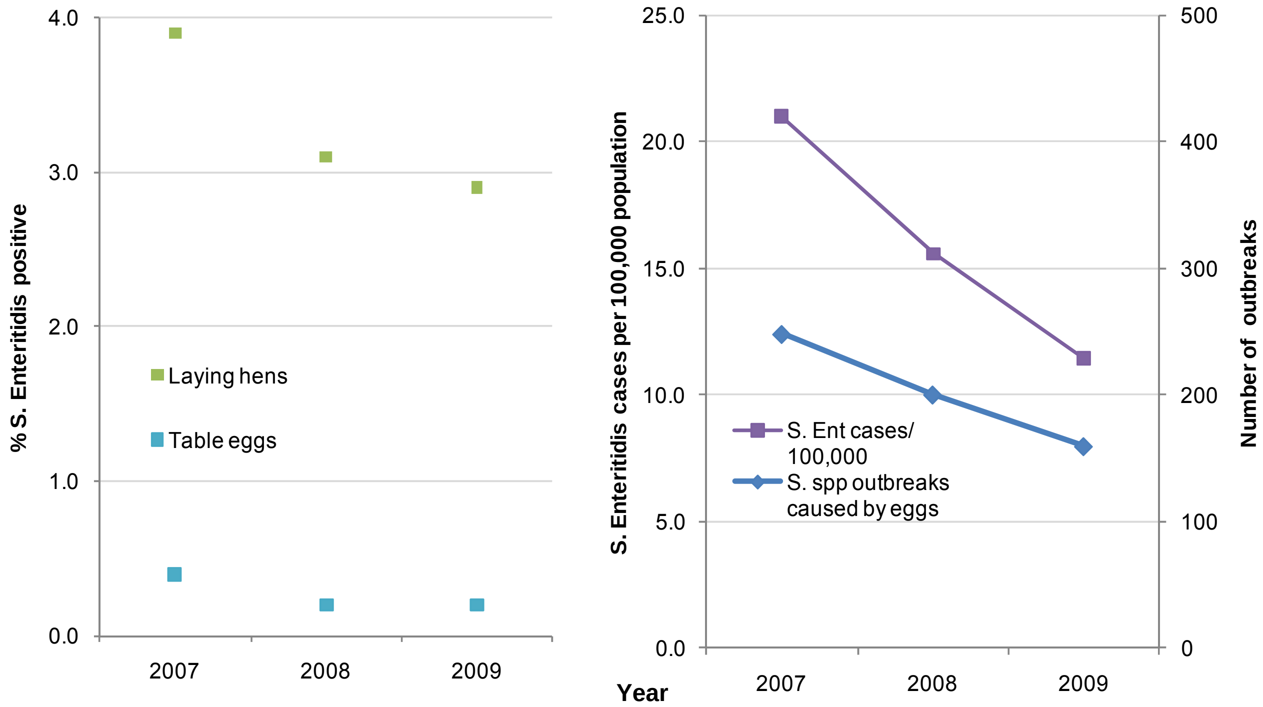
Eggs are considered to be the most important source of human salmonellosis cases in EU, particularly of those caused by *S*. Enteritidis. Therefore, in order to evaluate the impact of these control programmes on public health, the incidence of human salmonellosis cases caused by *S*. Enteritidis, the numbers of *Salmonella* food-borne outbreaks caused by eggs and the prevalence of *S*. Enteritidis in laying hen flocks were examined. However, it should considered that the *Salmonella* control programmes now in place in MSs cover the whole food chain from farm-to-fork; so a reduction of *Salmonella* at farm level is expected to reduce the risk of salmonellosis in humans, but the other control measures along the food chain are also important in reducing the risk.

At EU level, the proportion of laying hens flocks (sampling during the production period) infected with *S*. Enteritidis decreased from 3.9% in 2007 (19 MSs reporting) to 3.1% in 2008 (25 MSs reporting) and 2.9 % in 2009 (27 MSs reporting). During the same period the proportion of table eggs positive for *S*. Enteritidis decreased from 0.4 % in 2007 (15 MSs reporting) to 0.2 % in 2008 and 2009 (15 and 13 MSs reporting, respectively) (Figure SA19). Differences between MSs were observed with regard to the prevalence of *S*. Enteritidis in laying hen flocks (Figure SA20). In the same period, a 43.8 % drop in the notification rate of human *S*. Enteritidis cases per 100,000 population was observed (from 21.0 to 11.8). Correspondingly, a 36 % reduction in outbreaks caused by eggs was reported in EU from 2007 to 2009 (248 to 159 outbreaks) (Figure SA19).

In humans, the decrease in notified S. Enteritidis cases was seen in 23 MSs, and in 17 of them the reduction was statistically significant (p< 0.01). Germany accounted for about half of the total reduction in reported *S*. Enteritidis cases in EU (44.5 %). The most remarkable drop in the reporting rate was seen in Slovakia, where the notification rate halved from 111.7 cases per 100,000 population in 2008 to 58.4 cases per 100,000 population in 2009, followed by Lithuania with a reduction from 86.9 to 51.1 *S*. Enteritidis cases per 100,000 population (Figure SA21). Despite a general decreasing trend in reported *S*. Enteritidis cases, three countries reported more cases in 2009 than in 2008. In two of them, Austria and Italy, the increase in reported numbers was statistically significant (p< 0.01). Italy accounted for 60.1 % of the total increase in the number of *S*. Enteritidis cases as reported by those three countries.

These results indicate that the reduction of *S.* Enteritidis in laying hen flocks is likely to have contributed to the decline of *S.* Enteritidis cases in humans, since eggs are regarded to be the most important source of these infections.

Figure SA19. **Salmonella** ***Enteritidis in human cases, eggs and laying hens and the number of*** **Salmonella** ***outbreaks caused by eggs within EU, 2007-2009***



Note: Data for laying hens and table eggs are only presented for sample size ≥25. For laying hens only data from sampling during the production period were included.

Figure SA20. Prevalence of S. Enteritidis for laying hen flocks of **Gallus gallus** ***during the production period (flock-based data) for MSs and Norway and Switzerland, 2008-2009***

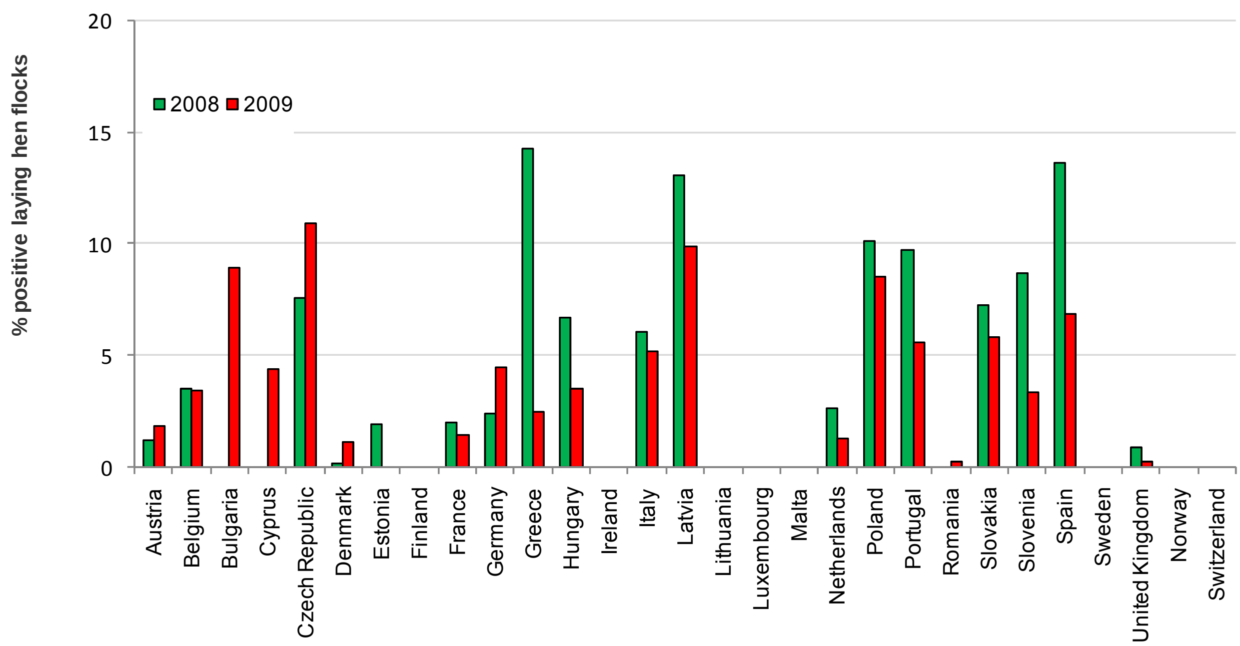
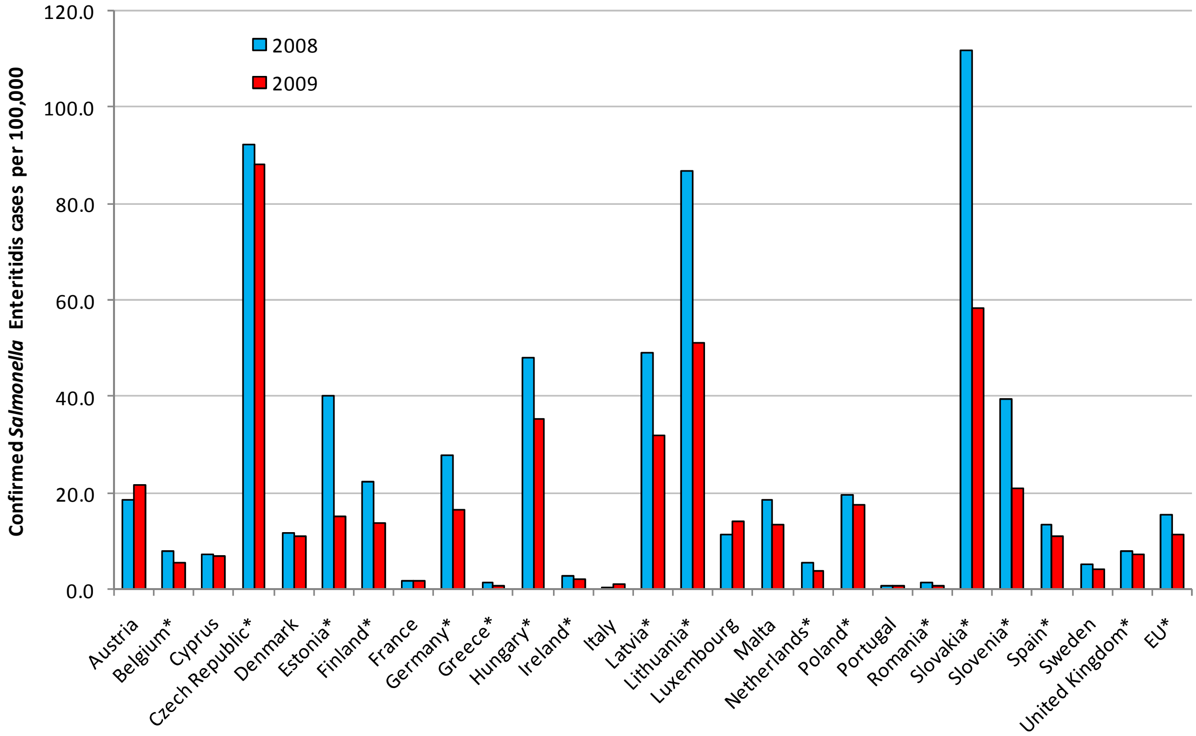


Figure SA21. S. Enteritidis notification rates (confirmed cases per 100,000) by MSs and EU, 2008-2009. TESSy data for 26 MSs



*Significant reduction in number of reported cases (p< 0.01)

3.1.6. *Salmonella* serovars

As in previous years, in 2009, the information available on the distribution of *Salmonella* serovars along the food chain varied greatly between countries. In all MSs, the serotyping of *Salmonella* isolates from food, animals and feed is carried out according to the White-Kaufmann-Le Minor Scheme.

In the following, the ten most frequently reported serovars among isolates from humans, food, animal species and feedingstuffs are presented. For human data, the most common phage types of *S.* Enteritidis and *S.* Typhimurium serovars are also presented. For the non-human data, information on serovar distribution will be presented in a food chain perspective by comparing serovar distribution in compound feed for specific animal species with serovars from relevant animals and foodstuffs. However, it should be noted that the amount of data in some categories are scarce and conclusions therefore should be drawn with great caution. Most MSs reported a subset designated “other serotypes”. For some MSs this may include isolates belonging to the ten most common serovars in EU and the relative EU occurrence of some serovars may therefore be underestimated. It should also be noted that, according to EU regulations, the method of analysis for poultry samples is the annex D of ISO 6579:2002, which uses a single selective enrichment medium and does not allow the identification of non-motile strains. In some MSs two selective enrichment media are used, which allow the identification of non-motile strains (e.g. NF U 47 100).

For detailed data on serovars in foodstuffs, animals, and feeding stuffs, please refer to Level 3 tables.

Serovars in humans

Information on serovars in humans was available from 26 MSs (Bulgaria reported no case-based serovar data). The distribution of the ten most common serovars in humans in EU is shown in Table SA32 and in Figure SA22.

As in previous years, the two most commonly reported *Salmonella* serovars in 2009 were *S.* Enteritidis and *S.* Typhimurium, representing 52.3 % and 23.3 % of all reported serovars in human confirmed cases respectively (N=102,001) (Table SA32). The decrease in *S.* Enteritidis serovars continued with 16,709 fewer cases (23.8 %) reported in EU in 2009 than in 2008. A reduction of 10.1 % in reported cases was also seen for *S.* Typhimurium serovars with a total decrease of 2,664 cases. At EU level, the impact of a reduction in notification rates was -3.7 per 100,000 population (from 15.6 in 2008 to 11.8 in 2009) for *S.* Enteritidis and -0.6 per 100,000 population (from 5.9 in 2008 to 5.3 in 2009) for *S.* Typhimurium. For a more detailed description of *S.* Enteritidis in the human population see Chapter 3.1.5 (Evaluation of the impact of *Salmonella* control programmes in fowl (*Gallus gallus*)).

In 2009, the number of reported *S.* Typhimurium cases decreased in 15 MSs and the reduction was statistically significant ($p<0.01$) in eight MSs (Belgium, Denmark, Estonia, France, Germany, Malta, the Netherlands and Sweden). Denmark experienced a drop in the notification rate from 36.6 cases per 100,000 population to 13.9 cases per 100,000 population as the national outbreak from 2008 ceased (Figure SA23). Germany accounted for 46.9 % of the total reduction, followed by Denmark with 24.5 %. A total of 11 MSs reported more *S.* Typhimurium cases in 2009 compared to 2008, and five of them had a significant increase in the reported *S.* Typhimurium cases (Austria, the Czech Republic, Hungary, Italy and Spain).

S. Infantis has been the third most common serovar in EU since 2006 with a relative proportion steadily increasing from 1.0 % (2006, 2007) through 1.1 % (2008) to 1.6 % (2009). In 2009, *S.* Agona and *S.* Stanley cases decreased so that they were no longer among the ten most common serovars, while *S.* Hadar and *S.* Saintpaul entered as new serovars to the seventh and ninth place of the top ten serovars (507 and 452 cases reported, respectively) (Table SA32).

The two most frequently reported phage types of *S.* Enteritidis in 2009 were PT8 (16.4 %) and PT4 (16.3 %) although PT4 decreased by 13.3 % in 2009 compared to 2008 (Table SA33). Three phage types increased remarkably compared to the previous year: PT1 increased by 42.0 % (from 905 to 1,285 cases), PT14b by 55.5 % (from 613 to 953 cases) and PT6 by 43.6 % (from 580 to 833 cases). Two new phage types, PT13a and PT51 entered the list of top ten *S.* Enteritidis phage types.

For *S.* Typhimurium, DT193 (DT= definitive phage type) was the most common phage type (N=1,370, 20.3 %) with the majority of cases being reported by the United Kingdom with 440 cases (32.1 %) and Germany with 389 cases (28.4 %). This phage type has increased in humans in EU over the past ten years and is associated to the dominant clone of monophasic *S.* Typhimurium which is frequently found in pigs and also cattle in Europe. Two definitive phage types, DT104b and U302 showed remarkable increases from 134 to 425 cases (DT104b) and from 146 to 361 cases (U302) in 2009 (Table SA33). Three new *S.* Typhimurium phage types entered the top ten list; phage type U311 with 343 cases, DT195 with 315 cases, and DT191 with 237 cases. In 2009, the proportion of *S.* Enteritidis and *S.* Typhimurium cases for which phage type data was reported improved, and it was 18.7 % (12.2 % in 2008) and 28.5 % (20.2 % in 2008), respectively.

Figure SA22. Distribution of the ten most common* Salmonella *serovars in humans, TESSy data from 26 MSs, 2009

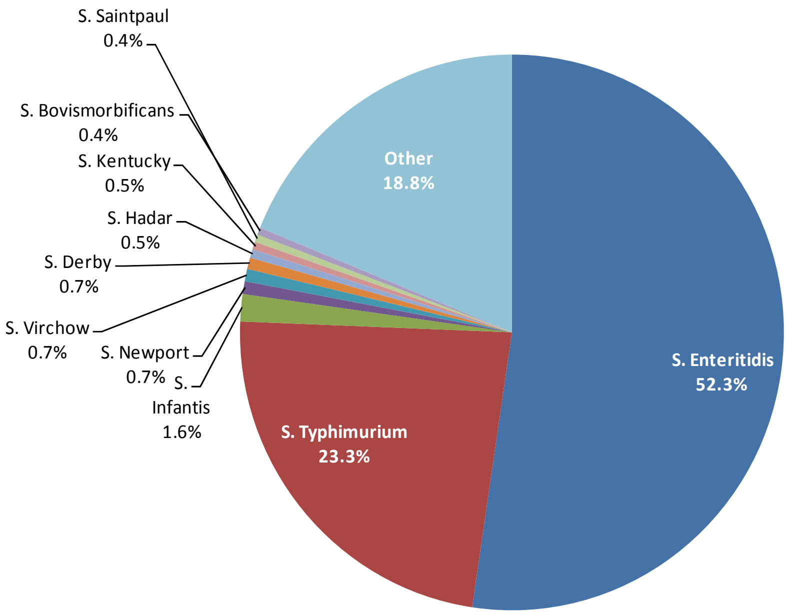
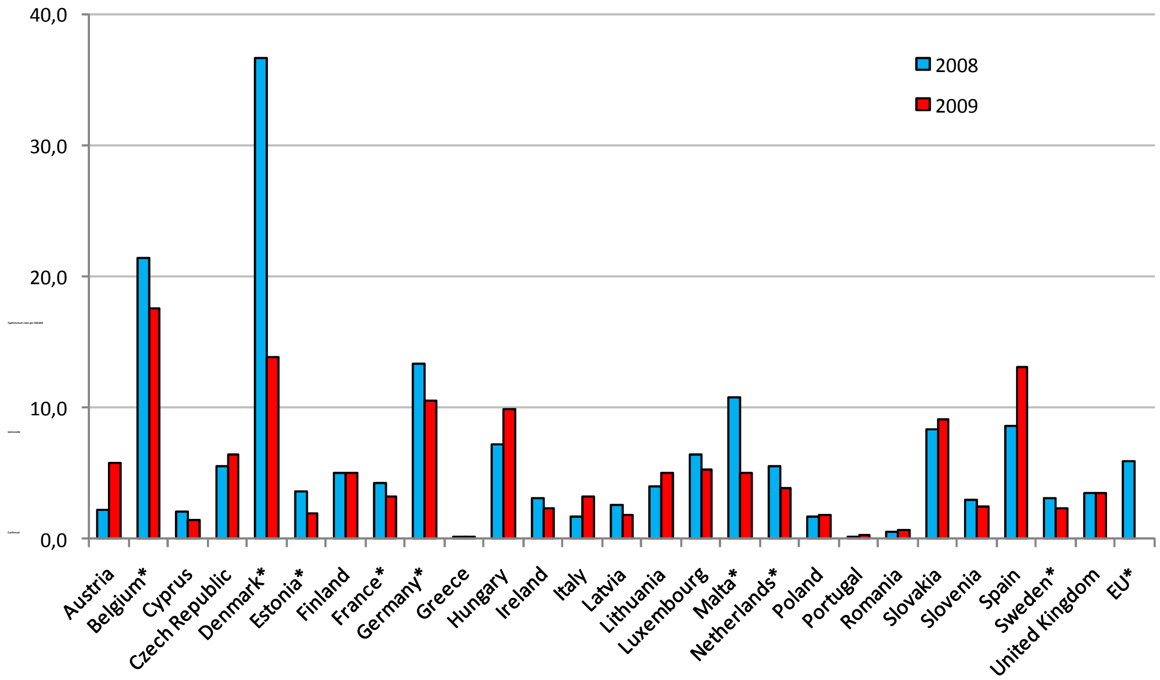


Table SA32. Distribution of confirmed salmonellosis cases in humans by serovar (ten most frequent serovars), TESSy data, 2008-2009

2009			2008		
Top Ten TESSy			Top Ten TESSy		
Serovar	N	%	Serovar	N	%
S. Enteritidis	53,382	52.3	*S.* Enteritidis	70,091	58
S. Typhimurium	23,759	23.3	*S.* Typhimurium	26,423	21.9
S. Infantis	1,616	1.6	*S.* Infantis	1,317	1.1
S. Newport	760	0.7	*S.* Virchow	860	0.7
S. Virchow	736	0.7	*S.* Newport	787	0.7
S. Derby	671	0.7	*S.* Agona	636	0.5
S. Hadar	507	0.5	*S.* Derby	624	0.5
S. Kentucky	460	0.5	*S.* Stanley	529	0.4
S. Saintpaul	452	0.4	*S.* Bovismorbificans	501	0.4
S. Bovismorbificans	433	0.4	*S.* Kentucky	497	0.4
Other	19,225	18.8	Other	18,495	15.3
Total	**102,001**	**100**	**Total**	**120,760**	**100**

Source: 26 MSs: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Figure SA23. Change in S. Typhimurium notification rate (confirmed cases per 100,000) by MSs and EU, 2008-2009. TESSy data for 26 MSs



*Significant reduction in number of reported cases (p<0.01)

Table SA33. Distribution of confirmed salmonellosis cases in humans by phage type for S. Enteritidis and S. Typhimurium, 2008-2009, TESSy data

2009						2008					
Top Ten TESSy						Top Ten TESSy					
S. Enteritidis			*S.* Typhimurium			*S.* Enteritidis			*S.* Typhimurium		
Phage type	N	%	Phage type	N	%	Phage type	N	%	Phage type	N	%
PT8	1,632	16.4	DT193	1,370	20.3	PT4	1,877	21.9	U292	1,021	19.1
PT4	1,628	16.3	DT120	673	10	PT8	1,656	19.3	DT193	751	14.1
PT1	1,285	12.9	DT104	589	8.7	PT21	951	11.1	DT104	731	13.7
PT14b	953	9.6	D104b	425	6.3	PT1	905	10.6	DT120	557	10.4
PT21	890	8.9	RDNC	376	5.6	PT14b	613	7.2	RDNC	241	4.5
PT6	833	8.3	U302	361	5.3	PT6	580	6.8	U320	203	3.8
RDNC	484	4.9	U311	343	5.1	PT12	371	4.3	NT	152	2.8
PT2	226	2.3	DT195	315	4.7	PT2	278	3.2	U302	146	2.7
PT13a	192	1.9	NT	305	4.5	PT6a	177	2.1	DT135	141	2.6
PT51	181	1.8	DT191	237	3.5	RDNC	104	1.2	DT104b	134	2.5
Other	1,675	16.8	Other	1,769	26.2	Other	1,049	12.3	Other	1,267	23.7
Total	**9,979**	**100.0**	**Total**	**6,763**	**100.0**	**Total**	**8,561**	**100.0**	**Total**	**5,344**	**100.0**

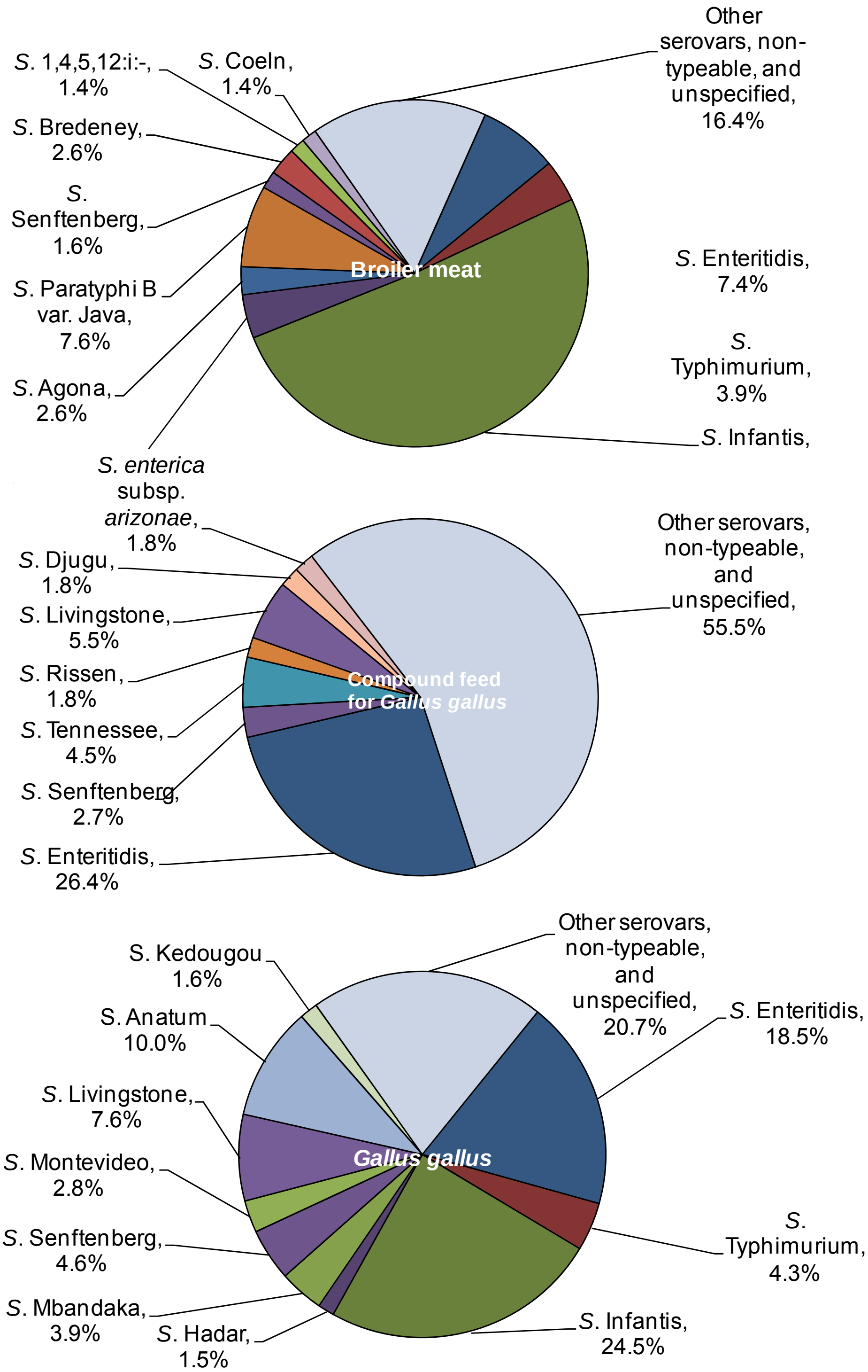
NT: Not typeable.

RDNC: reacts but does not conform.

Source: 14 MSs: Austria, Cyprus, Denmark, Estonia, Germany, Hungary, Ireland, Italy, Netherlands, Romania, Spain, Slovakia, Sweden and United Kingdom.

Serovars in the poultry production

Figure SA24. Distribution of the ten most common* Salmonella *serovars in broiler meat,* Gallus gallus *and compound feed for poultry, 2009



Note: Data are only included for MS sample size ≥10.

Graph on broiler meat includes data from 10 MSs (Austria, Czech Republic, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Romania and Slovenia), N=1,349.

Graph on *Gallus gallus* includes data from 15 MSs (Austria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Latvia, Poland, Romania, Slovakia, Slovenia, Spain and United Kingdom), N=10,531.

Graph on compound feed for *Gallus gallus* includes data from 10 MSs (Belgium, Czech Republic, Hungary, Italy, Netherlands, Poland, Romania, Slovakia, Slovenia and Spain), N=110.

Broiler meat

In 2009, ten MSs reported data on *Salmonella* serovar distribution in broiler meat. As in 2008, *S*. Infantis was by far the most frequently reported serovar from broiler meat in EU (50.9 %) (Figure SA24 and Table SA34). However, as in 2008, this result was mainly due to a high number of isolates from Hungary where this serovar is dominant (93.8 % of all isolates), but also in Austria, Romania and Slovenia more than 40 % of all reported findings of *Salmonella* in broiler meat were *S*. Infantis. *S*. Paratyphi B var. Java (7.6 %) was the second most common serovar due to a high prevalence among isolates from the Netherlands (60.8 %) and Germany (22.7 %), which were the only MSs to report this serovar. *S*. Enteritidis (7.4 %) was the third most frequently reported serovar, and was isolated in all but one of the reporting MSs. *S*. Hadar (4.1 %) was the fourth most frequently reported serovar, and the dominant serovar in broiler meat in Greece (30.6 %) and Italy (16.7 %). In the Czech Republic and Ireland, *S*. Agona was the most common serovar (10.5 % and 79.5 % of all isolates).

The number of reported serotyped isolates from broiler meat in 2009, decreased to 1,349 from 2,585 isolates in 2008.

When this distribution of serovars is compared to the serovar distribution observed in EU-wide baseline survey on *Salmonella* in broiler meat that was carried out in 2008 (Table SA8), they are quite similar: in both *S*. Infantis is the most often isolated serovar and seven out of the top ten isolates are the same.

New among the ten most common serovars in broiler meat in 2009 were *S*. Senftenberg (1.6 %), *S*. 1,4,5,12:i:- (1.4 %) and *S*. Coeln (1.4 %), replacing *S*. Kentucky, *S*. Virchow and *S*. Mbandaka.

Table SA34. Distribution[1] of the ten most common* Salmonella *serovars in broiler meat, 2009

Country	No of isolates serotyped	% positive										
		S. Infantis	*S*. Paratyphi B var. Java	*S*. Enteritidis	*S*. Hadar	*S*. Typhimurium	*S*. Bredeney	*S*. Agona	*S*. Senftenberg	*S*. 1,4,5,12:i:-	*S*. Coeln	Other serovars, non-typeable, and unspecified
Total no of isolates	**1,349**	**687**	**103**	**100**	**55**	**53**	**36**	**35**	**22**	**19**	**19**	**220**
Austria	52	48.1	-	5.8	1.9	9.6	1.9	-	1.9	-	-	30.8
Czech Republic	38	5.3	-	2.6	-	2.6	-	10.5	-	-	-	78.9
Germany	256	13.7	22.7	15.2	0.8	12.5	0.8	-	6.6	7.4	-	20.3
Greece	49	2.0	-	18.4	30.6	10.2	6.1	-	-	-	-	32.7
Hungary	624	93.8	-	1.1	0.8	0.5	1.4	-	-	-	-	2.4
Ireland[2]	39	-	-	2.6	-	-	-	79.5	-	-	-	17.9
Italy	174	6.9	-	14.4	16.7	2.9	10.3	-	1.1	-	9.2	38.5
Netherlands	74	10.8	60.8	17.6	1.4	-	-	-	-	-	-	9.5
Romania	19	47.4	-	10.5	10.5	-	-	-	-	-	-	31.6
Slovenia	24	41.7	-	-	-	8.3	12.5	-	8.3	-	12.5	16.7
Proportion of serotyped isolates		**50.9**	**7.6**	**7.4**	**4.1**	**3.9**	**2.7**	**2.6**	**1.6**	**1.4**	**1.4**	**16.3**

Note: Data are only presented for sample size ≥10. Both clinical and monitoring isolates are included, and it should be noted that there can be some overlap of isolates between the two reportings and the sum of isolates does not correspond to the number of tested samples.

1. The serovar distribution (% isolates) was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars.

2. For Ireland, 35 out of 39 isolates were from Industry sampling.

Gallus gallus

Fifteen MSs provided information on *Salmonella* serovars in *Gallus gallus* flocks in 2009 (Table SA35). This covers information from breeding flocks, laying hen flocks and broiler flocks. In 2009, *S*. Infantis (24.5 %) replaced *S*. Enteritidis as the most frequently reported serovar. However, as in broiler meat this was mainly due to a very high number of isolates from Hungary, and to a lesser degree Romania. In these MSs, *S*. Infantis was the dominant serovar in *Gallus gallus* (72.9 % of isolates in Hungary and 47.2 % of isolates in Romania). Overall, *S*. Enteritidis was the second most frequently reported serovar (18.5 %) and the most common serovar in nine of the fifteen reporting MSs. *S*. Infantis, *S*. Enteritidis and *S*. Typhimurium (the latter being the sixth most commonly occurring serovar (4.3 %)) were reported from all MSs but one.

In 2009 *S*. Anatum, which was the most common serovar in France (31.7 % of the French isolates), and *S*. Kedougou were new in the top ten replacing *S*. Paratyphi B, var. Java and *S*. Virchow.

The Salmonella *situation in Finland was exceptional in 2009 due to the feed-borne* S. *Tennessee outbreak in pigs and laying hens caused by contamination of a feed mill production line. The pathogen was detected in faecal, environmental or feed samples at 50 pig holdings and 40 laying hen holdings. Due to effective restrictive, sanitation and eradication measures* S. *Tennessee was not detected in humans or foodstuffs during the outbreak.*

For further information of reported data please refer to Level 3 tables.

Table SA35. Distribution[1] of the ten most common Salmonella serovars in Gallus gallus, 2009

Country	No of isolates serotyped	% positive										
		S. Infantis	S. Enteritidis	S. Anatum	S. Livingstone	S. Senftenberg	S. Typhimurium	S. Mbandaka	S. Montevideo	S. Kedougou	S. Hadar	Other serovars, non-typeable, and unspecified
Total no of isolates	**10,531**	**2,582**	**1,946**	**1,056**	**801**	**485**	**449**	**414**	**298**	**168**	**153**	**2,179**
Austria	673	20.5	35.4	-	0.4	1.8	10.1	0.7	9.7	-	3.3	18.1
Czech Republic	523	7.3	55.6	-	-	0.2	2.1	1.3	2.5	-	0.6	30.4
Denmark	43	14.0	11.6	-	-	-	27.9	4.7	-	-	-	41.9
Finland[2]	95	2.1	-	-	1.1	-	2.1	-	24.2	-	-	70.5
France	3,172	0.9	4.3	31.7	17.1	7.4	4.4	5.0	4.0	2.1	0.4	22.5
Germany	583	3.4	48.5	2.1	3.6	2.2	6.5	1.9	0.9	-	0.3	30.5
Greece	226	0.9	35.8	-	8.4	0.9	5.3	0.4	0.4	-	19.0	28.8
Hungary	2,675	72.9	6.2	0.2	1.2	3.4	2.6	0.2	0.7	-	1.3	11.3
Latvia	66	-	81.8	-	-	-	-	-	7.6	-	-	10.6
Poland	787	11.1	52.1	2.7	0.1	1.3	5.8	9.5	-	-	2.9	14.5
Romania	538	47.2	7.6	0.4	15.6	6.3	0.7	6.5	0.7	-	1.1	13.8
Slovakia	131	16.8	62.6	-	-	-	3.8	-	0.8	-	-	16.0
Slovenia	135	4.4	16.3	-	1.5	-	1.5	-	8.9	-	-	67.4
Spain	287	8.7	39.4	1.0	2.8	0.3	7.0	3.1	2.1	-	2.1	33.4
United Kingdom	597	0.3	3.9	1.2	14.4	14.4	3.2	17.6	2.7	17.1	-	25.3
Proportion of serotyped isolates		**24.5**	**18.5**	**10.0**	**7.6**	**4.6**	**4.3**	**3.9**	**2.8**	**1.6**	**1.5**	**20.7**

Note: Data are only presented for sample size ≥10. Both clinical and monitoring isolates are included, and it should be noted that there can be some overlap of isolates between the two reportings, and the sum of isolates does not correspond to the number of tested flocks.

1. The serovar distribution (% isolates) was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars.

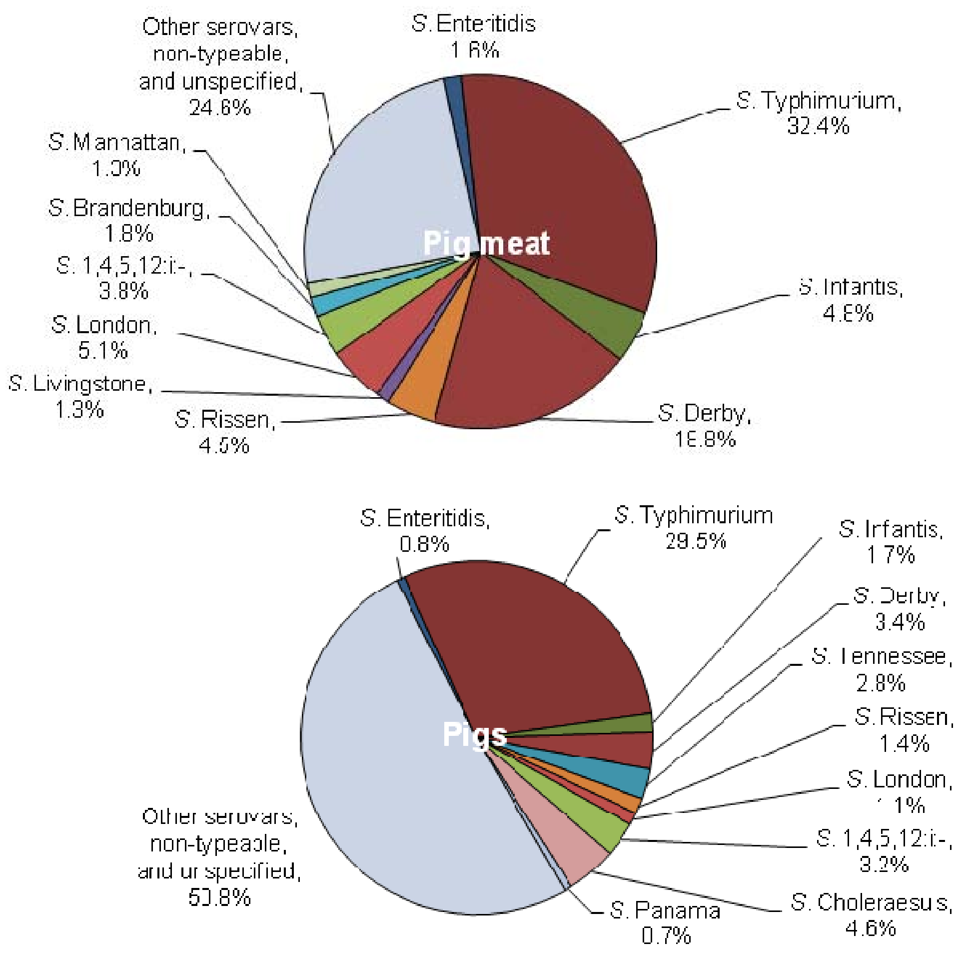
2. Isolates are from 56 *Gallus gallus* flocks.

Compound feed for *Gallus gallus*

In total, 10 MSs provided data on the serovar distribution in compound feed for poultry, however there were only 110 isolates and the diversity of the reported serovars was high (Figure SA24). The most common serovar in compound feed for poultry was *S.* Enteritidis (26.4 %) which was also the second most prevalent serovar in fowl (18.5 %) and the third most prevalent serovar in broiler meat (7.4 %). The second most common serovar in feed, *S*. Livingstone (5.5 %), was also among the top ten serovars for flocks of *Gallus gallus*. However MSs reporting serovars distributions in broiler meat, fowl and feed are not the same so comparison should be done with great caution.

Serovars in pig meat production

Figure SA25. Distribution of the ten most common **Salmonella** ***serovars in pig meat and pigs, 2009***



Note: Data are only included for MS sample size ≥10.

Graph on pig meat includes data from nine MSs (Czech Republic, Denmark, Estonia, Germany, Greece, Hungary, Ireland, Italy and Romania), N=1,070.

Graph on pig data includes data from 13 MSs (Austria, Estonia, Finland, Germany, Hungary, Ireland, Italy, Poland, Romania, Slovakia, Spain, Sweden and United Kingdom), N=3,442.

Pig meat

Nine MSs reported data of *Salmonella* serovars in pig meat. As in 2008, *S*. Typhimurium (32.4 %) and *S*. Derby (18.8 %) were the most frequently isolated serovars in pig meat (Figure SA25 and Table SA36). *S*. Typhimurium was the most common serovar in all reporting MSs, except in Hungary and Italy, where *S*. Typhimurium was only second to *S*. Infantis (25.6 %) and *S*. Derby (24.9 %), respectively. Compared to 2008, *S*. 1,4,5,12:i:-, which was only isolated in Germany, and *S*. Manhattan, which was only isolated in Italy and Romania, replaced *S*. Agona and *S*. Bredeney in the top ten.

Table SA36. Distribution[1] of the ten most common* Salmonella *serovars in pig meat, 2009

Country	No of isolates serotyped	% positive										
		S. Typhimurium	*S*. Derby	*S*. London	*S*. Infantis	*S*. Rissen	*S*. 1,4,5,12:i:-	*S*. Brandenburg	*S*. Enteritidis	*S*. Manhattan	*S*. Livingstone	Other serovars, non-typeable, and unspecified
Total no of isolates	**1,070**	**347**	**201**	**55**	**51**	**48**	**41**	**19**	**17**	**14**	**14**	**263**
Czech Republic	20	20.0	15.0	10.0	5.0	5.0	-	5.0	5.0	-	-	35.0
Denmark	157	36.3	28.7	3.2	1.9	-	-	1.3	-	-	2.5	26.1
Estonia	17	47.1	-	-	11.8	-	-	-	-	-	-	41.2
Germany	222	39.6	10.4	2.7	4.5	0.5	18.5	2.7	1.8	-	1.4	18.0
Greece	18	44.4	-	-	-	16.7	-	-	-	-	-	38.9
Hungary	82	23.2	8.5	7.3	25.6	3.7	-	-	12.2	-	3.7	15.9
Ireland[2]	108	64.8	16.7	5.6	1.9	-	-	-	-	-	-	11.1
Italy	389	16.5	24.9	7.7	2.8	9.0	-	2.6	0.3	3.3	0.5	32.4
Romania	57	50.9	14.0	-	1.8	8.8	-	-	1.8	1.8	3.5	17.5
Proportion of serotyped isolates		**32.4**	**18.8**	**5.1**	**4.8**	**4.5**	**3.8**	**1.8**	**1.6**	**1.3**	**1.3**	**24.6**

Note: Data are only presented for sample size ≥10. Both clinical and monitoring isolates are included, and it should be noted that there can be some overlap of isolates between the two reportings, and the sum of isolates does not correspond to the number of tested samples.

1. The serovar distribution (% isolates) was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars.
2. For Ireland, all 108 isolates were from industry samples.

Pigs

Information on the serovar distribution in pig herds was provided by 13 MSs. As in pig meat, *S.* Typhimurium was by far the most frequently reported serovar (29.5 %) (Figure SA25 and Table SA37), and the dominant serovar in nine of the 13 reporting MSs. The second most common serovar *S*. Choleraesuis (4.6 %) was the most frequently reported serovar in Italy, Poland and Romania. *S*. Tennesse was only reported from Finland, where it was the most frequently reported serovar in pigs as well as in flocks of *Gallus gallus. S*. Tennesse and *S*. Panama, (the latter being reported only by Germany and the United Kingdom), replaced *S*. Livingstone and *S*. Anatum in the top ten serovars.

When this distribution of serovars is compared to the serovar distribution observed in EU-wide baseline survey on *Salmonella* in breeding pigs that was carried out in 2008 (Table SA27), they are similarities: five out of the top ten isolates are the same in both, whereas, in the baseline survey the most often isolated serovar was *S*. Derby and *S*. Typhimurium was the second. It should, however, be noticed that the populations are not entirely the same since in the annual reporting both breeding and fattening pigs are covered.

Table SA37. *Distribution[1] of the ten most common* Salmonella *serovars in pigs, 2009*

Country	No of isolates serotyped	% positive										
		S. Typhimurium	S. Choleraesuis	S. Derby	S. 1,4,5,12:i:-	S. Tennessee	S. Infantis	S. Rissen	S. London	S. Enteritidis	S. Panama	Other serovars, non-typeable, and unspecified
Total no of isolates	**3,442**	**1,017**	**159**	**116**	**110**	**95**	**58**	**49**	**39**	**26**	**24**	**1,749**
Austria	38	52.6	-	5.3	-	-	-	23.7	-	2.6	-	15.8
Estonia	28	39.3	25.0	-	-	-	3.6	-	-	3.6	-	28.6
Finland[2]	95	-	-	-	-	100.0	-	-	-	-	-	-
Germany	2,378	27.6	-	2.0	4.6	-	0.8	0.0	1.1	0.8	1.0	62.1
Hungary	71	28.2	21.1	15.5	-	-	11.3	-	4.2	1.4	-	18.3
Ireland	14	100.0	-	-	-	-	-	-	-	-	-	-
Italy	304	15.5	20.7	7.2	-	-	3.3	-	2.3	-	-	51.0
Poland	14	35.7	50.0	-	-	-	7.1	-	-	7.1	-	-
Romania	141	21.3	45.4	2.1	-	-	12.8	2.8	-	0.7	-	14.9
Slovakia	26	73.1	3.8	7.7	-	-	-	-	3.8	-	-	11.5
Spain	112	29.5	-	17.9	-	-	-	25.0	-	2.7	-	25.0
Sweden	14	78.6	-	-	-	-	7.1	-	-	-	-	14.3
United Kingdom	207	72.5	1.0	3.9	-	-	-	3.4	1.4	-	0.5	17.4
Proportion of serotyped isolates		**29.5**	**4.6**	**3.4**	**3.2**	**2.8**	**1.7**	**1.4**	**1.1**	**0.8**	**0.7**	**50.8**

Note: Data are only presented for sample size ≥10. Both clinical and monitoring isolates are included, and it should be noted that there can be some overlap of isolates between the two reportings and the sum of isolates does not correspond to the number of tested herds.

1. The serovar distribution (% isolates) was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars.

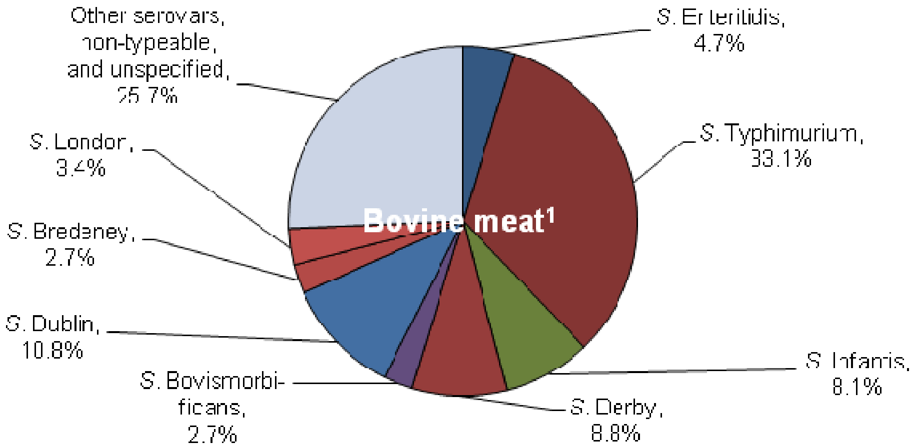
2. Isolates are from 12 pig herds.

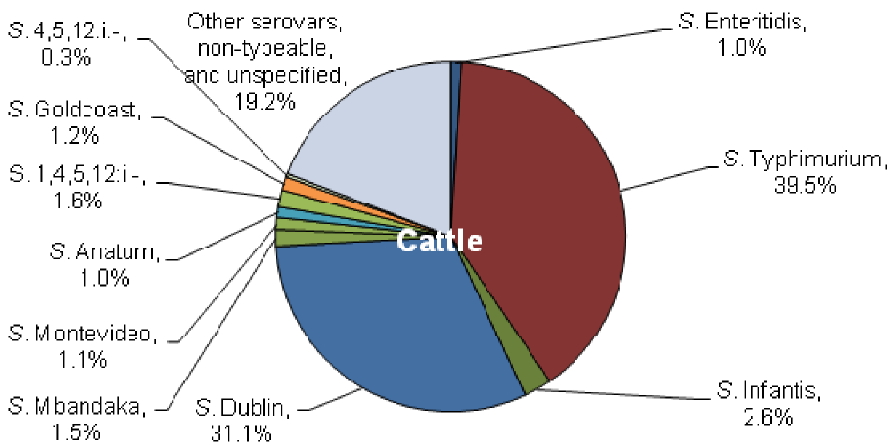
Compound feed for pigs

Nine MSs provided data on the serovar distribution in compound feed for pigs. There were only 49 isolates and the diversity was quite high with no serotypes being found in more than one MS. *S*. Tennessee was the most commonly reported serovar (38.8 %), due to a high number of isolates from Finland, which was the only MS reporting findings of this serovar. *S*. Djugu (14.3 %), which was only isolated in Romania, was the second most common type found in pig feed in 2009, followed by *S*. Infantis (4.1 %).

Serovars in the bovine meat production

Figure SA26. Distribution of the ten most common* Salmonella *serovars in bovine meat and cattle herds, 2009





Note: Data are only included for MS sample size ≥10.

Graph on bovine meat includes data from five MSs (Denmark, Germany, Ireland, Italy and Netherlands), N=148.

Graph on cattle includes data from 12 MSs (Austria, Estonia, Finland, Germany, Hungary, Ireland, Italy, Netherlands, Slovakia, Spain, Sweden and United Kingdom), N=4,306.

1. Only eight serovars have been included for bovine meat. The ninth to twelfth most commonly reported serovars in bovine meat were *S.* 1,4,5,12:i:-, *S.* Anatum, *S.* Give and *S.* Rissen with three isolates each.

Bovine meat

Five MSs provided information on *Salmonella* serovars in bovine meat in 2009 (Figure SA26 and Table SA38). As in 2007 and 2008, *S*. Typhimurium (33.1 %) and *S*. Dublin (10.8 %) were the most frequently isolated serovars from bovine meat. The ninth to twelfth most frequently isolated serovars (not included in the table), were *S*. 1,4,5,12:i:-, *S*. Anataum, *S*. Give and *S*. Rissen with three isolates each. It should be noted that several of the serovars were only reported in low numbers, and their presence on the list should be interpreted with caution.

Table SA38. Distribution[1] of the eight most common* Salmonella *serovars in bovine meat, 2009

Country	No of isolates serotyped	% positive								
		S. Typhimurium	S. Dublin	S. Infantis	S. Derby	S. Enteritidis	S. London	S. Bovismorbificans	S. Bredeney	Other serovars, non-typeable, and unspecified
Total no of isolates	**148**	**49**	**16**	**12**	**13**	**7**	**5**	**4**	**4**	**38**
Denmark	11	18.2	63.6	-	9.1	-	-	-	-	9.1
Germany	32	18.8	15.6	9.4	18.8	3.1	3.1	12.5	-	18.8
Ireland[2]	38	71.1	2.6	10.5	5.3	-	2.6	-	5.3	2.6
Italy	57	21.1	-	8.8	5.3	8.8	5.3	-	3.5	47.4
Netherlands	10	20.0	30.0	-	10.0	10.0	-	-	-	30.0
Proportion of serotyped isolates		**33.1**	**10.8**	**8.1**	**8.8**	**4.7**	**3.4**	**2.7**	**2.7**	**25.7**

Note: Data are only presented for sample size ≥10. Both clinical and monitoring isolates are included, and it should be noted that there can be some overlap of isolates between the two reportings and the sum of isolates does not correspond to the number of tested samples.

The ninth to twelfth most commonly reported serovars in bovine meat were *S*. 1,4,5,12:i:-, *S*. Anatum, *S*. Give and *S*. Rissen with three isolates each.

1. The serovar distribution (% isolates) was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars.
2. For Ireland, 33 out of 38 isolates were from industry samples.

Cattle

In 2009, information on the serovar distribution in cattle herds was provided by 12 MSs. The distribution of the ten most common serovars in cattle is shown in Figure SA26 and Table SA39. As in 2008, *S*. Typhimurium was by far the most frequently isolated serovar (39.5 %) and was detected in all reporting countries being the most reported serovar in five countries. Closely following, *S*. Dublin (31.1 %) was reported from nine countries and was the dominant serovar in six of them. The other serovars in the top ten accounted for less than 3 % of the serotyped isolates each, and except from *S*. Enteritidis (1.0 %), that was isolated in seven MSs, none of them were reported from more than two to five MSs.

Table SA39. Distribution[1] of the ten most common* Salmonella *serovars in cattle, 2009

Country	No of isolates serotyped	% positive										
		S. Typhimurium	*S.* Dublin	*S.* Infantis	*S.* 1,4,5,12:i:-	*S.* Mbandaka	*S.* Goldcoast	*S.* Montevideo	*S.* Enteritidis	*S.* Anatum	*S.* 4,5,12:i:-	Other serovars, non-typeable, and unspecified
Total no of isolates	**4,306**	**1,699**	**1,339**	**111**	**67**	**65**	**53**	**47**	**43**	**43**	**14**	**825**
Austria	15	26.7	46.7	-	-	-	-	-	6.7	-	-	20.0
Estonia	13	30.8	69.2	-	-	-	-	-	-	-	-	-
Finland	170	98.2	-	-	-	-	1.8	-	-	-	-	-
Germany	2,550	53.1	9.4	4.2	2.6	-	2.0	-	1.2	0.7	-	26.8
Hungary	29	44.8	10.3	6.9	-	-	-	-	3.4	3.4	-	31.0
Ireland	430	6.0	93.5	-	-	-	-	-	-	-	-	0.5
Italy	69	29.0	-	2.9	-	-	-	1.4	2.9	-	-	63.8
Netherlands	31	19.4	51.6	-	-	3.2	-	9.7	-	-	-	16.1
Slovakia	27	77.8	3.7	-	-	-	-	-	14.8	-	-	3.7
Spain	29	3.4	-	-	-	6.9	-	48.3	-	6.9	-	34.5
Sweden	48	29.2	35.4	-	-	-	-	-	4.2	-	-	31.3
United Kingdom	895	7.6	72.1	-	-	6.9	-	3.2	0.3	2.3	1.6	5.9

Note: Data are only presented for sample size ≥10. Both clinical and monitoring isolates are included, and it should be noted that there can be some overlap of isolates between the two reportings and the sum of isolates does not correspond to the number of tested herds.

1. The serovar distribution (% isolates) was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars.

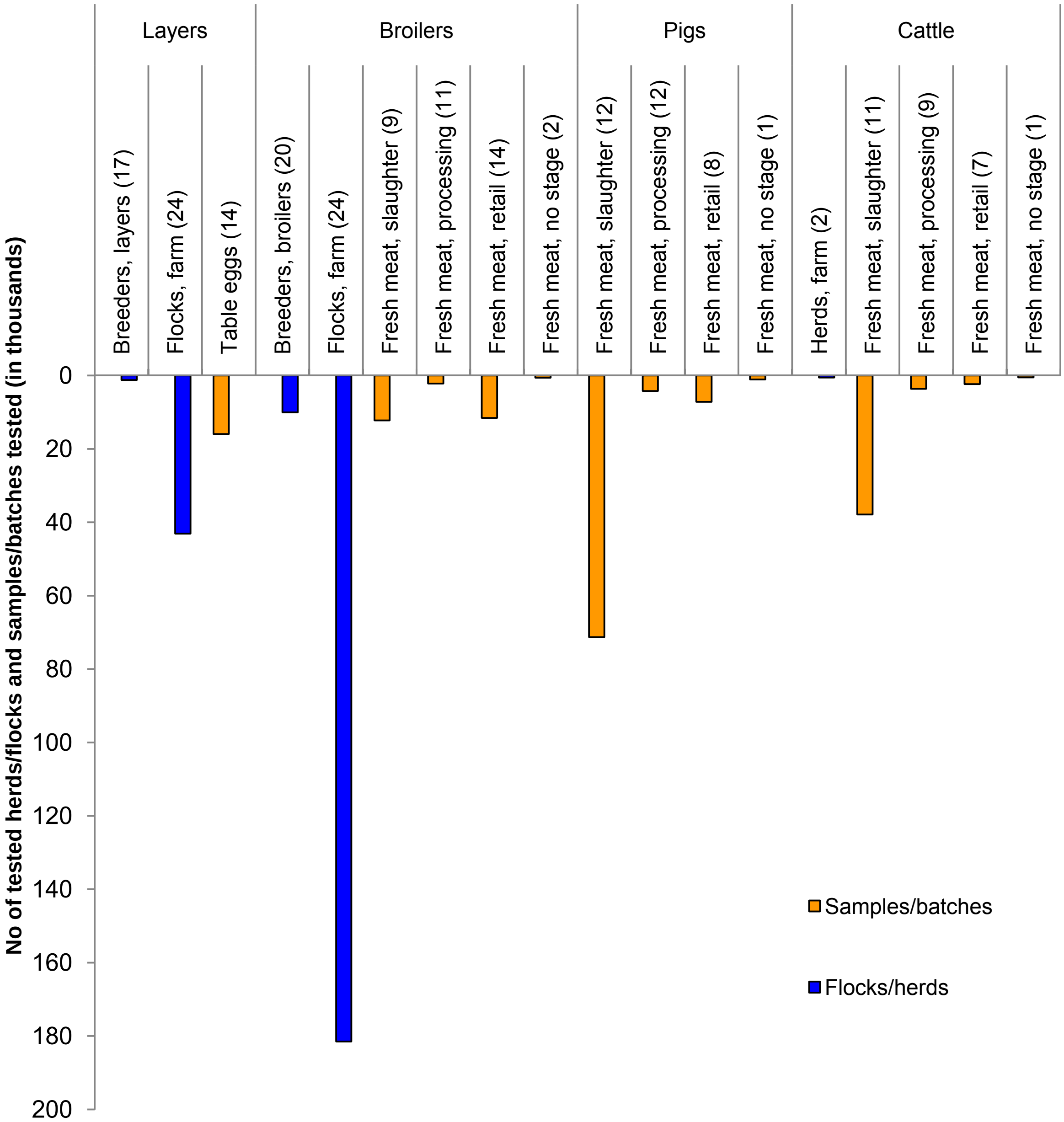
Compound feed for cattle

Only five MSs reported on the serovar distribution in compound feed for cattle. As only 15 isolates were reported, of which the majority was unspecified (80.0 %), it is not possible to draw any conclusions regarding the distribution of *Salmonella* serovars in compound feed for cattle in EU.

3.1.7 Overview of *Salmonella* from farm-to-fork

During the past few years, the quality and validity of reported data on the occurrence of *Salmonella* in food and animals have improved. This is due to the efforts of MS reporters, the implementation of EU *Salmonella* microbiological criteria, multi-annual control plans and the harmonisation of the *Salmonella* control programmes. Figure SA27 illustrates the type of data reported in 2009. The majority of the tested units were related to poultry production, mainly from flocks of *Gallus gallus* including breeding, laying hens and in particular broiler flocks. At farm level, 24 MSs reported on laying hen flocks and broiler flocks, 20 MSs on breeding flocks for meat production, 17 MSs on breeding flocks for egg production and 14 MSs on table eggs. For cattle and pigs, a relatively large number of samples were taken from fresh meat, whereas only little information was provided on *Salmonella* occurrence in cattle herds, and almost no information was available for pig herds at farm.

Figure SA27. The number of units tested, presented by animal species and sampling level within EU, 2009



Note. Table eggs include tests at packing centres, retail and where no level of sampling was reported.
Number of MSs included in brackets.

Figure SA28 provides an overview of the *Salmonella* occurrence in different animal populations and meat products thereof reported by MSs. In total, 733 investigations were included in the figure. Overall, in 87.7 % of the reported investigations in poultry, less than 10 % of the tested units were positive for *Salmonella*. However, the data demonstrate a substantial variation in the proportion of positive units among observations reported by MSs, especially in flocks of laying hens and broilers. Overall, in 97.9 % of the reported investigations of pigs and cattle and products thereof, *Salmonella* was isolated from less than 10 % of the sampled units. Higher prevalence was in some cases reported for pig meat and products and preparations thereof and meat preparations from bovine meat.

Analysis of data demonstrates a substantial variation among countries in the occurrence of *Salmonella* in different food categories and animal species, but also in different investigations within the categories. Therefore the variation in the occurrence of *Salmonella* between countries could, in part, be due to differences in sampling and testing schemes but also due to true differences. Similarly, great variations between MS-specific *Salmonella* prevalence were also observed in EU-wide baseline surveys that have been published in previous years. For areas where harmonised schemes have not yet been established, comparison between countries can only be done with caution taking into account the sampling schemes.

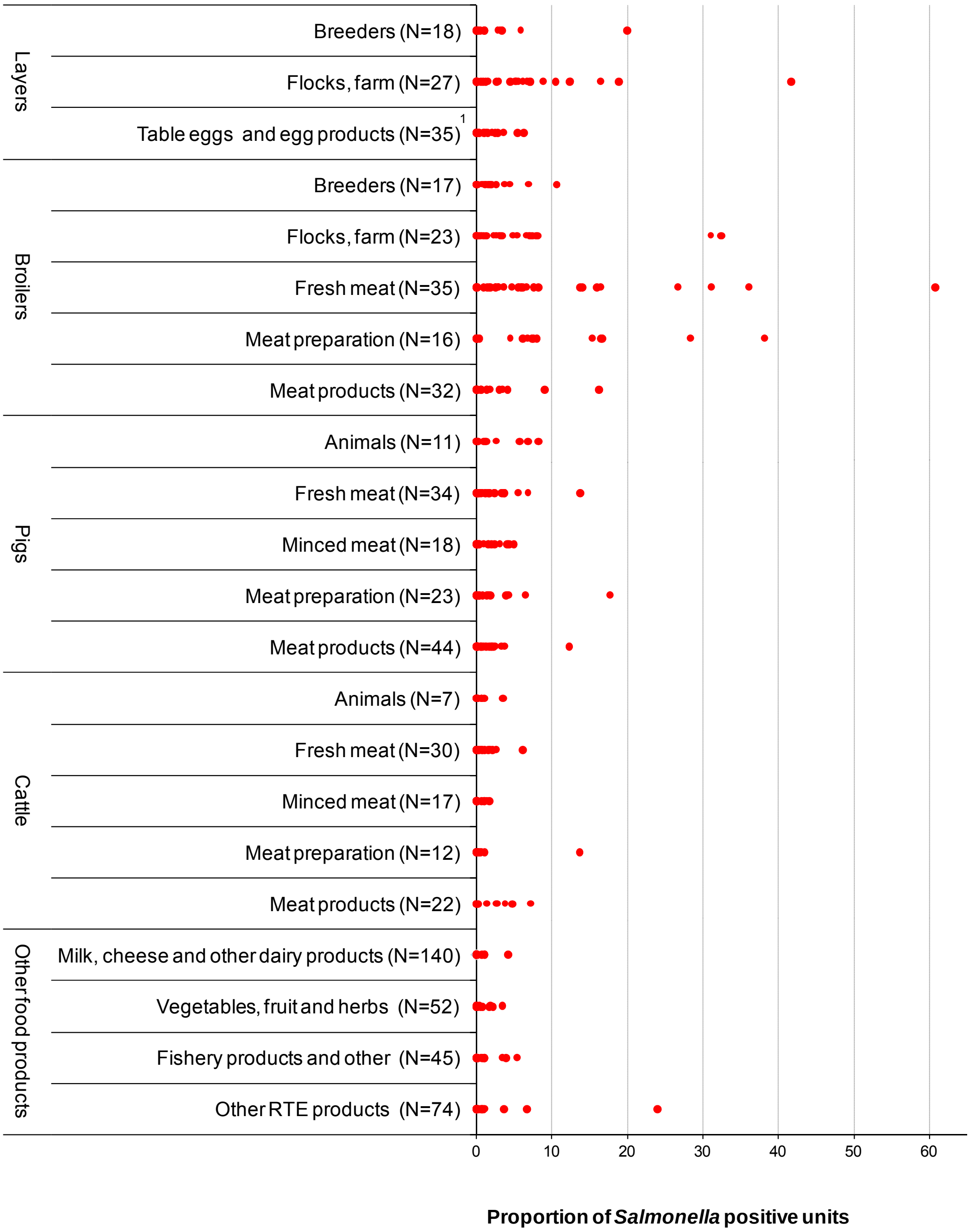
Overall, reported data from 2009 support the generally accepted perception that the main sources of *Salmonella* infections in humans are from different types of meat and from eggs in EU. This is also supported by the reported food-borne outbreak data, where eggs and eggs products are the source accounting for the largest part of verified *Salmonella* outbreaks.

In comparison to the distribution in human cases, serovar and phage type distribution in foodstuffs and food producing animals can provide initial information as to the significance of different sources of human infections. Only limited proportions of serovars (and phage types) are reported as part of routine surveillance in food and animals and therefore only weak conclusions can be drawn. However, recently, several harmonised baseline surveys have been conducted in different populations of food production animals, and together with data reported in the annual zoonoses report, it will constitute the basis for a source attribution analysis of human salmonellosis, which is being prepared by EFSA.

Again in 2009, *S.* Enteritidis was the most frequent serovar causing human salmonellosis at EU level followed by *S.* Typhimurium. *S*. Enteritidis was the most frequently isolated serovar from table eggs and the second most frequently isolated serovar from flocks of *Gallus gallus*. *S.* Typhimurium was the most frequently isolated serovar in pigs, pig meat, cattle and bovine meat and was also among the top three serovars isolated from fowl. Compared to previous years, *S*. Saintpaul and *S*. Hadar are the only new serovars in the human top ten, replacing *S*. Stanley and *S*. Agona. In 2009, *S*. Saintpaul was the most common serovar reported from turkey meat accounting for 28 % of isolates (N=316). *S*. Hadar was the fourth most frequently reported serovar from broiler meat and turkey meat and number ten in the top ten serovars for fowl.

Some serovars seem to be particularly well established in certain countries. As in 2008, a high proportion of *S.* Infantis positive flocks of *Gallus gallus* was reported by Hungary (72.9 %), which was also reflected in the broiler meat (93.8 %). In addition to that, *S*. Infantis was representing 11.3 % of the isolates from pigs and 25.6 % of the isolates from pig meat from Hungary. This was also reflected in the human cases, where *S*. Infantis was the third most frequently isolated serovar in Hungary in 2009, only outdone by *S*. Enteritidis and *S*. Typhimurium. In the Netherlands, the most frequently occurring serovar in broiler meat was *S.* Paratyphi B var. Java (60.8 %), which was also isolated from a few human cases. In Finland, findings of *Salmonella* in food, animals and meat of domestic origin is usually rare, however in 2009 the majority of reported isolates were *S*. Tennessee, accounting for all isolates from pigs and pig feed (95 and 19 isolates, respectively), and 67.4 % of isolates from *Gallus gallus*.

Figure SA28. Proportion of* Salmonella*-positive units presented by animals species and food category within EU, 2009



Note: Data are only presented for sample size ≥25. Each point represents a MS investigation, N = number of investigations including both batch and single samples.

1. Table eggs tested at packing centres and retail, as well as data where no level of sampling was indicated, are included.

In addition to source attribution based on sero- and phage typing, information from the outbreak investigation can contribute to the understanding of the attribution of human cases of salmonellosis to different food sources. In 90.7 % of the 324 verified outbreaks due to *Salmonella*, detailed information on implicated foodstuffs was provided. The most common single foodstuff category reported was eggs and egg products, responsible for 49.1 % of the outbreaks (primarily *S.* Enteritidis outbreaks), while broiler meat accounted for 5.2 % of the outbreaks. Pig meat was reported as the implicated foodstuff in 3.7 % of the outbreaks (primarily *S.* Typhimurium outbreaks). Bakery products (all due to *S.* Enteritidis) and mixed meals or buffet meals were the source in 10.2 %, and 5.6 % of the verified outbreaks, respectively. This data is generally in line with the observations made from the serovar distributions.

3.1.8 Discussion

In 2009, salmonellosis was again the second most commonly reported zoonotic disease in humans in EU, following campylobacteriosis. However, while the campylobacteriosis notification rate remained stable, the notification rate of salmonellosis cases continued to decrease at EU level, which is demonstrated by the statistically significant trend observed since 2005. The further decrease of reported salmonellosis cases by 17.4 % from the previous year was significant. *S*. Enteritidis and *S*. Typhimurium were once again the most frequently reported *Salmonella* serovars in human cases. The overall decrease in salmonellosis is mostly attributed to the *S*. Enteritidis serovar, which continued to decline for the fourth consecutive year, whereas the reporting of *S*. Typhimurium cases decreased but not to the same extent in 2009.

Among the reported food-borne outbreaks for 2009, *Salmonella* accounted for 31.0 % of outbreaks in EU (5,550 outbreaks), which represents a reduction of 12.4 % compared to 2008. Half of these outbreaks were *S*. Enteritidis outbreaks caused by eggs and egg products, but these outbreaks have decreased as well.

The above described figures and trends indicate that the prevention of *Salmonella* infections in humans has substantially improved in EU. It is assumed that the decline of human salmonellosis cases is mainly due to the reduction of *S*. Enteritidis in eggs and flocks of laying hens, even though also other control measures along the food chain may have contributed to the reduction. Eggs are considered to be the main source of human *S*. Enteritidis infection, as supported by the food-borne outbreak data and the recent opinion from BIOHAZ panel on the public health impact of setting a new target for the reduction of *Salmonella* in laying hens[23]. According to the opinion, attribution models suggest that in relation to eggs from laying hens (*Gallus gallus*), *S*. Enteritidis is by far the serovar most frequently associated with human illness. This is related to the ability of this serovar to persistently colonise the avian reproductive tract, resulting in internally contaminated eggs, as well as egg shell contamination. The quantitative risk assessment model used to support the opinion suggests a linear relationship between flock prevalence, as currently observed in different MSs, and the number of eggs contaminated with *S*. Enteritidis. The latter is assumed to be proportional to public health risk.

The reduction of *S*. Enteritidis and *S*. Typhimurium continued in flocks of laying hens in EU in 2009. The prevalence of these two serovars reduced from 3.5 % in 2008 to 3.2 % in 2009 at EU level. However, the number of MSs that met their annual *Salmonella* reduction targets decreased, because the 2009 targets were based on the national prevalence reported for 2008. Together, 17 MSs met the 2009 targets compared to 21 MSs in 2008.

The *Salmonella* control programmes in poultry have been implemented progressively starting from the top of the production pyramid. For breeding flocks of *Gallus gallus*, 2009 was the year when MSs had to meet EU reduction target of having ≤1 % of flocks infected with the five target serovars (*S*. Enteritidis, *S*. Typhimurium, *S*. Hadar, *S*. Infantis, *S*. Virchow). In 2009, only 18 MSs met the target compared to 20 MSs in 2008. However, the prevalence of breeding flocks infected with the five target serovars decreased slightly from 2008 to 2009 from 1.3 % to 1.2 %.

The new EU target for *S*. Typhimurium and *S*. Enteritidis positive broiler flocks (prevalence ≤1 %) has to be met by 31 December 2011. The first year of implementation of mandatory control programmes was in 2009 when 18 MSs had already met the target.

The slow progress made in 2009 with the reduction of *Salmonella* in the breeding flocks and laying hen flocks may reflect the difficulties in controlling the bacterium at farm level, but may also be due to a better programme implementation resulting in a more efficient detection of *Salmonella* in flocks in some MSs.

Salmonella was also reported from other farm animal species such as other poultry species, pigs and cattle, but most frequently from other poultry flocks.

In foodstuffs, *Salmonella* was mainly reported from fresh poultry meat and products thereof, as well as from fresh pig meat. According to the recent opinion from BIOHAZ on a quantitative microbiological risk assessment of *Salmonella* in slaughter and breeder pigs[24], the fraction of human salmonellosis cases

23 EFSA Panel on Biological Hazards (BIOHAZ), 2010. Scientific Opinion on a quantitative estimate of the public health impact of setting a new target for the reduction of *Salmonella* in laying hens. EFSA Journal, 8(4):1546, 86 pp.

24 EFSA Panel on Biological Hazards (BIOHAZ), 2010. Scientific Opinion on a Quantitative Microbiological Risk Assessment of *Salmonella* in slaughter and breeder pigs. EFSA Journal, 8(4):1547, 80 pp.

attributable to *Salmonella* in pigs and pig meat will vary considerably between MSs. From the descriptive and comparable analysis of the serovar distribution in animal sources and humans, a cautious assessment would be that around 10-20 % of human *Salmonella* infections in EU may be attributable to the pig reservoir as a whole.

Substantial numbers of other foodstuffs were tested for *Salmonella* as well, but in general the bacterium was only occasionally found in these products. However, some higher proportions of positive units were recorded for spices and live bivalve molluscs.

With regard to EU *Salmonella* microbiological criteria in food, non-compliance was most often detected in products of meat origin and the overall level of non-compliance was generally at the same level in 2009 as in 2008. However, in the case of egg products, the level of non-compliance reduced from 2.8 % in 2008 to 0.2 % in 2009, possibly due to the positive impact of control programmes in the prevalence of *Salmonella* in eggs.

3. INFORMATION ON SPECIFIC ZOONOSES

3.2 *Campylobacter*

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

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

Thermotolerant *Campylobacter* spp. are widespread in nature. The principal reservoirs are the alimentary tracts of wild and domesticated birds and mammals. They are prevalent in food animals such as poultry, cattle, pigs and sheep; in pets, including cats and dogs; in wild birds and in environmental water sources. Animals, however, rarely succumb to disease caused by these organisms.

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

Table CA1 presents the countries reporting data for 2009.

Table CA1. Overview of countries reporting data for* Campylobacter*, 2009

Data	Total number of MSs reporting	Countries
Human	25	**All MSs** except GR, PT **Non-MSs:** CH, IS, NO
Food	20	**All MSs** except BG, CY, FI, LV, MT, SE, UK **Non-MS:** CH
Animal	22	**All MSs** except BE, CY, CZ, LT, MT **Non-MSs:** CH, NO
Species	24	**All MSs** except BG, CY, MT **Non-MSs:** CH, NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP, own control or import is not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis.

In the following chapter thermotolerant *Campylobacter* spp. will be referred to as *Campylobacter*.

3.2.1 Campylobacteriosis in humans

In 2009, *Campylobacter* continued to be the most commonly reported gastrointestinal bacterial pathogen in humans in EU since 2005. The number of reported confirmed human campylobacteriosis cases in EU increased by 4.0 % in 2009 compared to 2008. The increase was also reflected as an increase in the overall EU campylobacteriosis notification rate, increasing from 43.9 per 100,000 population in 2008 to 45.6 per 100,000 population in 2009 (rates adjusted with the new information on population coverage in Spanish surveillance for 2008).

Overall, 18 MSs reported an increase in the number of confirmed campylobacteriosis cases and 75.3 % of the increase was attributed to the United Kingdom and Hungary. Six MSs reported a decrease, which was mainly (82.6 %) attributed to Austria and Germany. The largest increase in notification rate in 2009 compared with 2008 was observed in Romania, most likely due to improved surveillance of campylobacteriosis. On the other hand, the largest reduction was noted in Austria where the notification rate decreased from 51.4 per 100,000 population in 2008 to 18.1 per 100,000 population in 2009. Austria implemented a new electronic reporting system, in place since 2009, and the only laboratory data reported in 2009 were from the Austrian national reference laboratory.

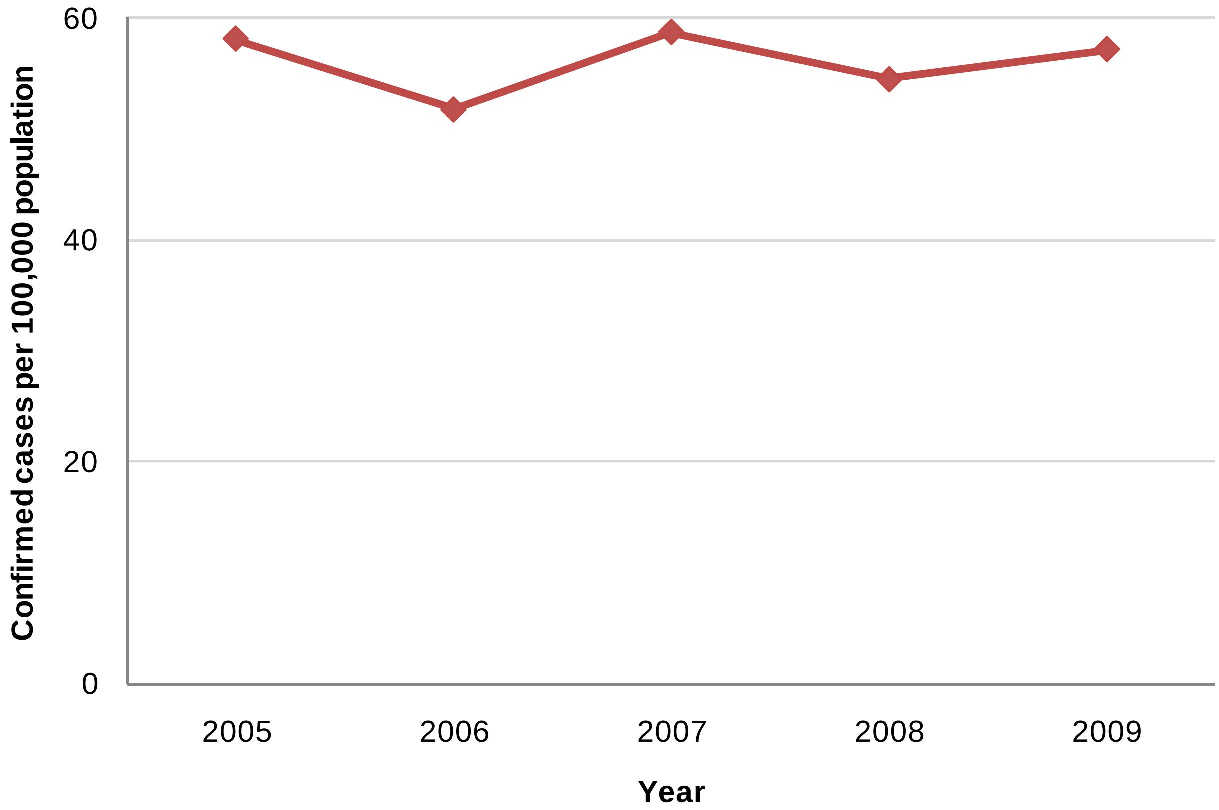
EU notification rate of confirmed cases of campylobacteriosis showed a slightly fluctuating but stable trend in the last five years. Because of this, no statistically significant increasing or decreasing EU trend was observed between 2005 and 2009 among the 20 MSs that reported consistently during this five-year period (Figure CA1). However, statistically significant increasing trends in campylobacteriosis notification rates from 2005 to 2009 were observed in Estonia, France, Luxembourg, Poland, Slovakia and the United Kingdom, while a statistically significant decreasing trend was observed in the Czech Republic, Ireland, and Spain (Figure CA2).

Table CA2. Reported campylobacteriosis cases in humans 2005-2009 and notification rates for 2009

Country	Report Type[1]	2009			2008	2007	2006	2005
		Cases	Confirmed Cases	Confirmed cases/ 100,000	Confirmed cases			
Austria[5]	C	1,516	1,516	18.14	4,280	5,821	5,020	5,065
Belgium	C	5,697	5,697	53.41	5,111	5,906	5,771	6,879
Bulgaria	A	26	26	0.34	19	38	0	–
Cyprus	C	37	37	4.64	23	17	2	–
Czech Republic	C	20,370	20,259	193.54	20,067	24,137	22,571	30,268
Denmark	C	3,353	3,353	60.84	3,470	3,868	3,239	3,677
Estonia	C	170	170	12.68	154	114	124	124
Finland	C	4,050	4,050	76.04	4,453	4,107	3,439	4,002
France	C	3,956	3,956	6.15	3,424	3,058	2,675	2,049
Germany	C	62,331	62,331	76.01	64,731	66,107	52,035	62,114
Greece	–[4]	–	–	–	–	–	–	–
Hungary	C	6,583	6,579	65.59	5,516	5,809	6,807	8,288
Ireland	C	1,819	1,810	40.67	1,752	1,885	1,810	1,801
Italy	C	531	531	0.88	265	676	–	–
Latvia	U	0	0	0	0	0	0	0
Lithuania	C	812	812	24.24	762	564	624	694
Luxembourg	C	551	551	111.65	439	345	285	194
Malta	C	132	132	31.91	77	91	54	91
Netherlands[2]	C	3,782	3,739	43.62	3,341	3,289	3,186	3,761
Poland	C	357	357	0.94	257	192	156	47
Portugal	–[4]	–	–	–	–	–	–	–
Romania	C	328	254	1.18	2	–	–	–
Slovakia	C	3,902	3,813	70.45	3,064	3,380	2,718	2,204
Slovenia	C	952	952	46.84	898	1,127	944	–
Spain[3]	C	5,106	5,106	44.57	5,160	5,055	5,889	5,513
Sweden	C	7,178	7,178	77.55	7,692	7,106	6,078	5,969
United Kingdom	C	65,043	65,043	106.32	55,609	57,815	52,134	52,686
EU Total		**198,582**	**198,252**	**45.57**	**190,566**	**200,507**	**175,561**	**195,426**
Iceland	C	74	74	23.17	98	93	117	128
Liechtenstein	–	–	–	–	2	0	10	–
Norway	C	2,848	2,848	59.34	2,875	2,836	2,588	2,631
Switzerland	C	8,154	8,154	105.90	7,817	6,038	5,429	5,259

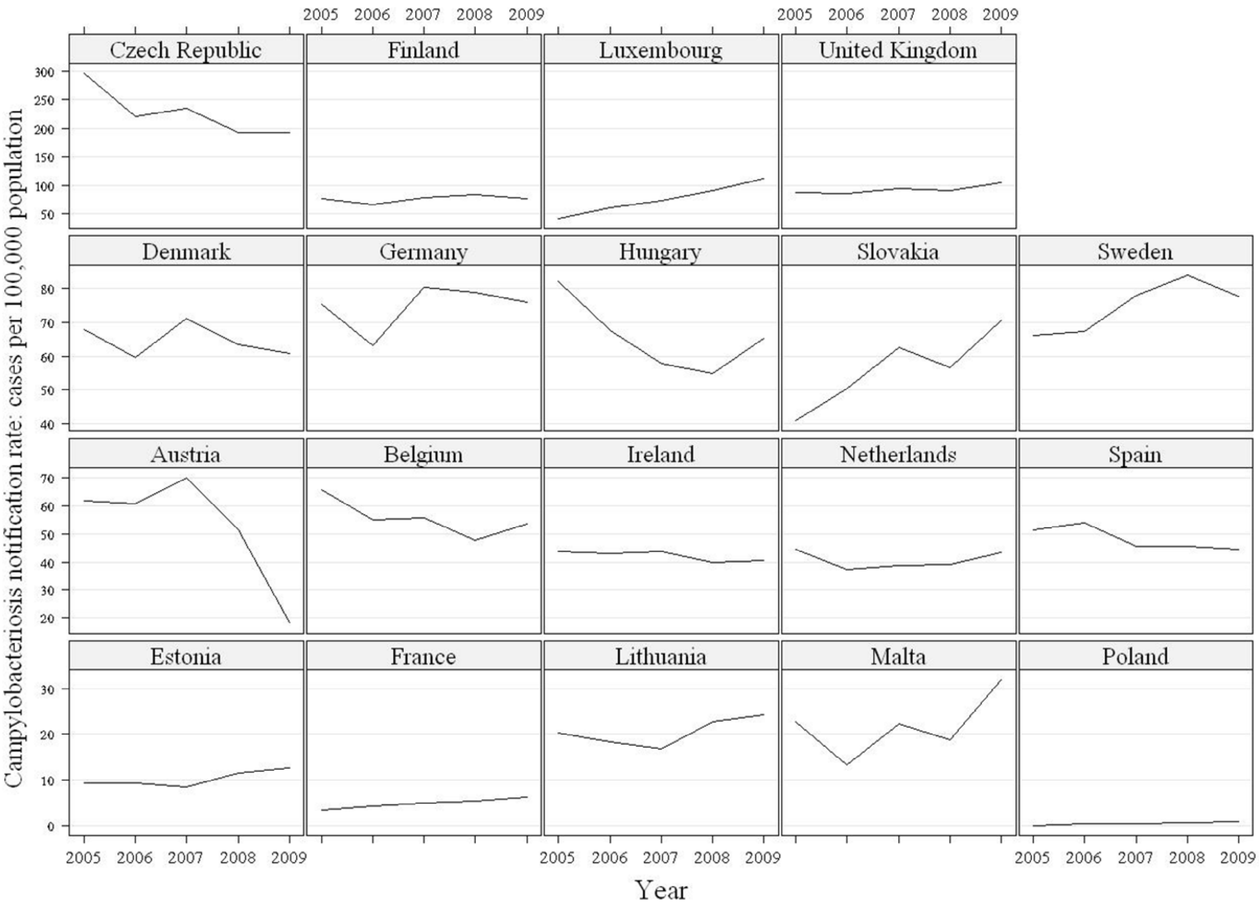
1. A: aggregated data report; C: case-based report; –: No report; U: unspecified.
2. Sentinel system; notification rates calculated on estimated coverage 52 %.
3. Sistema de informacion microbiologica (SIM); notification rates calculated on estimated coverage 25 %.
4. No surveillance system exists.
5. New electronic reporting system in place since 2009.

Figure CA1. Notification rates of reported confirmed cases of human campylobacteriosis in EU, 2005-2009



Source for EU trend: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Lithuania, Luxembourg, Malta, Netherlands, Poland, Slovakia, Spain, Sweden, United Kingdom.

Figure CA2. Notification rates of reported confirmed cases of human campylobacteriosis in MSs, 2005-2009



Note: MSs have been ranked according to the maximum value of the notification rate. A unique scale is used for MSs shown in the same row but scales differ among rows. In each row MSs have been presented in alphabetical order.

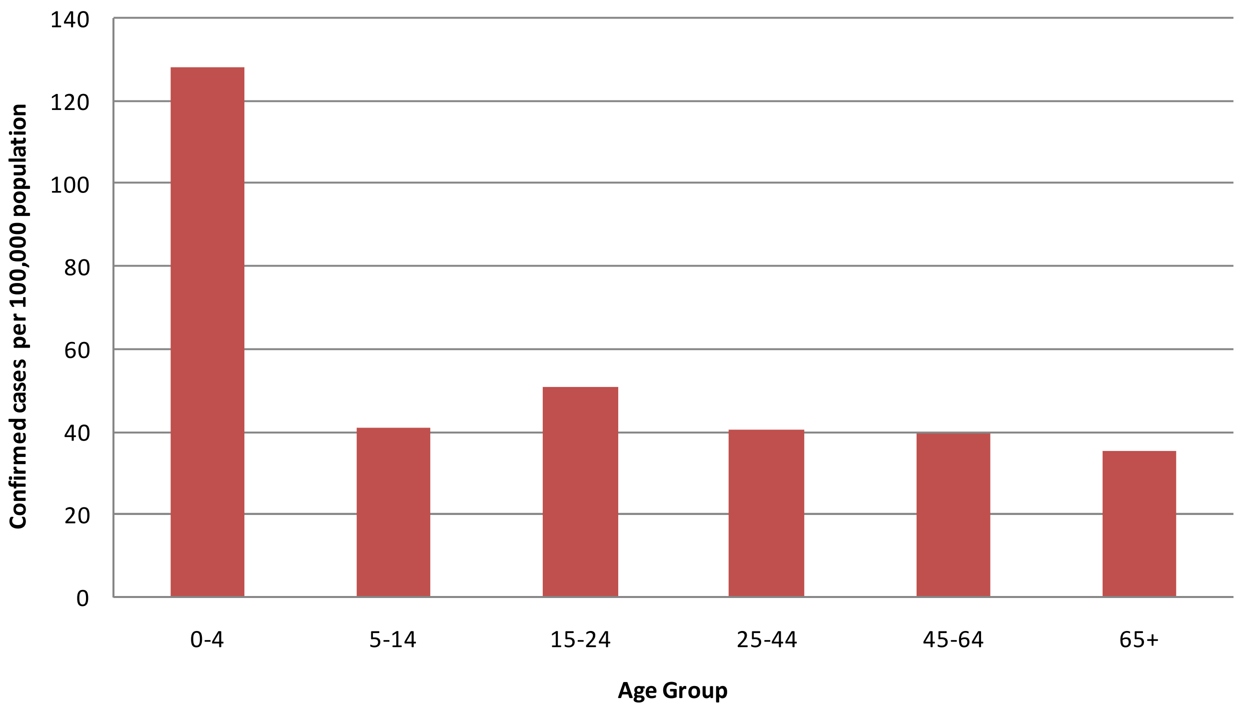
In 2009, both the proportion of imported and domestic confirmed campylobacteriosis cases decreased, from 7.5 % in 2008 to 4.0 % in 2009 and from 60.7 % in 2008 to 58.0 % in 2009, respectively (Table CA3). The proportion of reported cases of unknown origin thus increased, from 31.8 % in 2008 to 38.0 % in 2009.

Table CA3. Distribution of confirmed campylobacteriosis cases in humans by reporting countries and origin of case (domestic/imported), 2009

Country	Domestic (%)	Imported (%)	Unknown (%)	Total (n)
Austria	98.0	0	2.0	1,516
Belgium	0	0	100.0	5,697
Bulgaria	0	0	100.0	26
Cyprus	100.0	0	0	37
Czech Republic	99.0	1.0	0	20,259
Denmark	15.0	13.0	72.0	3,353
Estonia	93.5	6.5	0	170
Finland	17.0	61.0	22.0	4,050
France	21.0	3.0	76.0	3,956
Germany	88.0	6.0	6.0	62,331
Hungary	99.1	0	0	6,579
Ireland	12.0	2.0	86.0	1,810
Italy	16.0	4.0	8.0	531
Lithuania	0	0	100.0	812
Luxembourg	0	0	100.0	551
Malta	98.0	2.0	0	132
Netherlands	95.0	5.0	0	3,739
Poland	98.0	1.0	1.0	357
Romania	0	0	100.0	254
Slovakia	99.0	1.0	0	3,813
Slovenia	0	1.0	99.0	952
Spain	100.0	0	0	5,106
Sweden	0	0	100.0	7,178
United Kingdom	25.0	1.0	74.0	65,043
EU Total	**58.0**	**4.0**	**38.0**	**198,252**
Iceland	57.0	38.0	5.0	74
Norway	45.0	47.0	8.0	2,848

As in previous years, children under the age of five had the highest notification rate in 2009 (128.0 per 100,000 population). This is the highest rate since 2006. Overall, the notification rates for all age groups increased compared with 2008 meaning that the general increase in confirmed cases in 2009 was among all age groups (Figure CA3). However, the case fatality was relatively low, 0.02% among 107,169 confirmed cases for which information was reported.

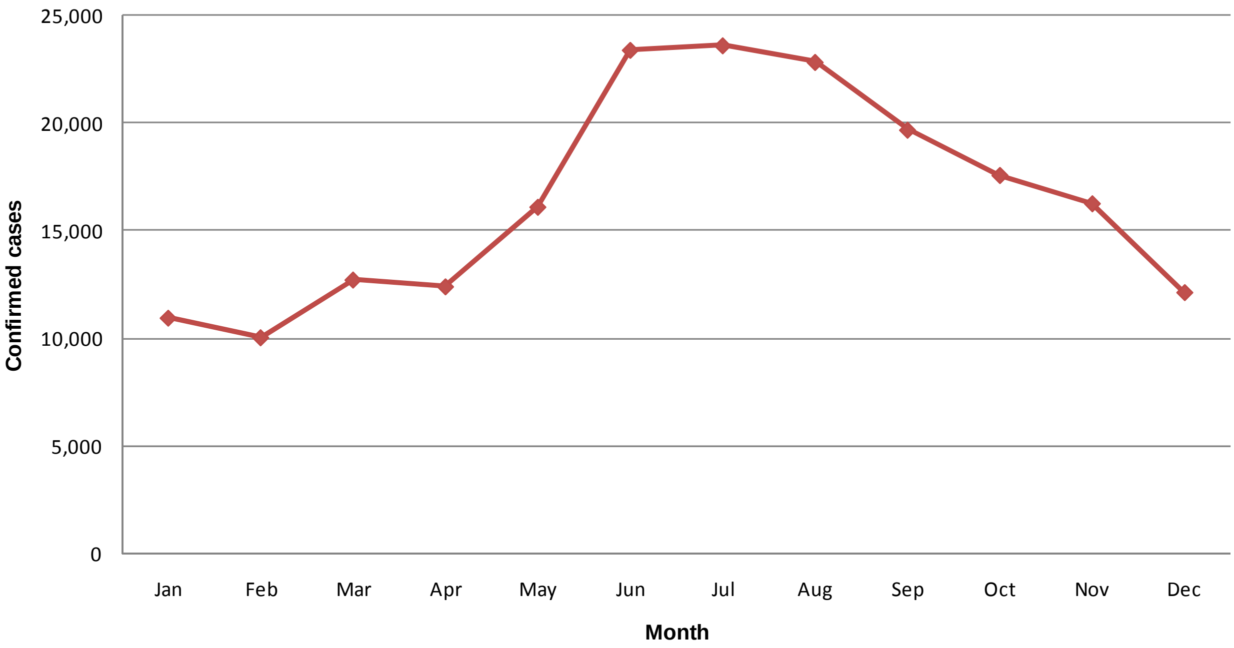
Figure CA3. Age-specific distribution of notification rate of reported confirmed cases of human campylobacteriosis per 100,000 population, TESSy data for reporting MSs, 2009



Source: All MSs except Greece, Latvia, Portugal and Romania. (N= 195,798).

The highest numbers and notification rates of *Campylobacter* cases in humans were reported during the summer months, from June to August, and started gradually decreasing from September to December (Figure CA4).

Figure CA4. Number of reported confirmed campylobacteriosis cases in humans by month, TESSy data for reporting MSs, 2009



Source: All MS except Greece, Latvia, Portugal and Romania (N=197, 851).

The most frequently reported *Campylobacter* species in 2009 was *C. jejuni* (36.4 %) and accounted for 90 % of the cases characterised at species level. There was a decrease in the proportion of *C. jejuni* cases compared with 2008 and 2007 where *C. jejuni* was responsible for 39.5 % and 44.3 % of the cases, respectively. The proportion of confirmed cases due to *C. coli* was 2.5 % of *Campylobacter* cases. The proportion of cases caused by *C. coli* remained almost equal to 2008 and 2007 with 2.3 % and 2.7 %. Other species, including *C. lari* (0.19 %) and *C. upsaliensis* (0.01 %), accounted for 10.1 % of the cases. In 2009, 51 % of the 198,252 confirmed *Campylobacter* cases were not characterised at species level or the species were unknown. This represented an increase compared to 2008 (49 %, N=190,566).

3.2.2 *Campylobacter* in food

Twenty MSs and Switzerland reported data on *Campylobacter* in food in 2009 (Table CA4). The number of samples within food categories tested ranged from a few to more than a thousand samples. The majority of the samples was from food of animal origin; primarily from poultry meat, which is considered to be one of the major vehicles of *Campylobacter* infections in humans. Compared to 2008, fewer MSs reported data on *Campylobacter* in poultry meat in 2009. No data for *Campylobacter* in drinking water was reported in 2009.

Table CA4. Overview of countries reporting data on foodstuffs, 2009

Data	Total number of MSs reporting	Countries
Poultry meat	20	**All MSs** except BG, CY, FI, LV, MT, SE, UK **Non-MS:** CH
Pig meat	14	**MSs:** AT, BE, CZ, DE, EE, ES, HU, IE, IT, LU, NL, PL, PT, RO
Bovine meat	11	**MSs:** BE, DE, ES, HU, IE, IT, LU, NL, PL, PT, RO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP, own control or import are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis.

Sampling and testing methods varied between countries and, as such, the results from the different countries are not directly comparable. Also, it should be taken into consideration that the proportion of positive samples observed may be influenced by the time of year at which the samples were taken, since in many countries *Campylobacter* are known to be more prevalent during the summer than during the winter.

Fresh poultry meat

The occurrence of *Campylobacter* in fresh broiler meat sampled at slaughter, processing and at retail in 2007 to 2009, is presented in Table CA5. In 2009, as in previous years, the proportions of *Campylobacter*-positive broiler meat samples varied widely between MSs (from 0 % to 95.8 %), and of the 16 reporting MSs seven MSs (the Czech Republic, France, Greece, Ireland, Luxembourg, Slovenia and Spain) recorded very high (>50 %) or extremely high levels (>75 %) of positive samples.

Compared to 2008, more MSs reported data collected at the slaughter level in 2009. This may be as a follow up of EU-wide baseline survey on *Campylobacter* in broilers and broiler carcasses carried out in 2008. All MSs were obliged to participate in the survey and due to this, many MSs tested fewer additional samples for *Campylobacter* in 2008. Results from the baseline survey are presented in specific sections further ahead subsequently in this report.

The data reported in 2009 revealed a large variation in proportions of positive samples at slaughterhouse level from 6.3 % in Estonia to 95.8 % in Spain (Table CA5). The results from the slaughterhouses are generally in line with the results from EU-wide baseline survey (Figure CA5). At processing, the proportion of positive broiler meat samples ranged from 9.0 % in Belgium to 70.7 % in Spain (Table CA5). At retail, the proportion of positive broiler meat samples varied from 10.8 % in the Netherlands to more than 75.0-79.8 % in the Czech Republic, France, Slovenia and Luxembourg (Table CA5). In Denmark, a lower proportion of positive samples was reported in 2009 compared to previous years. This was because sampling in 2009 was not evenly distributed over the year, and more samples were taken during the winter period wherein relatively fewer broiler flocks are found *Campylobacter*-positive. The proportion of *Campylobacter*-positive samples increased by more than 60 % in Luxembourg and more than two fold in Spain compared to 2008. In Austria, the proportions of positive samples have fluctuated during the last three years. In all the other reporting countries reported proportions of positive samples at retail were similar to the 2008 proportions.

Belgium, Denmark, Germany, Hungary, Ireland, Slovenia, Spain and Switzerland reported data from two or three stages of the food chain (slaughter, processing or retail). A reduction in the occurrence of *Campylobacter* along the food chain was mainly observed in Ireland, from 84.7 % at slaughter to 25.0 % at processing and in Spain, from 95.8 % positive samples at slaughter to 49.5 % at retail. In Denmark, the occurrence of *Campylobacter* increased from 12.4 % at slaughter-processing to 32.5 % at retail. All investigations listed as results from imports have been excluded. However, some MSs might not discriminate between domestic national and imported products when testing at processing and retail, which might influenced the proportion of positive samples along the food chain.

In 2009, seven MSs reported data on *Campylobacter* in fresh turkey and other poultry meat excluding broiler meat sampled at different stages in the production chain (Table CA6). The proportions of positive samples at slaughter were below 10 % in Belgium and Hungary, whereas extremely high occurrences were reported by Poland (89.7 %) and Spain (71.2 %). These high observed proportions of positive samples in non-broiler poultry meat indicate that poultry meat in general, and not only broiler meat, can be an important vehicle for *Campylobacter* infections in humans.

Germany and Hungary examined turkey meat samples at two stages of the production chain. The proportion of positive samples reported at retail compared to processing increased slightly in Hungary whereas a reduction of more than 10 % was reported in Germany (Table CA6).

Table CA5. **Campylobacter** *in fresh broiler meat[1], 2007-2009*

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
At slaughter								
Belgium[2]	Single	1 g	261	32.2	185	33.0	235	22.6
Denmark[3, 4]	Single	10 g/15 g	986	12.4	484	14.7	439	8.2
Estonia[6, 12]	Batch	1 g	48	6.3	-	-	46	2.2
France	Batch	10 g	-	-	-	-	192	86.5
Greece	Single	25 g	47	70.2	-	-	-	-
Hungary	Single	25 g	-	-	-	-	232	31.9
Ireland[8, 12]	Single	1 g	157	84.7	-	-	-	-
Romania[10]	Single	25 g	266	34.2	-	-	778	0
Spain[12]	Single	25 g	72	95.8	420	86.2	147	55.8
At processing plants								
Belgium[2]	Single	1 g	1007	9.0	523	7.3	257	9.3
Germany	Single	25 g	45	35.6	78	33.3	35	40.0
Hungary	Single	25 g	291	26.8	-	-	-	-
Ireland[12]	Single	Various	116	25.0	-	-	112	63.4
Latvia	Single	25 g	-	-	-	-	250	0.8
Slovenia[11]	Single	20 cm^2	101	67.3	-	-	295	56.9
Spain	Single	25 g	99	70.7	50	58.0	168	29.2
Norway	Single	25 g	-	-	-	-	305	9.5

Table continued overleaf.

Table CA5 (contd.).* Campylobacter *in fresh broiler meat[1], 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
At retail								
Austria	Single	25 g	37	24.3	138	8.0	219	62.6
Belgium[2, 12]	Single	1 g	199	12.1	-	-	415	11.1
Czech Republic	Single	25 g/27 g	120	75.0	-	-	-	-
Denmark[5]	Single	Various	702	32.5	1057	36.6	695	37.6
France	Single[12]	28 g	120	90.0	-	-	-	-
	Single[13]	28 g	241	69.3	-	-	-	-
Germany[7]	Single[14]	10 g	633	28.6	887	36.4	574	40.9
	Single[15]	10 g	413	47.0	-	-	-	-
Hungary	Single	25 g	64	17.2	-	-	-	-
Italy	Single	25 g	-	-	-	-	323	11.8
Latvia[9]	Single	1 g	-	-	205	9.8	46	4.3
Luxembourg	Single	10 g	84	79.8	122	49.2	182	37.9
Netherlands	Single	25 g	657	10.8	1,421	14.1	1,407	10.9
Slovenia	Single	25 g	106	78.3	315	74.6	343	67.1
Spain	Single	25 g	273	49.5	165	13.3	208	30.8
Sampling level not stated								
Italy	Single	Various	108	0	26	7.7	-	-
Italy	Batch	Various	59	16.9	66	3.0	-	-
Total (16 MSs in 2009)			**7,312**	**31.0**	**6,142**	**30.1**	**7,598**	**26.0**

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

1. Only data specified as fresh or carcass are included, frozen meat is not included.
2. In Belgium in 2007, sample weight 0.01 g.
3. In Denmark, data include both slaughter and processing.
4. In Denmark, 2008 data are not comparable to previous years as they only represent the high prevalence period.
5. In Denmark, 2009 data are not comparable to previous years as high prevalence period is underrepresented.
6. In Estonia in 2009, sample weight - whole carcass.
7. In Germany in 2009, sample weight 25 g.
8. In Ireland in 2009, each sample comprises three neck flaps.
9. In Latvia in 2007, batch-based data.
10. In Romania in 2009, batch-based data.
11. In Slovenia in 2009, sample weight 1 g.
12. Carcass data in Belgium (2007), Estonia (2009), France (2009), Ireland (2009), Spain (2008).
13. In France 2009, results include 120 samples of meat with skin (103 pos) and 121 samples from skinned meat (64 pos).
14. In Germany, surveillance in 2009.
15. In Germany, monitoring in 2009.

Table CA6. Campylobacter *in fresh[1] non-broiler poultry meat, 2009*

Country	Sample level	Sample unit	Sample weight	N	% pos
Turkeys					
Belgium	Slaughter	Single	1 g	278	5.0
Germany	Processing	Single	25 g	41	29.3
	Retail[2]	Single	25 g	317	15.5
	Retail[3]	Single	25 g	399	19.5
Hungary	Processing	Single	25 g	171	1.2
	Retail	Single	25 g	131	5.3
Luxembourg	Retail	Single	10 g	29	55.2
Poland	Slaughter	Batch	25 g	29	89.7
Slovenia	Retail	Single	25 g	28	39.3
Total turkeys (6 MSs)				**1,423**	**15.1**
Other poultry[4]					
Hungary (ducks)	Slaughter	Single	25 g	95	6.3
Hungary (geese)	Slaughter	Single	25 g	128	0.8
Spain	Slaughter	Single	25 g	66	71.2
Total other poultry (2 MSs)				**289**	**18.7**

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

1. Only data specified as fresh or carcass are included, frozen meat is not included.
2. In Germany, surveillance in 2009.
3. In Germany, monitoring in 2009.
4. Slaughter samples are regarded as 'fresh' though not specified.

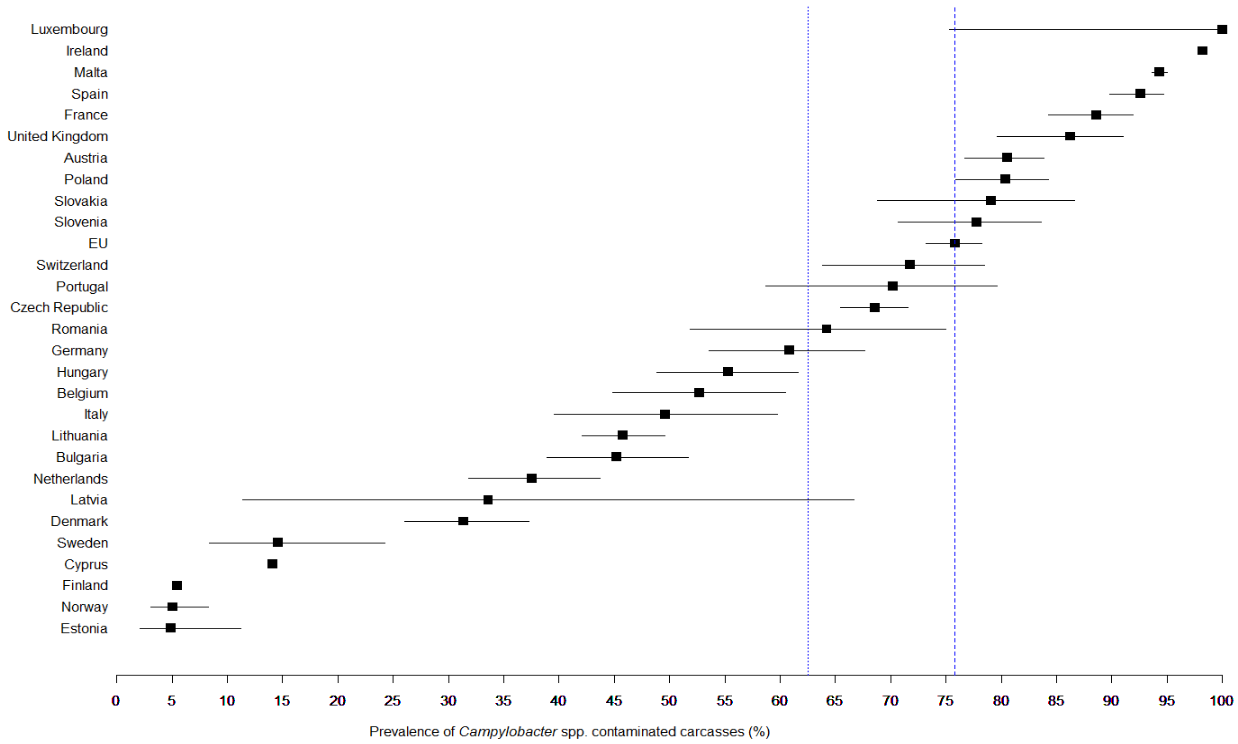
Broiler carcasses: EU-wide baseline survey

From January to December 2008, an EU-wide fully harmonised *Campylobacter* baseline survey was conducted in broiler batches and on broiler carcasses. Twenty-six EU MSs participated in the survey whereas Greece did not take part. In addition, two non-MSs, Norway and Switzerland, also participated in the survey.

The objective of the survey was to obtain comparable data for all MSs through harmonised sampling schemes. The cleaned dataset contained data from 10,132 broiler batches sampled from 561 slaughterhouses. The sampling of broiler batches was based on a random selection of slaughterhouses, sampling days in each month and the batches to be sampled on each sampling day. From each randomly selected batch one whole carcass was collected immediately after chilling but before freezing, cutting or packaging, for the detection and enumeration (determination of counts) of *Campylobacter.*

Campylobacter was isolated from broiler carcasses in all participating MSs and both non-MSs. EU prevalence was 75.8 % (95 % CI: 73.2; 78,3), and MS prevalence ranged from 4.9 % in Estonia to a 100 % in Luxembourg (Figure CA5). The median of MSs prevalences of *Campylobacter*-contaminated broiler carcasses was 62.5 % (Figure CA5).

Figure CA5. Prevalence[1] of* Campylobacter*-contaminated broiler carcasses in EU[2], baseline survey 2008



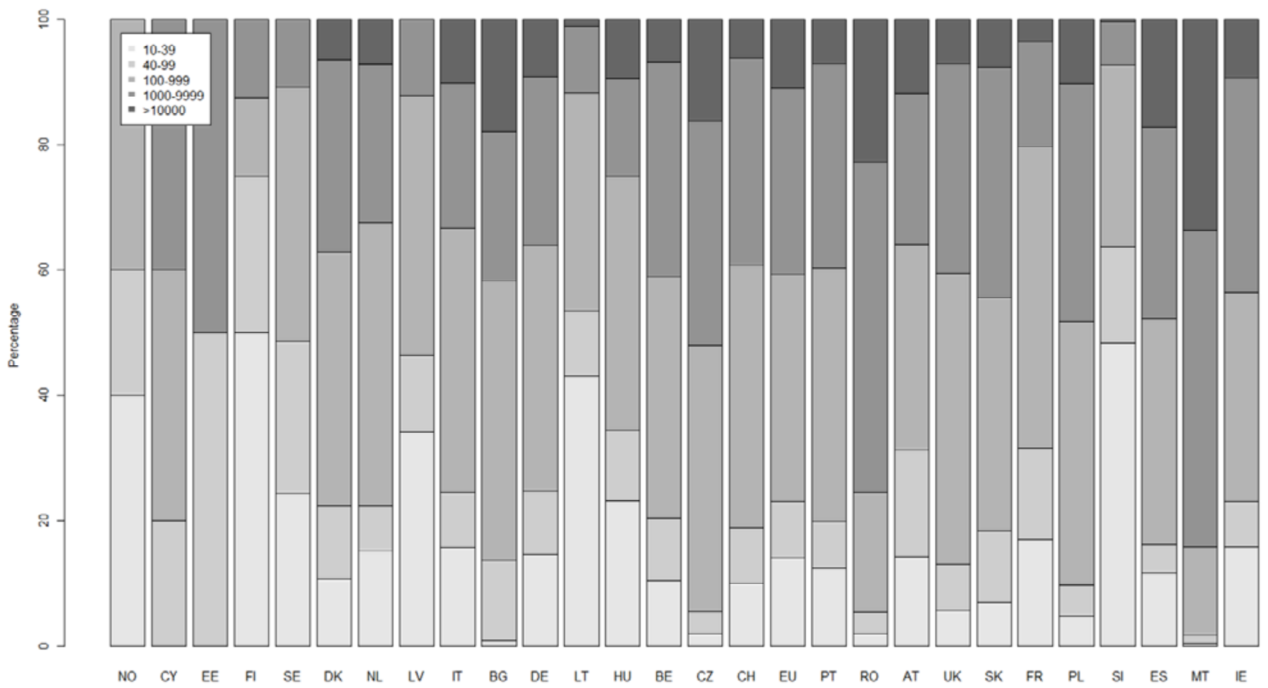
1. Horizontal lines represent 95 % confidence intervals. The dashed lines indicate EU mean and the dotted line indicates EU median prevalence of 26 participants.
2. Greece did not participate in the baseline survey and two non-MSs, Norway and Switzerland, participated.

The enumeration results were used to estimate the distribution of *Campylobacter* counts on the broiler carcasses (Figure CA6).

As an exception in this baseline survey, Luxembourg did not perform *Campylobacter* enumeration on carcass samples. At EU level, almost half of the tested samples (neck skin together with breast skin) contained less than 10 cfu/g. The percentages of broiler carcass samples with enumeration results (cfu/g) below 10, between 10-99, between 100-999, between 1,000-10,000 and above 10,000 were: 46.6 %, 12.5 %, 19.3 %, 15.8 % and 5.8 %, respectively.

Figure CA6 presents the distribution of samples found containing *Campylobacter* 10 cfu/g or more. The *Campylobacter* enumeration results on broiler carcasses showed a huge variation at country-specific level. All countries except Norway reported some samples containing between 1,000-10,000 cfu/g neck skin together with breast skin, and all countries except Cyprus, Estonia, Finland, Latvia, Sweden and Norway reported samples containing more than 10,000 cfu/g.

Figure CA6. Distribution[1] of the* Campylobacter *enumeration results in broiler carcasses in EU[2], baseline survey 2008



1. Distribution of samples containing; 10-39, 40-99, 100-999, 1,000-9999 and >10,000 cfu/g of neck skin together with breast skin; samples containing less than 10 cfu/g of neck skin together with breast skin not included in the figure.
2. Exceptionally in Luxembourg no *Campylobacter* enumeration was executed in broiler carcass samples, Greece did not participate in the baseline survey and two non-MSs, Norway and Switzerland, participated.

When comparing MS-specific figures for the prevalence of *Campylobacter*-colonised broiler batches (Figure CA8 shown in section 3.2.3), and *Campylobacter*-contaminated broiler carcasses (Figure CA5) with *Campylobacter* enumeration results (Figure CA6), a tendency can be observed for countries having a higher *Campylobacter* prevalence in both slaughter batches and carcasses, to have higher quantitative loads on carcasses.

In total 6,030 *Campylobacter* isolates were identified at species level from the 5,558 positive broiler carcasses, based on detection. *C. jejuni* was detected in 67.9 % of positive samples, whereas *C. coli* and *C. lari* were isolated in 39.4 % and 0.3 % of the positive carcass samples, respectively. Other *Campylobacter* spp. were detected in 0.9 % of the positive samples. *C. jejuni* was the most commonly reported species in 20 MSs and two non-MSs with up to 100 % of this species identified among isolates in Estonia, Finland, Sweden and Norway. In six MSs (Bulgaria, Ireland, Italy, Luxembourg, Malta and Spain), *C. coli* was the most commonly isolated species on broiler carcasses based on detection with up to 72.8 % and 76.9 % of this species identified among carcasses in Spain and Luxembourg, respectively.

The speciation of *Campylobacter* isolates, obtained through the enumeration method, was only mandatory when negative results of the *Campylobacter* detection were observed in the same samples. In total, 1,802 *Campylobacter* isolates were identified from the 1,712 positive broiler carcasses, based on enumeration. *C. jejuni* was found in 62.6 % of positive samples, *C. coli* and *C. lari* in 32.7 %, and 0.4 %, respectively, while in 4.1 % of positive samples “other *Campylobacter* spp.” were identified. Up to 5.5 % of isolates were not speciated.

More information on the analysis of this survey's results can be found in the EFSA reports[25,26]. The part A report regards the estimation of prevalence and the published part B the analysis of factors associated with *Campylobacter* colonisation of broiler batches and with *Campylobacter* contamination of broiler carcasses as well as investigation of the culture method diagnostic characteristics used to analyse broiler carcass samples.

Fresh pig meat

Data reported by MSs on the occurrence of *Campylobacter* in fresh pig meat sampled at retail for the period 2007 to 2009 are summarised in Table CA7. Despite only few reporting MSs, the data reported in previous years imply that pig meat at retail is only infrequently contaminated with *Campylobacter* spp. One exception is Spain who in 2008 reported 6.1 % positive, however only testing 33 samples. In 2009, the isolation of *Campylobacter* spp. in fresh pig meat at retail in the reporting MSs was low or very low. In 2009, Germany and Hungary reported data at several stages of production. The occurrence of *Campylobacter* at processing and retail was 0 % and 0.5 %, respectively in Germany, and 1.4 % and 1.9 %, respectively in Hungary. At slaughter, Spain reported positive findings of 18.8 % of samples. At processing, Germany and Hungary found 0 % and 1.4 % positive samples, respectively.

Table CA7.* Campylobacter *in fresh pig meat[1] at retail, 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
Austria	Single	25 g	-	-	-	-	109	0.9
Germany	Single[2]	25 g	238	0.8	212	0.5	123	0.8
	Single[3]	25 g	382	0.3	-	-	-	-
Hungary	Single	25 g	52	1.9	-	-	-	-
Latvia	Single	1 g	-	-	440	0	-	-
Luxembourg[4]	Single	10 g	26	3.8	-	-	-	-
Netherlands	Single	25 g	308	0.3	-	-	269	1.1
Spain	Single	25 g	-	-	33	6.1	36	0
United Kingdom	Single	swab	-	-	1,693	0.6	-	-
Total (4 MSs in 2009)			**1,006**	**0.6**	**2,378**	**0.5**	**537**	**0.9**

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

1. Only data specified as fresh or carcass are included, frozen meat is not included.
2. In Germany, surveillance in 2009.
3. In Germany, monitoring in 2009.
4. In Luxembourg in 2009, additional 169 samples (1 positive) from bovine and pig meat at retail (single sample, 10 g).

25 EFSA (European Food Safety Authority), 2010. Report of Task Force on Zoonoses Data Collection on the analysis of the baseline survey on the prevalence of *Campylobacter* in broiler batches and of *Campylobacter* and *Salmonella* on broiler carcasses in EU, 2008, Part A: *Campylobacter* and *Salmonella* prevalence estimates. EFSA Journal, 8(03): 1503, 99p.

26 EFSA (European Food Safety Authority), 2010. Report of Task Force on Zoonoses Data Collection on the analysis of the baseline survey on the prevalence of Campylobacter in broiler batches and of Campylobacter and Salmonella on broiler carcasses in EU, 2008, Part B: Analysis of factors associated with Campylobacter colonisation of broiler batches and with Campylobacter contamination of broiler carcasses; and investigation of the culture method diagnostic characteristics used to analyse broiler carcass samples. EFSA Journal, 8(8):1522, 132pp.

Fresh bovine meat

Four MSs reported findings of *Campylobacter* in fresh bovine meat at retail in 2009 (Table CA8). In Germany, the proportion of positive samples was reduced from 4.7 % in 2008 to 0.4 % in 2009, however it should be noted that only 86 samples were tested in 2008 compared to 519 samples in 2009. In the Netherlands, the reported proportion of positive samples has increased since 2007, reaching 1.0 % in 2009. Hungary reported data at both processing and retail level from 2009, and the occurrence of *Campylobacter* increased from 0.4 % at processing to 1.8 % at retail. In 2009, no MS reported data (sample size ≥25) at slaughter.

Table CA8.* Campylobacter *in fresh bovine meat[1] at retail, 2007-2009

Country	Sample unit	Sample weight	2009		2008		2007	
			N	% pos	N	% pos	N	% pos
Germany	Single[2]	25 g	168	0.6	86	4.7	35	0
	Single[3]	25 g	351	0.3	-	-	-	-
Hungary	Single	25 g	57	1.8	-	-	-	-
Italy	Single	25 g	-	-	-	-	334	2.4
Luxembourg[4]	Single	10 g	151	0	-	-	62	0
Netherlands	Single	25 g	201	1.0	322	0.9	264	0
United Kingdom	Single	swab	-	-	3,249	0.1	-	-
Total (4 MSs in 2009)			**928**	**0.5**	**3,657**	**0.3**	**695**	**1.2**

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

1. Only data specified as fresh or carcass are included, frozen meat is not included.
2. In Germany, surveillance in 2009.
3. In Germany, monitoring in 2009.
4. In Luxembourg in 2009, additional 169 samples (1 positive) from bovine and pig meat at retail (single sample, 10 g).

Products of meat origin

Data reported on the occurrence of *Campylobacter* in RTE minced meat, meat preparations and meat products are summarised in Table CA9. In 2009, *Campylobacter* was only isolated from RTE products of broiler meat origin in Ireland that reported *Campylobacter*-positive findings in 0.4 % of retail samples. *Campylobacter* was not reported from RTE meat products of turkey, pig and bovine meat origin, however the number of tested samples were relatively low.

Several MSs reported data for various types of non-RTE minced meat, meat preparations and meat products at retail, and particularly products from broiler meat were found *Campylobacter*-positive. However, this meat was intended to be eaten cooked, where the presence of *Campylobacter* is unlikely to occur unless cooking is insufficient or cross-contamination has occurred. Please refer to Level 3 tables for more detailed information.

Table CA9.* Campylobacter *in ready-to-eat meat products of meat origin, 2009

Country	Description	Sample unit	Sample weight	N	% pos
Broiler meat					
Germany	Meat products at retail	Single	25 g	71	0
Ireland	Meat products at processing	Single	25 g	32	0
Ireland	Meat products at retail	Single	25 g	236	0.4
Switzerland	Meat products at processing	Batch	25 g	341	0
Total broiler meat (2 MSs)				**339**	**0.3**
Turkey meat					
Germany	Meat products at retail	Single	25 g	34	0
Ireland	Meat products at processing	Single	25 g	49	0
Ireland	Meat products at retail	Single	25 g	61	0
Total turkey meat (2 MSs)				**144**	**0**
Pig meat					
Germany	Minced meat at retail, intended to be eaten raw	Single	25 g	131	0
Ireland	Meat products at processing	Single	25 g	29	0
Ireland	Meat products at retail	Single	25 g	92	0
Total pig meat (2 MSs)				**252**	**0**
Bovine meat					
Belgium	Minced meat at retail, intended to be eaten raw	Batch	1 g	27	0
Germany	Minced meat at retail, intended to be eaten raw	Single	25 g	28	0
Ireland	Meat products at retail	Single	25 g	49	0
Total bovine meat (3 MSs)				**104**	**0**

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

Other foodstuffs

Several MSs tested food categories other than poultry, pig or bovine meat for the presence of *Campylobacter*. The proportion of positive samples in raw cow's milk and dairy products in 2009 is presented in Table CA10. No MSs reported investigations from pasteurised cow's milk with 25 samples or more, while the occurrence of *Campylobacter* ranged from 0 % to 5.2 % in other cow's milk samples. Italy reported 0.2 % of positive samples of milk from other animal species. In dairy products made with various types of milk, *Campylobacter* was detected in Italy and Slovakia, where 3.8 % of tested cheeses from goat's milk and 7.0 % of tested batches of cheeses from sheep's milk, respectively, were *Campylobacter*-positive.

Four MSs tested a total of 410 units of fruit and vegetables (unspecified) and none was *Campylobacter*-positive. In the Netherlands, a total of 2,769 units of various spices and herbs were tested, but only one sample (0.04 %) was *Campylobacter*-positive.

***Table CA10. Campylobacter* in milk and dairy products, 2009**

Country	Description	Sample unit	Sample weight	N	% pos
Cow's milk					
Austria	Raw milk	Single	25 g	86	0
Germany	Raw milk 'at farm'	Single	25 g	337	0.9
	Raw milk, 'certified'	Single	25 g	171	0
Hungary	Raw milk for manufacture of raw or low heat-treated products	Single	25 ml	197	0.5
Italy	Milk	Batch	not indicated	952	0.1
Slovakia	Raw milk 'at processing'	Single	25 g	268	5.2
Total cow's milk (5 MSs)				**2,011**	**0.9**
Other milk					
Italy	Milk unspecified	Batch	not indicated	5,707	0.2
	Milk unspecified	Single	not indicated	43	0
Dairy products					
Austria	Dairy products unspecified (excluding cheeses)	Single	25 g	26	0
Italy	Cheese made from goat's milk	Single	not indicated	26	3.8
	Cheese made from sheep's milk	Single	not indicated	95	0
	Cheese from unspecified milk	Single	not indicated	89	0
Slovakia	Cheese made from sheep's milk	Batch	25 g	100	7.0
Spain	Cheese from unspecified milk	Single	25 g	30	0
Total dairy products (4 MSs)				**366**	**2.2**

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

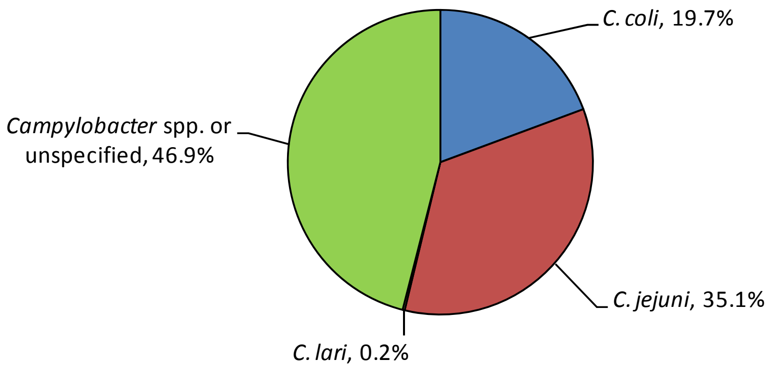
For additional data on other food categories, please refer to Level 3 tables.

Campylobacter species in fresh broiler meat

The overall *Campylobacter* species distribution in fresh broiler meat at EU level is presented in Figure CA7. *C. jejuni* accounted for approximately one third of the isolates. Unfortunately, almost half of the *Campylobacter* isolates were reported only as *Campylobacter* spp.; although 13 of 17 MSs reporting data on *Campylobacter* in broiler meat provided some information at species level. Four MSs reported *C. jejuni* as the predominant species (more than 70 % of isolates) in fresh broiler meat, while *C. coli* was reported as the predominant species (more than 46 %) in three MSs (Italy, Romania and Spain). *C. lari* was found in fresh broiler meat in Germany and Romania in two of 391 and four of 91 speciated isolates, respectively. These results are in line with the baseline survey where on a general level *C. jejuni* was the most frequently reported species. However, there were some differences such as Romania who reported more *C. jejuni* in the baseline survey.

For information on data reported on other foodstuffs, please refer to Level 3 tables.

Figure CA7. Species distribution of Campylobacter isolates from fresh broiler meat, 2009



Source: Includes data from 17 MSs (Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Romania, Slovenia and Spain) and 1 non-MSs, N=7,976.

Note: Some of the isolates might be positive with more than one species.

3.2.3 *Campylobacter* in animals

In 2009, 22 MSs and two non-MSs reported data on *Campylobacter* in animals (Table CA11); primarily from broiler flocks, but also in pigs, cattle and to some extent in goats, sheep and pets.

Table CA11. Overview of countries reporting animal data, 2009

Data	Total number of MSs reporting	Countries
Poultry	17	**MSs:** AT, DE, DK, EE, ES, FI, FR, HU, IT, LU, NL, PT, RO, SE, SI, SK, UK **Non-MSs:** CH, NO
Pigs	12	**MSs:** DE, DK, ES, FR, GR, HU, IE, IT, LV, SI, SK, UK **Non-MSs:** CH, NO
Cattle	14	**MSs:** BG, DE, DK, ES, GR, HU, IE, IT, LU, LV, NL, PL, SK, UK **Non-MSs:** CH, NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP, own control and import are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis.

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

Broilers and other poultry

In 2009, 12 MSs and two non-MSs provided information on the occurrence of *Campylobacter* in broiler flocks, batches or individual animals (Table CA12). In three of four MSs reporting animal-based data, the occurrences were extremely high (>78 %). In four of the MSs reporting flock/batch-based data, the reported occurrences were very high (>55 %), whereas low levels (<7 %) were observed in Estonia, Finland and Norway. Twelve MSs reported data in 2009 compared to eight MSs in 2008. This is most likely because of EU-wide baseline survey on *Campylobacter* in broilers carried out in 2008, where results have been reported separately.

In most cases, MSs reported the occurrence of *Campylobacter* in broilers or broiler flocks in 2009 at similar levels as in previous years (Table CA12). However, in Germany, the proportion of positive flocks has decreased continuously since 2007, and Spain reported a higher proportion of positive flocks in 2009 compared to 2007 (no data were reported in 2008).

Campylobacter investigations in turkeys were reported by Germany, where 14.6 % samples were positive.

Table CA12. Campylobacter in broilers, 2007-2009

Country	2009		2008		2007	
	N	% pos	N	% pos	N	% pos
Broilers (animal-based data)						
Czech Republic	-	-	422	69.9	-	-
Denmark	4,591	29.4	-	-	-	-
France	191	80.6	-	-	-	-
Hungary[2]	713	78.0	325	54.2	-	-
Romania	104	100.0	-	-	-	-
Total animal-based (4 MSs in 2009)	**5,599**	**38.6**	**747**	**63.1**	**0**	**0**
Switzerland	-	-	-	-	320	43.4
Broilers (flock-based data)						
Austria[1]	326	55.5	-	-	80	60.0
Czech Republic[1]	-	-	422	61.1	246	45.1
Denmark	-	-	4,912	25.9	4,527	26.8
Estonia[1]	48	0	-	-	46	0
Finland[1]	1,720	4.8	1,276	6.5	1,538	6.6
France[1]	-	-	-	-	192	80.2
Germany[2, 4]	149	15.4	345	32.2	111	78.4
Germany[2, 5]	332	10.2	-	-	-	-
Italy	-	-	-	-	116	82.8
Latvia[1]	-	-	-	-	265	37.0
Latvia[2]	-	-	-	-	75	34.7
Lithuania	-	-	374	42.0	-	-
Poland[1]	-	-	420	79.0	-	-
Slovenia[1]	306	78.4	-	-	372	75.3
Spain[1]	198	59.6	-	-	89	46.1
Sweden[1]	3,219	12.0	2,398	12.4	2,603	12.6
United Kingdom[1]	400	77.5	-	-	-	-
Total flock-based (8 MSs in 2009)	**6,698**	**20.5**	**10,147**	**24.7**	**10,260**	**25**
Norway[1]	-	-	-	-	4,268	5.2
Norway[2, 3]	1,924	6.1	4,675	4.1	4,109	4.4
Switzerland	442	44.3	-	-	-	-

Note: Data are only presented for sample size ≥25. Clinical investigations not included.

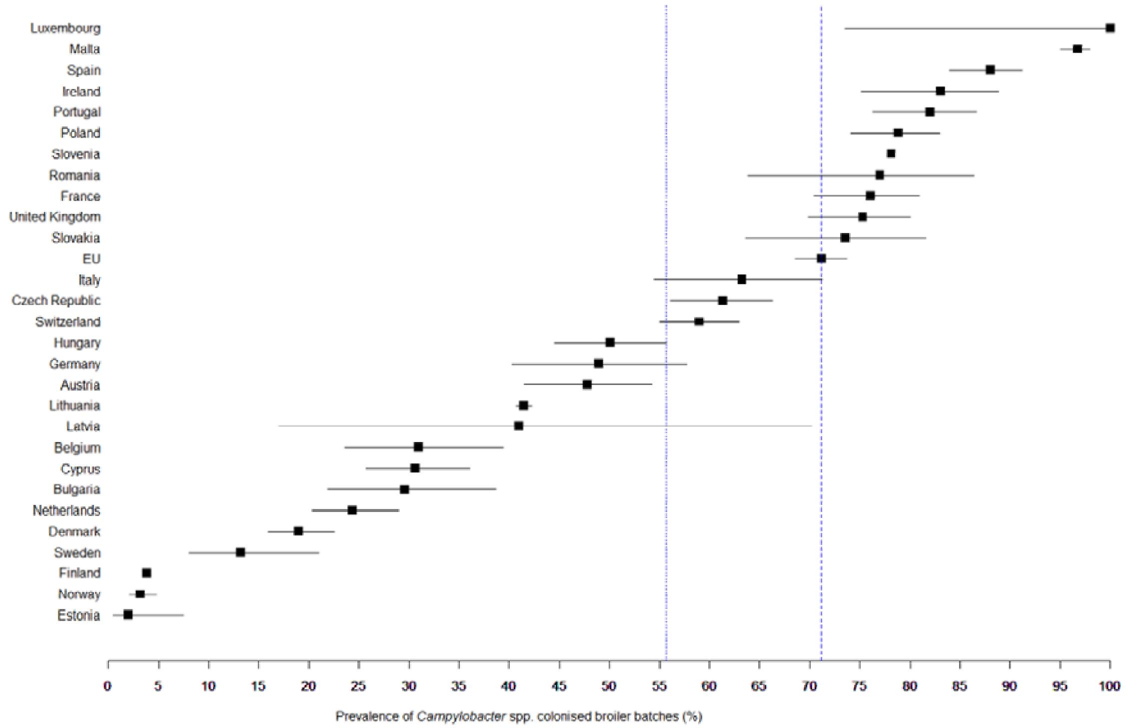
1. Slaughter batch-based data
2. At farm, Germany (2009), Hungary (2009), Norway (2009) and Latvia (2007). For Norway, flocks sampled maximum four days before slaughter.
3. Data from Norway 2009 only cover peak season 1 May to 31 October.
4. In Germany, surveillance in 2009.
5. In Germany, monitoring in 2009.

Broiler batches - baseline survey 2008

From each randomly selected batch from the 2008 EU-wide *Campylobacter* baseline survey in broiler batches and on broiler carcasses (see specific section under 3.2.2) also the intact caecal contents of 10 slaughtered broilers were collected for the detection of *Campylobacter*.

Using the detection method, *Campylobacter* was isolated from caecal samples from broiler batches in all participating MSs and both non-MSs. EU prevalence was 71.2 % (95 % CI: 68.5-73.7), ranging from 2.0 % in Estonia to 100 % in Luxembourg. The median of MS prevalence of *Campylobacter*-colonised broiler batches was 57.1 % (Figure CA8).

Figure CA8. Prevalence[1] of* Campylobacter*-colonised broiler batches in EU[2], baseline survey 2008



1. Horizontal lines represent 95 % confidence intervals. The dashed lines indicate EU mean and the dotted line indicates EU median prevalence of 26 participants.
2. Greece did not participate in the baseline survey and two non-MSs, Norway and Switzerland, participated.

*C. jejuni w*as detected in broiler batches in all participating MSs and both non-MSs. EU prevalence was 40.6 % (95 % CI: 38.3-42.9). The MS-specific prevalence in EU ranged from a minimum of 2.0 % (Estonia) to a maximum of 56.4 % (Slovakia). *C. coli* was detected in broiler batches in most MSs with the exception of Estonia, Finland and Sweden and of the non-MS Norway. EU prevalence was 31.9 % (95 % CI: 29.2-34.8). The MS-specific prevalence in EU ranged from a minimum of 0 % (Estonia, Finland and Sweden) to a maximum of 91.9 % (Luxembourg).

In total 5,457 isolates were reported from 5,255 positive pooled caecal content samples (positive broiler batches). *C. jejuni* was found in 60.8 % positive batches, *C. coli* and *C. lari* were detected in 41.5 % and 0.2 %, respectively, and other *Campylobacter* spp. were isolated in 1.4 % of positive broiler batches. *C. jejuni* was the most commonly reported species in 19 MSs and two non-MSs with up to 100 % of this species identified among isolates in Estonia, Finland, Sweden and Norway. In seven MSs (Bulgaria, Hungary, Italy, Luxembourg, Malta, Portugal and Spain) *C. coli* was the most commonly isolated species in broiler batches, with up to 76.1 % and 91.7 % of this species identified among batches in Malta and Luxembourg, respectively.

Pigs

In 2009, seven MSs and one non-MS reported *Campylobacter* in pigs (clinical investigations not included). The proportion of *Campylobacter*-positive samples ranged between 3.2 % and 67.6 % (Table CA13). The proportion of positive samples increased markedly in Hungary from 23.6 % in 2008 to 61.2 % in 2009. In Germany, the reported increase in *Campylobacter* occurrence in pigs in 2008 compared to 2007 continued in 2009.

Table CA13. **Campylobacter** *in pigs, 2007-2009*

Country	2009		2008		2007	
	N	% pos	N	% pos	N	% pos
Pigs (animal-based data)						
Austria	-	-	286	50.0	-	-
Denmark	287	55.7	-	-	-	-
France	174	67.2	-	-	-	-
Hungary	930	61.2	225	23.6	-	-
Italy	155	3.2	-	-	-	-
Slovakia	-	-	156	7.7	148	19.6
Slovenia	261	23.4	-	-	-	-
Total animal-based (5 MSs in 2009)	**1,807**	**50.5**	**667**	**31.2**	**148**	**19.6**
Switzerland	350	67.4	-	-	-	-
Pigs (herd-based data)						
Denmark	-	-	292	67.8	261	78.5
France	-	-	-	-	192	64.1
Germany	123	43.9	209	37.3	224	29.5
Italy	-	-	-	-	47	66.0
Spain[1]	284	67.6	171	65.5	230	71.3
Total herd-based (2 MSs in 2009)	**407**	**60.4**	**672**	**57.7**	**954**	**61.7**

Note: Data are only presented for sample size ≥25. Clinical investigations not included.

1. In Spain, slaughter batch-based data.

Cattle

Eight MSs provided data on cattle in 2009 (clinical investigations are not included). The data on *Campylobacter* findings in cattle populations for the years 2007 to 2009 are summarised in Table CA14.

As in 2008, the proportion of positive samples of animal-based data was low (≤ 8 %) or non-existent in Bulgaria, Ireland, Italy and Slovakia, whereas Denmark, Germany and Poland reported very high and high occurrences of 58.0 %, 29.0 % and 30.8 % test positive animals, respectively. Hungary reported all 39 tested animals positive, without indicating if these animals were tested due to suspicion. In 2008, only 9.4 % of the cattle tested in Hungary was *Campylobacter*-positive.

In contrast to 2008, high proportions of positive animals were also reported for cattle older than two years (58.0 % in Denmark) and in adult dairy cows (100 % in Hungary).

Table CA14.* Campylobacter *in cattle, 2007-2009

Country	Description	2009		2008		2007	
		N	% pos	N	% pos	N	% pos
Cattle (animal-based data)							
Austria[1]	Dairy cows	-	-	923	28.5	569	20.2
	Meat production animals	-	-	-	-	326	34.4
Bulgaria	Dairy cows	222	0	218	0	-	-
Denmark	Cattle >2 years	188	58.0	-	-	-	-
Germany[2]	Calves <1 year	321	29.0	-	-	-	-
Hungary	Dairy cows	39	100	234	9.4	5,011	0
Ireland	Calves <1 year	2,358	8.0	2,549	11.9	1,869	11
Italy	Unspecified	2,756	1.2	2,147	1.6	-	-
Luxembourg	Unspecified	-	-	-	-	166	14
Netherlands	Unspecified	-	-	-	-	3,005	<1
Poland	Calves <1 year	130	30.8	-	-	-	-
Slovakia	Unspecified	316	0	508	6.1	635	<1
Slovenia	Unspecified	-	-	385	7.8	-	-
Total animal-based (8 MSs in 2009)		**6,330**	**7.9**	**6,964**	**9.8**	**11,581**	**4**
Switzerland	Meat production animals	-	-	100	10.0	-	-
Cattle (herd-based data)							
Denmark	Cattle >2 years	-	-	168	61.3	132	70
Germany	Cattle (all)	706	18.0	788	6.7	503	11
	Calves <1 year	149	4.7	206	9.7	70	23
	Dairy cows	179	0.6	184	0	57	0
Italy	Unspecified	-	-	-	-	33	6
Spain3	Calves <1 year	258	41.5	168	37.5	163	46
Total herd-based (2 MSs in 2009)		**1,292**	**18.7**	**1,514**	**15.8**	**958**	**25**

Note: Data are only presented for sample size ≥25. Clinical investigations not included.

1. In Austria in 2008, cattle unspecified.

2. In Germany, monitoring in 2009.

3. In Spain, slaughter batch-based data; in 2007, meat production animals.

Other farm animals

Data on *Campylobacter* in sheep and goats are primarily from clinical investigations as no surveillance is carried out. In 2009, a total of 410 goats (animal-based) from Greece, Ireland, Italy, the Netherlands, Portugal, Slovakia and Switzerland were tested (overall, 2.0 % positive) and 26 herds from Germany (11.5 % positive). A total of 1,843 sheep (animal-based) from Greece, Ireland, Italy, the Netherlands, Norway, Slovakia, Switzerland and the United Kingdom were tested (overall, 12.0 % positive) and 53 herds from Germany (11.3 % positive). Additionally, 129 mixed sheep and goats were tested in Italy (3.9 % positive).

Pets

In 2009, MSs tested 1,582 cats and dogs for *Campylobacter*; mostly from clinical investigations. All countries providing information on *Campylobacter* in cats and dogs reported between 0 % (Italy) and 27.5 % (Norway) positive samples (Table CA15).

Table CA15.* Campylobacter *in pets, 2007-2009

Country	2009		2008		2007	
	N	% pos	N	% pos	N	% pos
Cats						
Germany	184	6.5	251	2.0	227	7.0
Italy[1]	27	0	-	-	286	5.2
Netherlands[2]	246	13.0	214	8.9	225	8.9
Slovakia	-	-	25	8.0	-	-
Total (cats, 3 MSs in 2009)	**457**	**9.6**	**490**	**5.3**	**738**	**6.9**
Norway[2]	97	9.3	85	7.1	34	11.8
Switzerland[2]	952	0.3	929	1.2	-	-
Dogs						
Germany	374	4.8	491	5.9	677	5.5
Ireland[2]	-	-	33	27.3	48	14.6
Italy[3]	169	3.6	61	11.5	179	25.1
Latvia[2]	-	-	26	3.8	-	-
Netherlands[2]	461	15.6	418	15.8	376	19.9
Slovakia[2]	121	5.0	137	10.9	55	7.3
Total (dogs, 4 MSs in 2009)	**1,125**	**9.1**	**1,166**	**10.9**	**1,335**	**12.6**
Norway[2]	342	27.5	287	28.9	115	23.5
Switzerland[2]	1,350	0.9	1,366	3.4	-	-

Note: Data are only presented for sample size ≥25. Clinical or diagnostic investigations are included.

1. In Italy in 2007, sampling unit is holding, not animals.
2. Clinical investigations: Ireland (2007), Latvia (2008), Netherlands (2008), Norway (2007 and 2008), Slovakia (2008) and Switzerland (2008 and 2009).
3. In Italy in 2008, clinical investigations and surveillance.

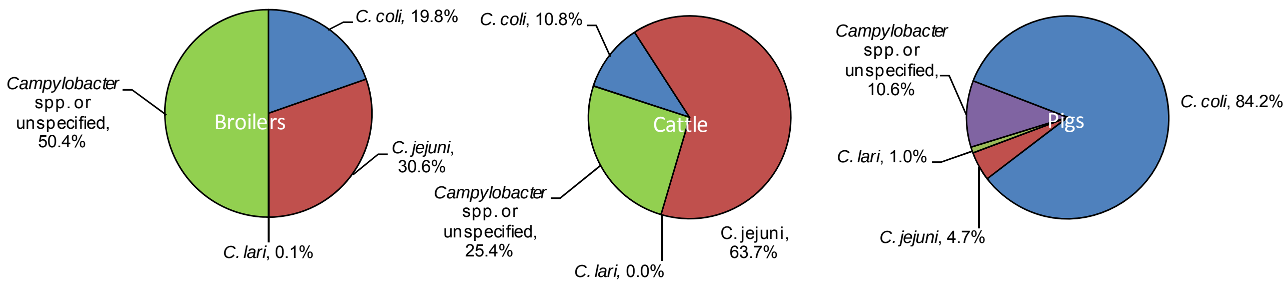
Campylobacter species in animals

Among animal samples tested positive for *Campylobacter*, only about half of the isolates from broilers were speciated (50.4 %), while speciation was more common for isolates from pigs (89.9 %) and cattle (74.5 %). Nevertheless, the reported data indicate that *C. jejuni* was the most commonly isolated species in broilers (30.6 %) and cattle (63.7 %), while the vast majority of isolates from pigs was *C. coli* (84.2 %) (Figure CA9). *C. lari* was reported in two broilers and 14 pig isolates.

In pet cats and dogs, the reported *Campylobacter* species were *C. jejuni*, *C. coli,* and *C. upsaliensis*.

For additional information on the speciation of animal isolates, please see Level 3 tables.

Figure CA9. Species distribution of positive samples isolated from broilers, cattle and pigs, 2009



Source:

Broilers: Data from 16 MSs are included (Austria, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom) and two non-MSs (Norway and Switzerland), N=16,490.

Cattle: Data from 13 MSs are included (Bulgaria, Denmark, Germany, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Slovakia, Spain and United Kingdom) and two non-MSs (Norway and Switzerland), N=11,002.

Pigs: Data from 11 MSs are included (Denmark, France, Germany, Hungary, Ireland, Italy, Latvia, Slovakia, Slovenia, Spain and United Kingdom) and two non-MSs (Norway and Switzerland), N=2,758.

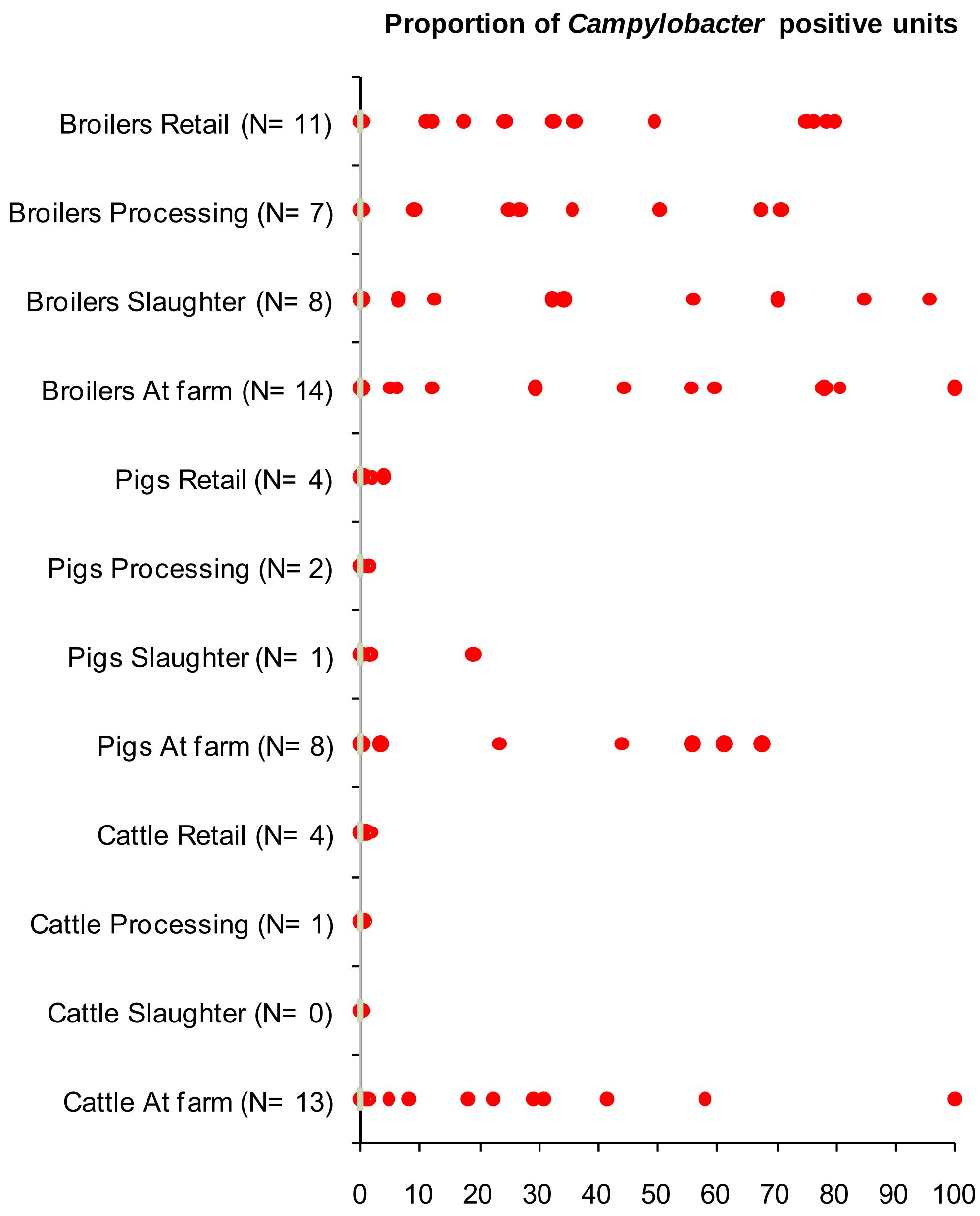
Note: Clinical investigations included.

3.2.4 Overview of *Campylobacter* from farm-to-fork

A general overview of *Campylobacter* data reported by MSs in 2009 from broilers, pigs, bovine animals, and food thereof is presented in Figure CA10. As in previous years, data indicate that the proportion of positive samples is much higher in pig and cattle populations compared to samples of fresh pig and bovine meat at processing and retail. However, the prevalence of *Campylobacter* in broilers does not decrease notably from live animals along the food chain to retail; although this is based on relatively few reported observations.

In 2009, findings are similar to those of 2008. This suggests that pig and bovine carcasses are less contaminated with faecal material during slaughter and/or that *Campylobacter* are not able to survive well on pig and bovine meat during slaughtering and processing operations. *Campylobacter* observations are distributed quite evenly between the maximum and minimum values within the different categories which might indicate substantial variations within EU. The observed variation may be due to several reasons, e.g. a true variation between MSs, differences in sampling and testing protocols or seasonal variation in the occurrence of *Campylobacter* or simply a random variation due to a low number of tested samples.

Figure CA10. Proportions of* Campylobacter*-positive units, by animal species and sampling level of fresh meat within EU, 2009



Note: Data are only presented for sample size ≥25. Each point represents a MS investigation, including animal, herd, single samples and batch-based data.

3.2.5 Discussion

Campylobacteriosis continues to be the most commonly reported zoonosis in humans in EU since reporting to ECDC started in 2004. In 2009, the number of notified cases of thermotolerant *Campylobacter* increased by 4 % in EU, compared with 2008. Notified cases of human campylobacteriosis increased in 18 MSs.

EU notification rate also increased from 43.1 to 45.5 cases per 100,000 population in 2009 compared to 2008 (rates adjusted with the new information on population coverage in the Spanish surveillance). At a five year perspective, however, EU notification rate has shown a marked fluctuation. The reason for this phenomenon is not well understood, but marked yearly increases or decreases in single MSs have affected this picture. More information is therefore needed from the MSs in order to assess the underlying factors for this phenomenon. While significant increasing five-year trends were noted in six MSs from 2005 to 2009, only four of these were the same as the seven that had an increasing trend for 2004-2008. Similarly four MSs had significant decreasing trends for 2005 to 2009, but only one of these countries was among the five with a decreasing trend for 2004 to 2008.

The EFSA Panel on Biological Hazards (BIOHAZ) estimated in its recent scientific opinion[27] on the quantification of the risk posed by broiler meat to human campylobacteriosis cases that the handling, preparation and consumption of broiler meat may account for 20 % to 30 % of human campylobacteriosis cases, while 50 % to 80 % may be attributed to the chicken (broiler) reservoir as a whole. *Campylobacter* strains from the broiler reservoir may reach humans via routes other than food (e.g. by the environment or by direct contact). In line with this estimation, based on the reported data in 2009, poultry meat still appears to be an important food-borne source of *Campylobacter* since the occurrence of the bacteria remained at a high level in fresh poultry meat. Some findings were also reported from raw milk and cheeses. The importance of poultry meat as a source of human *Campylobacter* infections was supported by the reported food-borne outbreak data from 2009, where seven out of 16 verified outbreaks were linked to poultry meat. One of the verified outbreaks was linked to dairy products other than cheeses, and interestingly two outbreaks were associated with bovine meat or products thereof.

As in previous years, *Campylobacter* occurrence in live poultry and pig populations was generally at very high levels in MSs. Nevertheless, lower occurrences in broiler flocks were once again reported by some Nordic countries and Estonia. These MSs were also found to have a very low occurrence of *Campylobacter* on broiler carcasses in the EU-wide baseline survey. Generally MSs reporting a high prevalence in broiler flocks also tended to have a high proportion of positive broiler meat samples and vice versa. *Campylobacter* was also regularly detected in cattle but the occurrence was somewhat lower compared to levels in broilers and pigs. In addition, *Campylobacter* was present in other investigated animal species but not at equally high levels. Even though a high *Campylobacter* occurrence was observed in cattle and pigs, a strong decrease during slaughter was observed in the meat samples in a similar manner than in previous years.

The baseline survey on *Campylobacter* carried out in 2008 by EU MSs provided interesting datasets on the prevalence in broiler batches and on broiler carcasses in MSs in the survey. Very large variation within the *Campylobacter* prevalence was detected between the MSs and also for the first time comparable data on the numbers of *Campylobacter* on the carcasses was collected. These data may assist the European Commission and MSs to consider needs for control options to reduce *Campylobacter* in the broiler production. The data is also used by EFSA's Scientific Panel on Biological Hazards in the ongoing quantitative risk assessment of *Campylobacter* in broiler meat.

27 EFSA (European Food Safety Authority), 2005. Scientific Opinion of the Panel on Biological Hazards (BIOHAZ) related to *Campylobacter* in animals and foodstuffs. The EFSA Journal 173, 115 pp.

3. INFORMATION ON SPECIFIC ZOONOSES

3.3 *Listeria*

The bacterial genus *Listeria* currently comprises six species, but human cases of listeriosis are almost exclusively caused by the species *Listeria monocytogenes*. *Listeria* is ubiquitous organisms that are widely distributed in the environment, especially in plant matter and soil. The principal reservoirs of *Listeria* are soil, forage and water. Other reservoirs include infected domestic and wild animals. The main route of transmission to both humans and animals is believed to be through consumption of contaminated food or feed. However, infection can also be transmitted directly from infected animals to humans as well as between humans. Cooking destroys *Listeria*, but the bacteria are known to multiply at temperatures down to +2/+4°C, which makes the occurrence in RTE foods with a relatively long shelf life of particular concern.

In humans severe illness mainly occurs in the unborn child, infants, the elderly and those with compromised immune systems. Symptoms vary, ranging from mild flu-like symptoms and diarrhoea to life threatening infections characterised by septicaemia and meningoencephalitis. In pregnant women the infection can spread to the foetus, which may either be born severely ill or die in the uterus and result in abortion. Illness is often severe and mortality is high. Human infections are rare yet important given the associated high mortality rate. These organisms are among the most important causes of death from food-borne infections in industrialised countries.

In domestic animals (especially sheep and goats) clinical symptoms of listeriosis include encephalitis, abortion, mastitis or septicaemia. However, animals may also commonly be asymptomatic intestinal carriers and shed the organism in significant numbers, contaminating the environment.

Table LI1 presents the countries that have reported data on *Listeria monocytogenes* for 2009.

Table LI1. Overview of MSs reporting **Listeria monocytogenes** ***data, 2009***

Data	Total number of MSs reporting	Countries
Human	26	**All MSs** except PT **Non-MSs**: CH, IS, LI, NO
Food	25	**All MSs** except MT, SE **Non-MSs:** CH, NO
Animals	20	**All MSs** except BE, CY, CZ, DK, MT, SE, SI **Non-MSs:** CH, NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP or own control are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis.

3.3.1 Listeriosis in humans

In 2009, 26 MSs reported 1,645 confirmed human cases of listeriosis (Table LI2). This represented an increase of 264 cases (19 %) compared to 2008. The overall EU notification rate was 0.4 cases per 100,000 population, with the highest country-specific notification rates observed in Denmark and Spain (1.8 and 1.1 cases per 100,000 population respectively). The new appearance of Spain at the top, besides an increase in Spanish cases, is a result of adjusting notification rates with the population coverage of 25 % in the Spanish surveillance system.

Table LI2. Reported listeriosis cases in humans, 2005-2009, and incidence for confirmed cases, 2009

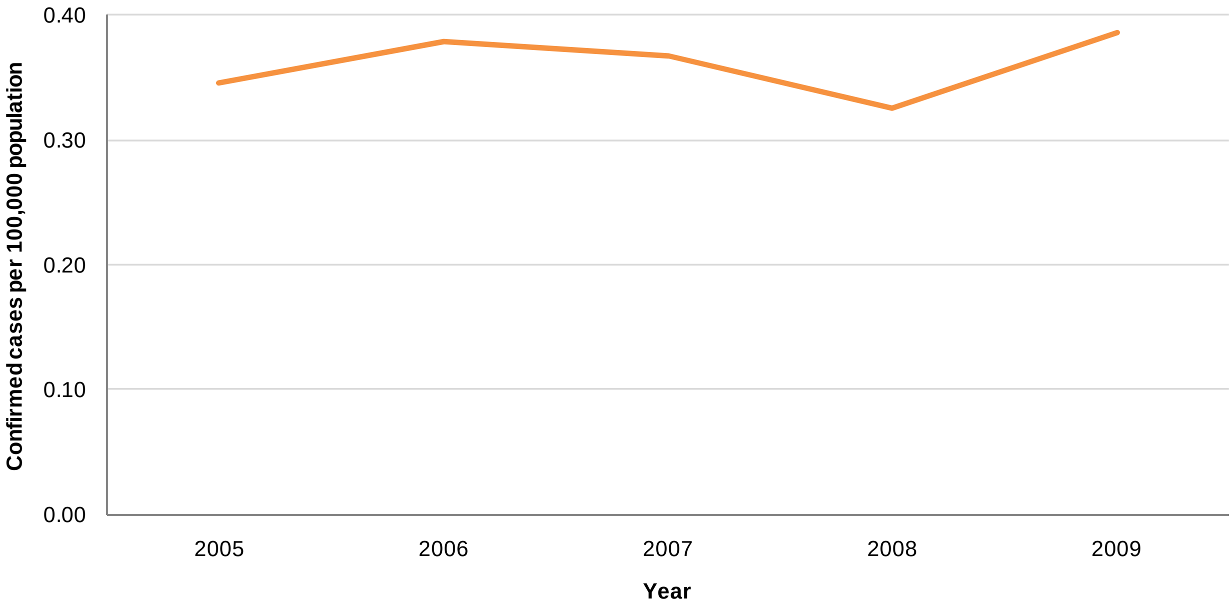
Country	Report Type[1]	2009			2008	2007	2006	2005
		Cases	Confirmed Cases	Confirmed cases/ 100,000	Confirmed Cases			
Austria[4]	C	46	46	0.55	31	20	10	9
Belgium	C	58	58	0.54	64	57	67	62
Bulgaria	A	5	5	0.07	5	11	6	-
Cyprus	U	0	0	0.00	0	0	1	-
Czech Republic	C	32	32	0.31	37	51	78	15
Denmark	C	97	97	1.76	51	58	56	46
Estonia	C	3	3	0.22	8	3	1	2
Finland	C	34	34	0.64	40	40	45	36
France	C	328	328	0.51	276	319	290	221
Germany	C	388	388	0.47	306	356	508	512
Greece	C	4	4	<0.1	1	10	7	8
Hungary	C	16	16	0.16	19	9	14	10
Ireland	C	10	10	0.22	13	21	7	11
Italy	C	88	88	0.15	75	65	51	51
Latvia	C	1	1	<0.1	5	5	2	6
Lithuania	A	5	5	0.15	7	4	4	2
Luxembourg	C	3	3	0.61	1	3	4	0
Malta	U	0	0	0.00	0	0	0	0
Netherlands	C	44	44	0.27	44	68	64	96
Poland	C	32	32	0.08	33	43	28	22
Portugal	-[2]	-	-	-	-	-	-	-
Romania	C	6	6	<0.1	-	0	-	-
Slovakia	C	10	10	0.18	8	9	12	5
Slovenia	C	6	6	0.30	3	4	7	3
Spain[3]	C	121	121	1.06	88	81	78	68
Sweden	C	73	73	0.79	60	56	42	35
United Kingdom	C	235	235	0.38	206	261	208	223
EU Total		**1,645**	**1,645**	**0.36**	**1,381**	**1,554**	**1,590**	**1,443**
Iceland	U	-	0	-	0	4	0	0
Liechtenstein	-	-	-	-	0	0	0	-
Norway	C	31	31	0.65	34	49	27	14
Switzerland[5]	C	41	41	0.53	44	59	76	71

1. A: aggregated data report; C: case-based report; –: No report; U: unspecified.
2. No surveillance system exists.
3. Sistema de Informacion Microbiolgica (SIM), notification rates calculated on estimated coverage, 25 %.
4. New electronic reporting system in place since 2009.
5. Data for 2005-2008 have been updated in comparison to published data following a communication received from Switzerland.

EU notification rate of confirmed cases of listeriosis (based on countries reporting data for five consecutive years) increased again in 2009 after two years of decrease (Figure LI1).

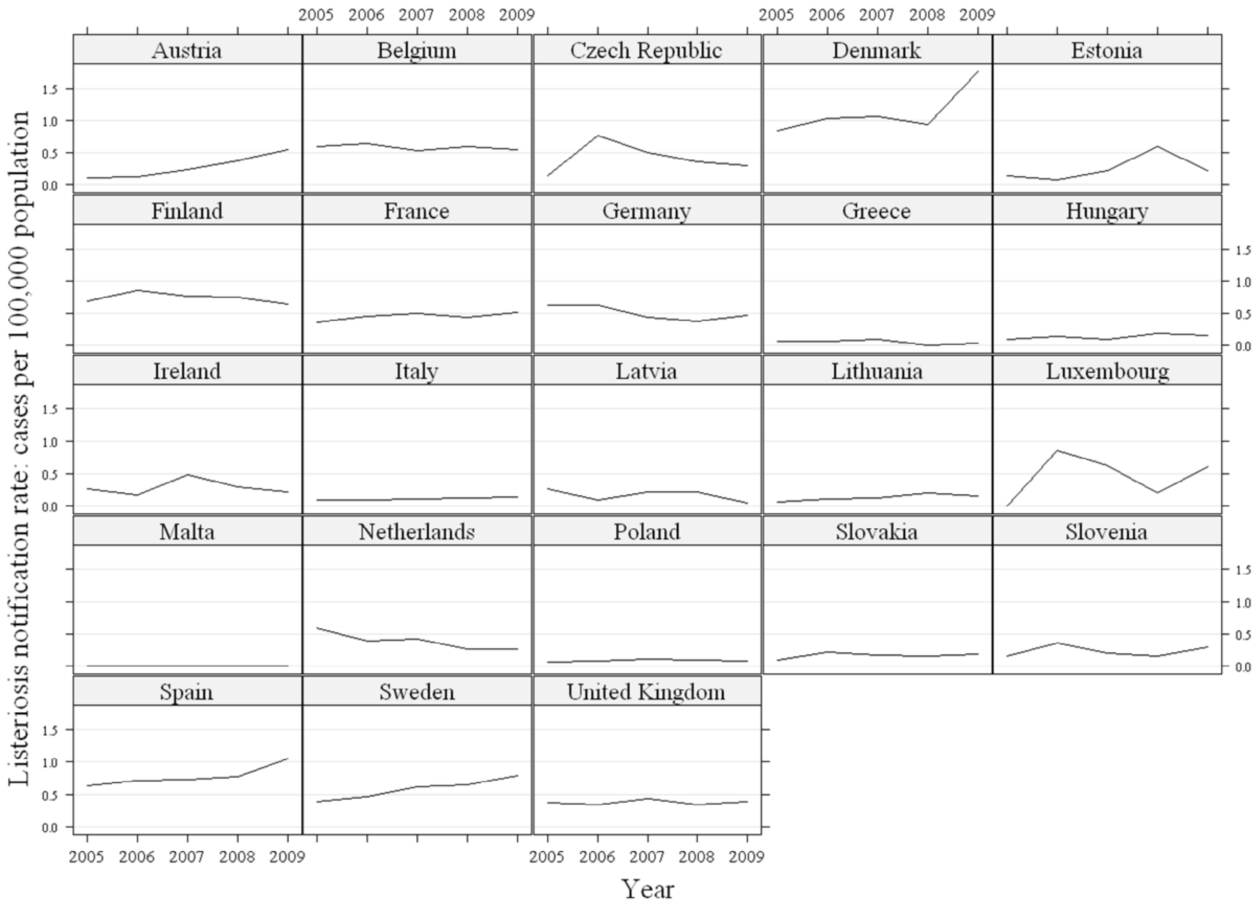
Within each reporting MS, statistically significant increasing trends in listeriosis notification rates from 2005 to 2009 were noted in Austria, Denmark, Hungary, Italy, Spain and Sweden, while statistically significant decreasing trends were noted in the Netherlands (Figure LI2).

Figure LI1. Notification rates of reported confirmed cases of human listeriosis in 23 MSs[1], 2005-2009



1. Includes only MSs with data from five consecutive years: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Greece, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Figure LI2. Notification rates of reported confirmed cases of listeriosis in human per MS (2005-2009)



The age distribution of listeriosis cases in 2009 was similar to that observed in previous years. The notification rate was highest in those aged over 65 years (1.1 cases per 100,000 population), covering 58.5 % of all reported cases. Only 4.2 % (N=78, case-based data) of reported cases were detected in the age group 0-4 years but the majority of these cases (88.5 %) were infants (age <1).

The transmission route was stated for 71 (4.3 %) confirmed cases. Sixty cases were infected with *Listeria monocytogenes* via suspected food and nine cases were pregnancy-associated. One case was reported as person-to-person transmission and one as other transmission. Of the cases infected via food, cheese was mentioned as the suspected vehicle for 14 cases and milk for two cases, while for the remaining cases no information on the food source was provided.

The outcome of the disease was known for 757 confirmed cases (46 %). Of these, 126 cases were reported as deceased due to the disease (16.6 %), with the high case fatality reported in the age groups 45-64 years (19.1 %, 34 deaths in 178 cases) and 65 years and older (18.6 %, 83 deaths in 447 cases).

In total, 98 % of confirmed *L. monocytogenes* cases with known importation status (reported for 75 % of cases) were of domestic origin.

3.3.2 *Listeria* in food

EU legislation (Regulation (EC) No 2073/2005) lays down food safety criteria for *Listeria monocytogenes* in ready-to-eat (RTE) foods. This regulation came into force in January 2006. According to the legal provisions *L. monocytogenes* must not be present in levels above 100 cfu/g during the shelf life of a product. In addition, products in which the growth of the bacterium is possible must not contain *L. monocytogenes* in 25 g at the time they leave the production plant, unless the producer can demonstrate, to the satisfaction of the competent authority, that the product will not exceed the 100 cfu/g limit throughout shelf life. Data reported reflect the Regulation, and investigations have therefore focused on testing RTE foods for compliance with these limits.

In 2009, data on *L. monocytogenes,* in 25 or more samples of food, were reported by 25 MSs and two non-MSs. These data cover a substantial number of food samples and food categories. The data presented in the following chapter focus on RTE foods, where *L. monocytogenes* was detected either by qualitative (absence or presence) or quantitative (enumeration) investigations (findings of *L. monocytogenes* with more than 100 cfu/g) or both.

Compliance with microbiological criteria

The *L. monocytogenes* criteria laid down by Regulation No (EC) 2073/2005, cover primarily RTE food products, and require that:

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

For much of the reported data, it was not evident whether the RTE food tested was able to support the growth of *L. monocytogenes* or not. This information is difficult to collect, because even within the same food category, some products may support growth while others may not, depending on various factors such as the pH, water activity and composition of the specific product. Also, information from studies, carried out by the producers, on the growth capacity of *L. monocytogenes* in individual products was not available. Furthermore, in some cases, it was not possible to establish at which stage in the production chain samples were collected.

Due to the reasons described above, the following assumptions were applied to the analyses:

- for samples reported to be taken at processing, a criterion of absence in 25 g was applied. Samples from hard cheeses and fermented sausages are an exception, as these categories are assumed not to be able to support the growth of *L. monocytogenes*. For these samples the limit ≤100 cfu/g was applied at processing;
- for all investigations, where the sampling stage was not reported, it was assumed that samples were collected from products placed on the market, and the criterion ≤100 cfu/g was applied; and
- for food intended for infants and special medical purposes the criterion absence in 25 g was applied throughout the food chain.

Only investigations including 25 tested units or more were included in analyses. Samples reported as part of HACCP and own check programmes, or data reported as suspect sampling and outbreak investigations were not included for analysis. The results from qualitative examinations have been used to analyse the compliance with the criterion: absence in 25 g, and the results from quantitative analyses have been used to analyse compliance with the limit 100 cfu/g.

For some MSs the *L. monocytogenes* enumeration method was only carried out for the samples which were positive in the *L. monocytogenes* detection method. In these cases in order to avoid overestimation, the proportions of samples with more than 100 cfu/g were calculated using as a denominator the total number of samples tested for the presence (and not for enumeration) of *L. monocytogenes*.

The number of samples in non-compliance with the *L. monocytogenes* criteria is shown in Table LI3. For RTE products on the market, very low proportions of samples were generally found to be non-compliant with the criterion of ≤100 cfu/g. However higher levels of non-compliant samples were reported in samples analysed using the detection method (absence in 25 g) for RTE products at the processing stage.

For single samples of RTE products, sampled at the processing stage, the highest level of non-compliance was observed in RTE products of meat origin other than fermented sausage (6.7 %), in RTE fishery products (6.6 %) and in the category 'other RTE products' (1.8 %). In samples from RTE milk, cheeses and other dairy products, the levels were lower and non-compliance ranged from 0 % to 0.2 % (Table LI3). For batch-based sampling, collected at processing, the highest non-compliance was reported for RTE fishery products (5.3 %), soft and semi-soft cheeses (1.3 %) and in batches from the category 'other RTE products' (1.2 %). Except for less than 0.2 % of batches of RTE products of meat origin other than fermented sausage, all other samples and batches tested at processing were in compliance with the *L. monocytogenes* criteria (for observations with 25 units or more).

The highest levels of non-compliance with the criterion ≤100 cfu/g among single samples collected at retail, were observed in soft and semi-soft cheeses (1.1 %), RTE fishery products (1.0 %) and RTE meat products other than fermented sausage (0.3 %) (Table LI3). For the batch-based sampling at retail the highest non-compliance was reported for RTE fishery products (0.5 %) followed by RTE products of meat origin other than fermented sausage as well as other RTE products (<0.1 %). All other samples and batches tested at retail were in compliance with the *L. monocytogenes* criteria (for observations with 25 units or more).

Figure LI3 presents the proportions of non-compliance of single samples of selected RTE foods in 2006 to 2009. At processing, the proportion of samples of fishery products in non-compliance with the criteria was relatively higher in 2006 (18.6 %) compared to the following years, where the reported level has increased from 4.4 % in 2007 to 6.6 % in 2009. At retail, the level of non-compliance for fishery products was also higher in 2006 and 2007 (1.7 %), and then decreased in 2008, mainly due to large surveys carried out in the United Kingdom with very few samples exceeding the limit. The 2009 data on fishery products at retail is not dominated by large surveys in some MSs, and may therefore be regarded more representative for EU. Nevertheless, the level of non-compliance observed in 2009 in RTE fishery products is less than in 2006 to 2007.

At the processing stage, the level of non-compliance among single samples has generally increased in RTE products of meat origin over the last four years, and decreased in the category of other RTE products. However at retail, no trend was obvious, and the level of non-compliance in these products varied between less than 0.1 % and 0.3 % during the period 2006 to 2009. From 2006 to 2008 the proportion of non-compliance in cheeses tested at processing ranged from 0 % to 0.7 % and at retail from 0.1 % to 1.1 %. At retail none of the single samples of hard cheeses was found to exceed the limit of 100 cfu/g, whereas in soft and semi-soft cheeses a relatively higher level of non-compliance (1.1 %) was detected in 2009.

Overall, the highest levels of non-compliance in 2009 were found in RTE fishery products and RTE products of meat origin other than fermented sausage, followed by 'other RTE products' and cheeses (especially, soft and semi-soft).

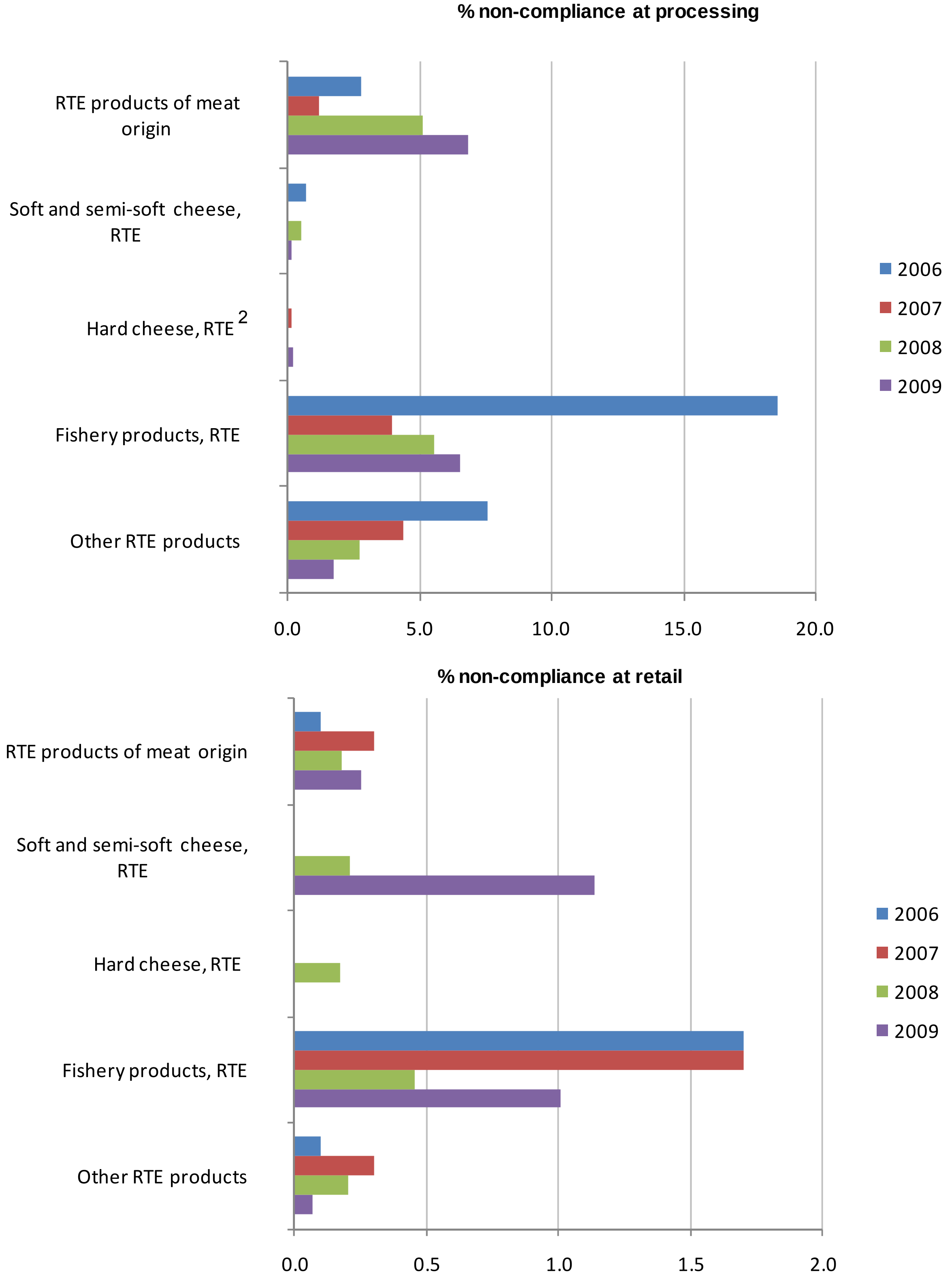
Table LI3. Compliance with the L. monocytogenes criteria laid down by Regulation (EC) No 2073/2005 in food categories in EU, 2009

Food category[1]	Sampling unit	Absence in 25 g		≤ 100 cfu/g	
		Units tested	% in non-compliance	Units tested	% in non-compliance
RTE food intended for infants and for medical purposes					
Processing plant	Single	140	0	-	-
	Batch	72	0	-	-
Retail	Single	225	0	-	-
	Batch	496	0	-	-
RTE products of meat origin other than fermented sausage					
Processing plant	Single	2,250	6.8	-	-
	Batch	165,449	0.2	-	-
Retail	Single	-	-	6,694	0.3
	Batch	-	-	9,387	<0.1
RTE products of meat origin, fermented sausage					
Retail	Single	-	-	85	0
	Batch	-	-	39	0
Milk, RTE		-	-	-	-
At farm	Single	26	7.7	-	-
Processing plant	Single	428	0.2	-	-
	Batch	386	0	-	-
Retail	Single	-	-	329	0
	Batch	-	-	2,202	0
Soft and semi-soft cheeses, RTE					
Processing plant	Single	585	0.2	-	-
	Batch	2,642	1.3	-	-
Retail	Single	-	-	879	1.1
	Batch	-	-	3,503	0
Hard cheeses, RTE					
Processing plant	Single	-	-	392	0.3
	Batch	-	-	56	0
Retail	Single	-	-	2,058	0
	Batch	-	-	8,328	0
Other Dairy products, RTE					
Processing plant	Single	1,963	0	-	-
	Batch	1,754	0	-	-
Retail	Single	-	-	605	0
	Batch	-	-	690	0
Fishery products, RTE					
Processing plant	Single	456	6.6	-	-
	Batch	568	5.3	-	-
Retail	Single	-	-	1,894	1.0
	Batch	-	-	420	0.5
Other RTE products					
Hospital or care home	Batch	152	0	-	-
Processing plant	Single	57	1.8	-	-
	Batch	954	1.2	-	-
Retail	Single	-	-	10,218	<0.1

Note: RTE: ready-to-eat products. Data are only presented for sample size ≥25.

1. Retail include data with unspecified sampling stage.

Figure LI3. Proportion of single samples at processing and retail[1] in non-compliance with EU L. monocytogenes criteria, 2006-2009



Note: RTE: ready-to-eat products. Data are only presented for sample size ≥25.

1. Retail include data with unspecified sampling stage.

2. In 2006, there were no investigations with 25 samples or more reporting results for evaluation of non-compliance in hard cheese.

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

Data on examinations for *L. monocytogenes* in RTE meat products and other RTE products of meat origin were available from 18 MSs. Data categorised according to the origin of the meat are presented in Tables LI4, LI5 and LI6.

Data on RTE meat products and RTE meat preparations of bovine origin, reported by seven MSs, are summarised in Table LI4. The number of units tested, reported by MSs in 2009, was lower than in 2008 (7,510 samples). A total of 1,808 units were investigated qualitatively, and *L. monocytogenes* was detected in 25 g from 1.0 % of these units. The highest occurrence of *L. monocytogenes* at processing was recorded in meat products from Poland (2.6 %). A large investigation was reported from the Czech Republic where 0.6 % of the tested batches of meat products contained *L. monocytogenes*. In total, 1,299 units of RTE meat products were analysed quantitatively at processing and retail. Overall, 0.2 % of RTE meats from bovine meat contained levels of *L. monocytogenes* above 100 cfu/g and all of these were units tested at retail in Ireland and the Netherlands.

Data on RTE products from pig meat was provided by 18 MSs (Table LI5). *L. monocytogenes* was detected in 25 g from 2.6 % of 20,758 units investigated qualitatively, with positive findings ranging from 0 % to 40 %. The highest occurrence at processing was reported by Greece (27.9 %), Poland (21.5 %) and Portugal (19.2 %). Four MSs reported comparable data (with regard to the sampling unit) on the presence of *L. monocytogenes,* in RTE products from pig meat, both from processing plants and retail. In Germany and Ireland an increase in presence was observed along the food chain, whereas in Poland the proportion of positive samples decreased from processing to retail. In Hungary, for products intended to be eaten raw, the presence of *Listeria* decreased from processing to retail, whereas *Listeria* presence increased in unspecified RTE products.

Quantitative investigations of RTE products from pig meat generally revealed the low occurrence of units exceeding 100 cfu/g, however a high proportion of samples containing more than 100 cfu/g was reported by Greece (25.7 %) at processing. Reports of findings of *L. monocytogenes* above 100 cfu/g, in RTE pig meat products, tested at retail, were reported by the Czech Republic, France, Germany, Hungary and Portugal, ranging from 0.2 % to 3.2 % (Table LI5). The overall proportion of observations with counts above 100 cfu/g was 0.2 %, similar to the proportion reported for 2008 (0.3 %).

Ten MSs reported results concerning *L. monocytogenes* in RTE products from broiler meat and two MSs reported on RTE products from turkey meat. Overall, *L. monocytogenes* was found by qualitative analysis in 2.2 % of the 3,207 units of poultry meat products tested, ranging from 0 % to 10.2 % positive units (Table LI6).

Four MSs reported comparable data (with regard to the sampling unit) on the presence of *L. monocytogenes* in poultry meat from both processing and retail. In Ireland an increase in presence was observed in broiler and turkey meat products along the food chain; and this was also the case for turkey meat products from Hungary. However, Germany and Hungary reported a decrease in presence in broiler meat from processing to retail. In Slovakia no broiler meat samples tested positive.

Overall, 0.3 % of the 2,984 units of RTE products from poultry meat analysed quantitatively were found to contain levels of *L. monocytogenes* above 100 cfu/g. The occurrence ranged from 0 % to 10.3 %, the highest proportion reported from broiler meat products sampled at processing in Hungary. Poland reported the largest investigations of broiler meat products collected at processing plants, where 1.4 % of 1,118 samples where found positive, and 0.4 % of 533 samples were found to contain the bacteria above 100 cfu/g.

A summary of proportions of positive units for RTE products of meat origin are presented in Figure LI4. It appears that *L. monocytogenes* was most often found from RTE products from pig meat. For further information on reported data please refer to Level 3 tables.

Table LI4. **L. monocytogenes** ***in ready-to-eat products of bovine meat, 2009***

Country	Sampling unit	Description	Units tested presence	*L. m.* presence in 25 g	Units tested enumeration	> detection but =< 100 cfu/g	*L. m.* > 100 cfu/g
			N	% Pos	N	%	%
At processing/cutting plant							
Czech Republic	Batch	Meat products	1,083	0.6	30	0	0
Poland	Batch	Meat products	233	2.6	-	-	-
Romania	Batch	Meat products	137	0	-	-	-
At retail							
Bulgaria	Batch	Meat products	243	0	727	0	0
Germany	Single	Meat products	55	0	56	0	0
Ireland	Single	Meat products	57	10.5	197	0	0.5
Netherlands	Single	Meat preparation, intended to be eaten raw	-	-	253	0.8	0.4
	Single	Meat products	-	-	36	0	0
Total (7 MSs)			**1,808**	**1.0**	**1,299**	**0.2**	**0.2**

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

Table LI5. ***L. monocytogenes*** ***in ready-to-eat products of pig meat, 2009***

Country	Sampling unit	Description	Units tested presence	*L. m.* presence in 25 g	Units tested enumeration	> detection but =< 100 cfu/g	*L. m.* > 100 cfu/g
			N	% Pos	N	%	%
At processing/cutting plant							
Cyprus	Single	-	435	0	-	-	-
Czech Republic	Batch	-	7,603	2.7	806	0	0
Estonia	Single	-	93	8.6	-	-	-
Germany	Single	-	313	2.9	230	1.3	0
Greece	Single	-	197	27.9	35	25.7	25.7
Hungary[1]	Single	-	127	0	-	-	-
	Single	Intended to be eaten raw	238	9.7	57	8.8	0
Ireland	Single	-	111	0	-	-	-
Latvia[1]	Single	-	31	0	40	0	0
Poland	Batch	-	7,161	1.0	2,609	23.6	0
	Batch	Intended to be eaten raw	65	21.5	-	-	-
Romania	Batch	-	543	0	-	-	-
Portugal	Single	-	78	19.2	78	17.9	1.3
Slovakia	Batch	-	360	1.4	-	-	-
At retail							
Austria	Single	-	155	6.5	145	0.7	0
Bulgaria	Batch	-	945	0.3	5,572	0	0
Czech Republic	Single	-	60	0	60	6.7	0
	Batch	-	-	-	102	0	1.0
France	Single	-	137	1.5	137	0	0.7
Germany	Single	-	567	3.7	1,084	0.6	0.2
Hungary[1]	Single	-	123	3.3	31	3.2	3.2
	Single	Intended to be eaten raw	162	4.9	45	4.4	0
Ireland	Single	-	127	3.1	333	0	0
Netherlands	Single	-	-	-	281	0.7	0
Poland	Single	-	25	40.0	-	-	-
	Batch	-	101	0	57	0	0
Portugal	Batch	-	-	-	876	0	0.7
Romania	Single	-	33	0	-	-	-
Slovakia	Batch	-	-	-	160	0	0
Sampling level not specified							
Portugal	Batch	-	45	0	-	-	-
Spain	Single	-	896	8.1	192	30.7	2.6
United Kingdom	Single	-	27	0	27	0	0
Total (18 MSs)			**20,758**	**2.6**	**12,957**	**5.6**	**0.2**

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

1. Sampling weight 10 g or 25 g.

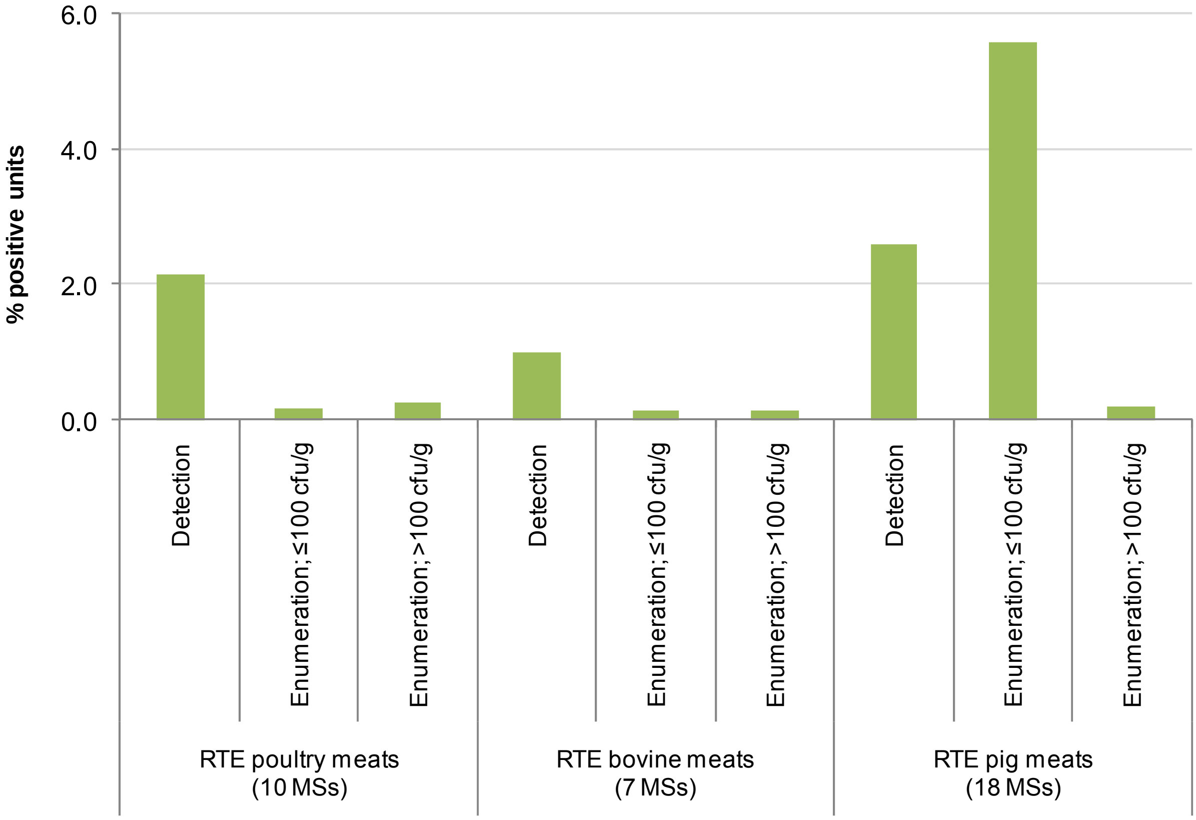
Table LI6. L. monocytogenes *in ready-to-eat products of poultry meat, 2009*

Country	Sampling unit	Description	Units tested presence	*L. m.* presence in 25 g	Units tested enumeration	> detection but =< 100 cfu/g	*L. m.* > 100 cfu/g
			N	% Pos	N	%	%
At processing/cutting plant							
Cyprus	Single	Broiler meat products	50	0	-	-	-
Czech Republic	Batch	Broiler meat products	294	4.4	45	0	0
Germany	Single	Broiler meat products	144	4.2	55	1.8	0
Hungary[1]	Single	Broiler meat products	117	6.8	29	3.4	10.3
	Single	Turkey meat products	76	1.3	-	-	-
Ireland	Single	Broiler meat products	62	0	-	-	-
	Single	Turkey meat products	59	0	-	-	-
Poland	Batch	Broiler meat products	1,118	1.4	533	0.4	0.4
Romania	Batch	Broiler meat products	77	0	-	-	-
Slovakia	Batch	Broiler meat products	25	0	-	-	-
At retail							
Bulgaria	Batch	Broiler meat products	324	0.9	1,397	-	-
Czech Republic	Single	Broiler meat products	36	0	-	-	-
Germany	Single	Broiler meat products	215	3.7	170	0.6	1.2
Hungary[1]	Single	Broiler meat products	162	1.2	-	-	-
	Single	Turkey meat products	196	3.1	-	-	-
Ireland	Single	Broiler meat products	89	1.1	406	0	0
	Single	Turkey meat products	49	10.2	98	0	0
Portugal	Batch	Broiler meat products	-	-	165	0	0
Slovakia	Batch	Broiler meat products	114	0	86	0	1.2
Total (10 MSs)			**3,207**	**2.2**	**2,984**	**0.2**	**0.3**

Note: Data are only presented for sample size ≥25

1. Sampling weight 10 g or 25 g.

***Figure LI4. Proportion of* L. monocytogenes*-positive units in ready-to-eat meat categories in EU, 2009*[1]**



Note: Test results obtained by detection and enumeration methods are presented separately.

RTE poultry meats include data from Bulgaria, Cyprus, Czech Republic, Germany, Hungary, Ireland, Poland, Portugal, Romania and Slovakia (Detection: 9 MSs, Enumeration: 7 MSs).

RTE bovine meats include data from Bulgaria, Czech Republic, Germany, Ireland, Netherlands, Poland and Romania (Detection: 6 MSs, Enumeration: 5 MSs).

RTE pig meats include data from Austria, Bulgaria, Cyprus, Czech Republic, Estonia, France, Germany, Greece, Hungary, Ireland, Latvia, Netherlands, Poland, Portugal, Romania, Slovakia, Spain and United Kingdom (Detection: 18 MSs, Enumeration: 16 MSs).

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

Milk and dairy products

In 2009, 13 MSs and one non-MS (Switzerland) provided large quantity of data on *L. monocytogenes* in cheeses (Tables LI7, LI8, LI9 and LI10) and other RTE dairy products.

The presence of *L. monocytogenes* in soft and semi-soft cheeses made from raw or low heat-treated milk from cows, sheep and goats was detected in three out of nine qualitative investigations (Table LI7). At processing, Belgium reported 2.6 % of the batches positive (cheeses made from cow's milk), and Slovakia reported 1.4 % and 2.4 % batches positive (cheeses made from sheep's milk and cheeses made from mixed milk, respectively). However, levels above 100 cfu/g were not reported from soft and semi-soft cheeses made from raw or low heat-treated milk.

In the case of soft and semi-soft cheeses made from pasteurised milk, a substantial amount of data was reported (Table LI8). A total of 3,267 samples of cheeses made with milk from cows were analysed qualitatively by MSs and 1.3 % were found to be contaminated with *L. monocytogenes*. The proportion of positive findings ranged from 0 % to 2.2 %, the highest ones reported by Germany and Slovakia. A total of 609 samples of soft and semi-soft cheeses, made from pasteurised goat's and sheep's milk, were investigated qualitatively. Presence of *L. monocytogenes* was not reported in any of these samples. In contrast to the reported results from soft and semi-soft cheese made from raw or low heat-treated cow's milk, levels above 100 cfu/g were reported for cheeses made from pasteurised milk. Germany reported that 2.1 % of the samples from retail contained the bacteria above 100 cfu/g and the Czech Republic found 0.2 % of such samples at processing. Levels above 100 cfu/g were not reported for soft and semi-soft cheese made from pasteurised milk from sheep and goats.

Hard cheeses have also been the subject of a number of reported investigations. The results regarding hard cheeses made from raw or low heat-treated milk are shown in Table LI9 and the results for hard cheese made from pasteurised milk are shown in Table LI10. It appears that these cheeses may occasionally harbour *L. monocytogenes*, however, very rarely in levels above 100 cfu/g. Germany reported 4.0 % and 0.4 % *L. monocytogenes* positive samples for hard cheese made from unpasteurised cow's milk, tested at processing plants, and at retail, respectively. Levels above 100 cfu/g were not reported. Germany also reported investigations of hard cheeses made from pasteurised cow's milk, with findings of 0.4 % of positive samples collected at processing plants, and 0.4 % positive at retail. Germany also reported 0.3 % of 366 samples of hard cheeses made from pasteurised cow's milk (tested at processing) to contain *L. monocytogenes* above 100 cfu/g.

It appears that *L. monocytogenes* is only rarely detected in qualitative investigations of cheeses in EU MSs, and the numbers of the bacteria seldom reach levels above 100 cfu/g. Nevertheless, the bacterium was isolated both from cheeses made from raw or low heat-treated milk and pasteurised milk as well as from soft/semi-soft cheeses and hard cheeses (Tables LI7-10). From the data for 2007 and 2008, it was observed that *L. monocytogenes* was most often detected in soft and semi-soft cheeses made from pasteurised milk as compared to cheeses made from unpasteurised milk. This also seems to be the case in 2009.

A summary of tested units and proportion of positive units for cheeses are presented in Figure LI5. For further information on reported data please refer to Level 3 tables.

Table LI7. *L. monocytogenes in soft and semi-soft cheeses made from raw or low heat-treated milk, 2009*

Country	Sampling unit	Description	Units tested presence	*L. m.* presence in 25 g	Units tested enumeration	> detection =< 100 cfu/g	*L. m.* > 100 cfu/g
			N	% Pos	N	%	%
Cheeses made from milk from cows							
Belgium[1]	Batch	At processing plant	38	2.6	-	-	-
Bulgaria	Batch	At retail	105	0	421	0	0
Czech	Batch	At processing plant	91	0	-	-	-
Germany	Single	At retail	94	0	135	0	0
Total cheeses made from milk from cows (4 MSs)			**328**	**0.3**	**556**	**0**	**0**
Cheeses made from milk from sheep and goats							
Greece	Single	Goat's milk, at processing plant	40	0	-	-	-
Portugal	Single	Sheep's milk, at processing plant	32	0	32	0	0
Slovakia[2]	Batch	Sheep's milk, at processing plant	289	1.4	75	0	0
	Batch	Sheep's milk at retail	-	-	25	0	0
Total cheeses made from milk from sheep and goats (3 MSs)			**361**	**1.1**	**132**	**0**	**0**
Switzerland	Single	Goat's milk, at processing plant	44	0	-	-	-
Cheeses made from mixed milk from cows, sheep and/or goats							
Slovakia[2]	Batch	Mixed from cows, sheep and /or goats, at processing plant	41	2.4	-	-	-
	Batch	Mixed from cows, sheep and /or goats, at retail	-	-	87	0	0
Total cheeses made from mixed milk (1 MS)			**41**	**2.4**	**87**	**0**	**0**

Note: Data are only presented for sample size ≥25. Carcass swabs are included in fresh meat.

1. Sampling weight 1 g or 25 g.
2. Sampling weight 10 g or 25 g.

*Table LI8. **L. monocytogenes** in soft and semi-soft cheeses made from pasteurised milk, 2009*

Country	Sampling unit	Description	Units tested presence	*L. m.* presence in 25 g	Units tested enumeration	> detection =< 100 cfu/g	*L. m.* > 100 cfu/g
			N	% Pos	N	%	%
Cheeses made from milk from cows							
Belgium	Batch	At processing plant	73	0	29	3.4	0
	Batch	At retail	-	-	80	0	0
Bulgaria	Batch	At retail	410	0	2,050	0	0
Czech Republic	Batch	At processing plant	1,876	1.3	1,042	0	0.2
	Batch	At retail	-	-	51	0	0
Germany	Single	At processing plant	46	2.2	-	-	-
	Single	At retail	550	2.2	466	2.1	2.1
Hungary	Single	At processing plant	78	0	-	-	-
	Single	At retail	-	-	72	0	0
Romania	Batch	At processing plant	56	0	-	-	-
Slovakia	Batch	At processing plant	178	2.2	-	-	-
	Batch	At retail	-	-	114	0	0
Total cheeses made from milk from cows (7 MSs)			**3,267**	**1.3**	**3,904**	**0.3**	**0.3**
Switzerland	Single	At processing plant	66	0	-	-	-
Cheeses made from milk from sheep and goats							
Bulgaria	Batch	Goat's milk, at retail	60	0	316	0	0
	Batch	Sheep's milk, at retail	54	0	359	0	0
Germany	Single	Goat's milk, at retail	-	-	32	0	0
	Single	Sheep's milk, at retail	-	-	41	0	0
Greece	Single	Sheep's milk, at retail	495	0	50	0	0
Total cheeses made from milk from sheep and goats (3 MSs)			**609**	0	**798**	0	0
Cheeses made from unspecified milk or mixed milk from cows, sheep and/or goats							
Cyprus	Single	Mixed from cows, sheep and /or goats, at processing plant	50	0	-	-	-
Ireland	Single	Unspecified, at processing plant	95	0	-	-	-
Total cheeses made from mixed or unspecified milk (2 MSs)			**145**	0	**-**	-	-

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

Table LI9. ***L. monocytogenes** in hard cheeses made from raw or low heat-treated milk, 2009*

Country	Sampling unit	Description	Units tested presence	*L. m.* presence in 25 g	Units tested enumeration	> detection =< 100 cfu/g	*L. m.* > 100 cfu/g
			N	% Pos	N	%	%
Cheeses made from milk from cows							
Bulgaria	Batch	At retail	190	0	571	0	0
Czech Republic	Batch	At processing plant	-	-	31	0	0
Germany	Single	At processing plant	25	4.0	26	0	0
	Single	At retail	278	0.4	217	0.5	0
Romania	Batch	At processing plant	179	0	-	-	-
	Single	At retail	195	0	-	-	-
Total hard cheeses made from milk from cows (4 MSs)			**867**	**0.2**	**845**	**0.1**	**0**
Cheeses made from milk from sheep and goats							
Bulgaria	Batch	Sheep's milk, at retail	-	-	95	0	0
Romania	Batch	Sheep's milk, at processing plant	39	0	-	-	-
	Single	Sheep's milk, at retail	95	0	-	-	-
Total hard cheeses made from milk from sheep and goats (2 MSs)			**134**	**0**	**95**	**0**	**0**

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

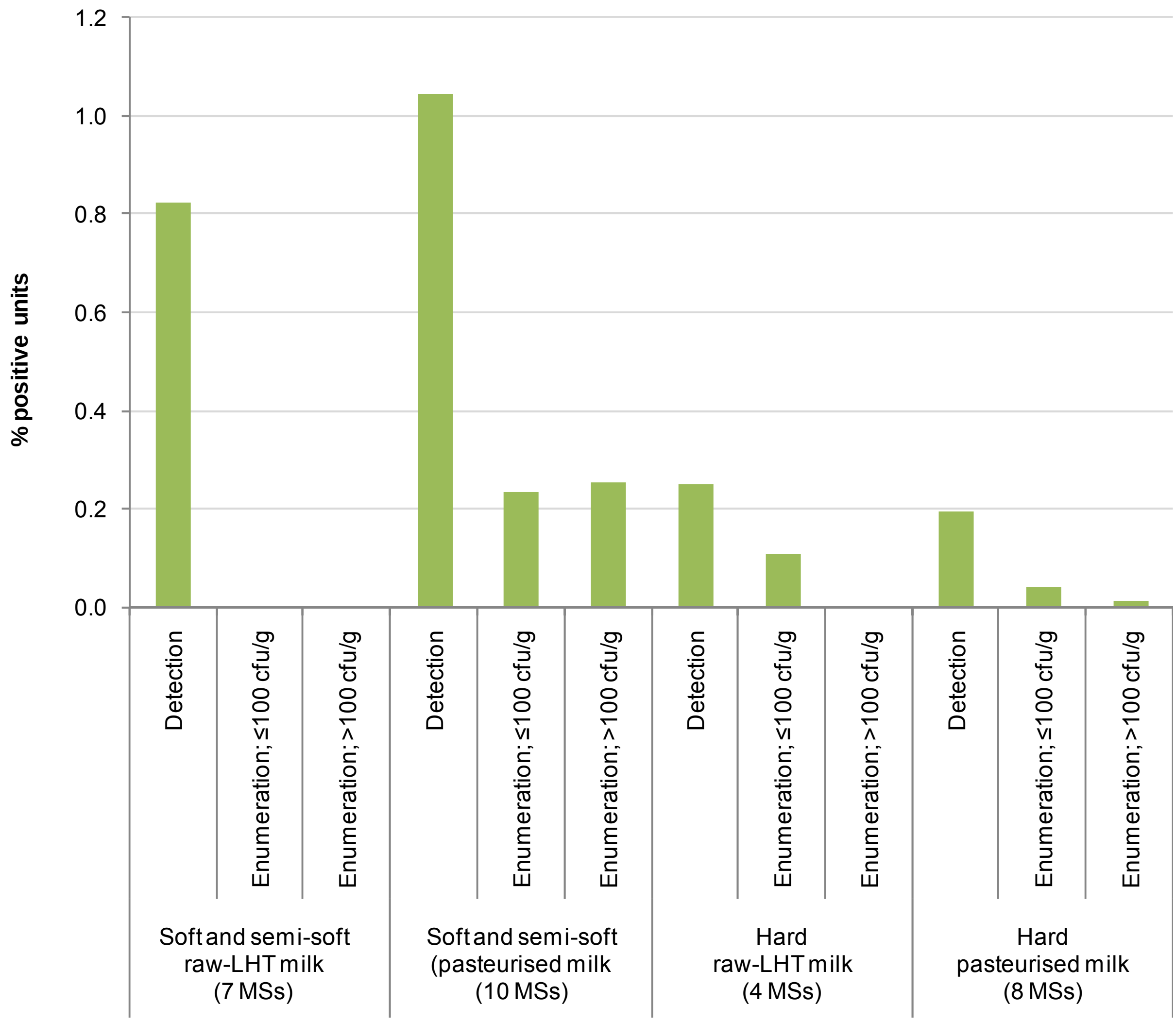
Table LI10. **L. monocytogenes** *in hard cheeses made from pasteurised milk, 2009*

Country	Sampling unit	Description	Units Tested Presence	*L. m.* presence in 25 g	Units Tested Enumeration	> detection =< 100 cfu/g	*L. m.* > 100 cfu/g
			N	% Pos	N	%	%
Cheeses made from milk from cows							
Bulgaria	Batch	At retail	1,141	0	5,788	0	0
Czech	Batch	At processing plant	779	0	25	0	0
Germany	Single	At processing plant	754	0.4	366	0	0.3
	Single	At retail	2,507	0.4	1,779	0.2	0
Latvia[1]	Single	At processing plant	100	0	-	-	-
Poland	Batch	At processing plant	56	0	-	-	-
Romania	Batch	At processing plant	130	0	-	-	-
Total hard cheeses made from milk from cows (6 MSs)			**5,467**	**0.2**	**7,958**	**0.1**	**0**
Cheeses made from milk from sheep and goats							
Bulgaria	Batch	Goat's milk, at retail	156	0	467	0	0
	Batch	Sheep's milk, at retail	350	0	1,407	0	0
Germany	Single	Goat's milk, at processing plant	52	0	-	-	-
	Single	Goat's milk, at retail	87	0	25	0	0
	Single	Sheep's milk, at processing plant	30	3.3	-	-	-
	Single	Sheep's milk, at retail	108	0.9	37	2.7	0
Greece	Single	Sheep's milk, at retail	209	0	-	-	-
Total hard cheeses made from milk from sheep and goats (3 MSs)			**992**	**0.2**	**1,936**	**0.1**	**0**
Cheeses made from milk mixed from cows, sheep and goats							
Cyprus	Single	Mixed from cows, sheep and /or goats, at processing plant	787	0	-	-	-
Total hard cheeses made from mixed milk (1 MS)			**787**	**0**	**-**	**-**	**-**

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

1. Sampling weight 10 g or 25 g.

***Figure LI5. Proportion of* L. monocytogenes*-positive units in soft and semi-soft cheeses, and hard cheeses made from raw or low heat-treated milk and pasteurised milk, 2009*[1]**



Note: Test results obtained by detection and enumeration methods are presented separately. LHT: low heat-treated milk; past. milk: pasteurised milk.

Soft and semi-soft cheeses, made from raw-LHT milk, include data from Belgium, Bulgaria, Czech Republic, Germany, Greece, Portugal and Slovakia (Detection: 7 MSs, Enumeration: 4 MSs).

Soft and semi-soft cheeses, made from pasturised milk, include data from Belgium, Bulgaria, Czech Republic, Cyprus, Germany, Greece, Hungary, Ireland, Romania and Slovakia (Detection: 6 MSs, Enumeration: 5 MSs).

Hard cheese, made from raw-LHT milk, include data from Bulgaria, Czech Republic, Germany and Romania (Detection: 3 MSs, Enumeration: 3 MSs).

Hard cheeses, made from pasteurised milk, include data from Bulgaria, Czech Republic, Cyprus, Germany, Greece, Latvia, Poland and Romania (Detection: 8 MSs, Enumeration: 3 MSs).

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

Fishery products

In 2009, 14 MSs reported data on findings of *L. monocytogenes* in RTE fish products (Table LI11). The products tested were mainly smoked fish.

The presence of *L. monocytogenes* in fish products was detected in 12 out of 14 qualitative investigations. In 2009, a total of 2,066 samples were tested qualitatively and 7.0 % were found positive for *L. monocytogenes*, compared to 9.8 % in 2008. Relatively high proportions of *L. monocytogenes* positive samples (qualitative examinations) were reported at retail by Slovenia with 35.0 % of 40 samples of smoked fish positive, and by Finland with 28.1 % positive of 64 samples of gravad fish products packaged in a vacuum or modified atmosphere.

Five of 12 investigations reported levels *of L. monocytogenes* above 100 cfu/g. Overall, 0.6 % of 1,965 samples tested quantitatively were found to exceed the limit of 100 cfu/g, compared to 0.5 % in 2008. The proportion of samples containing the bacteria above the limit of 100 cfu/g ranged from 0.7 % to 2.5 % in samples of smoked fish from Slovenia.

A summary of tested units and proportion of tested units for different types of fishery products are set out in Figure LI6. In crustaceans and other fishery products *L. monocytogenes* was detected less often. For further information on reported data please refer to Level 3 tables.

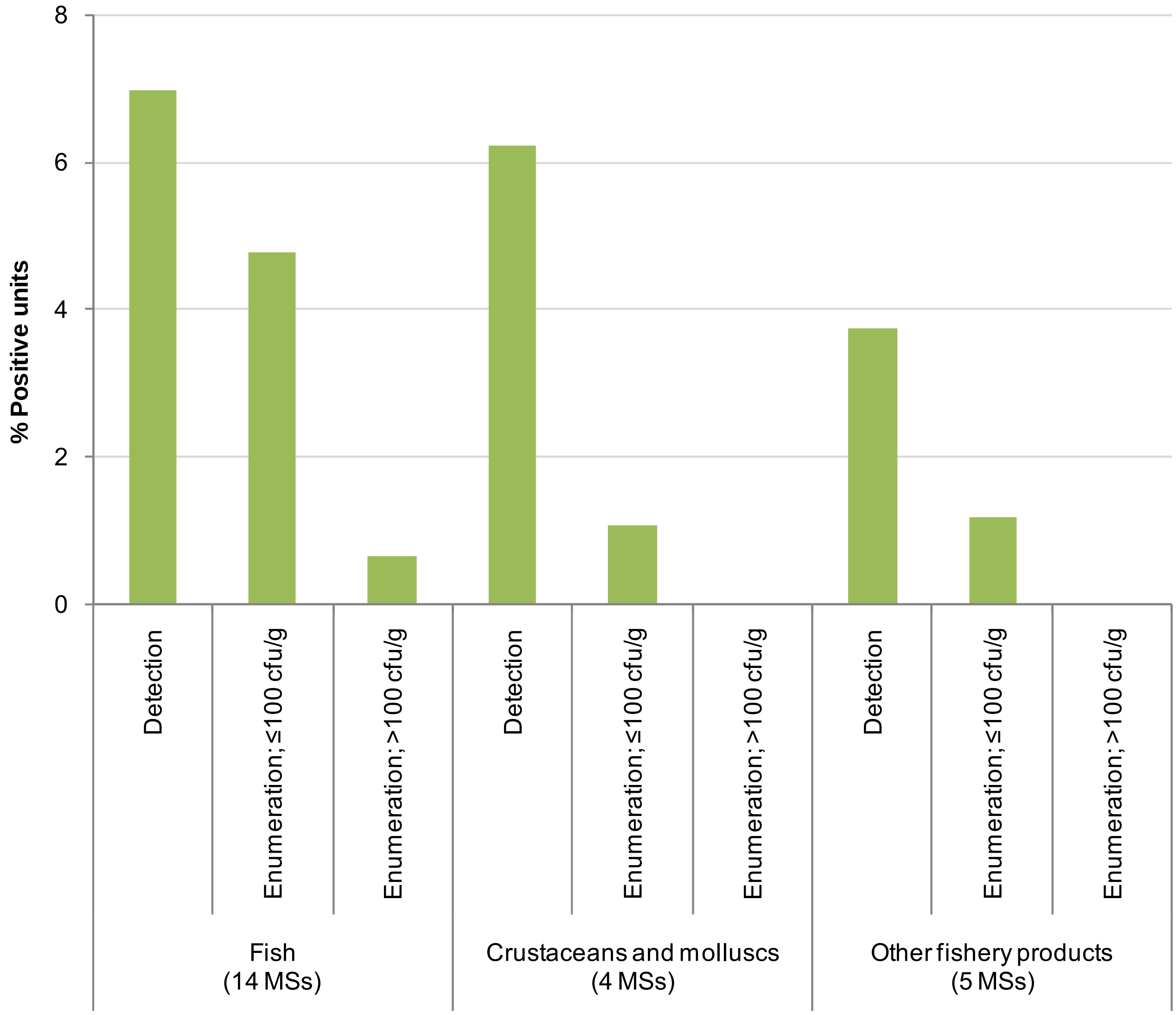
Table LI11. **L. monocytogenes** ***in ready-to-eat fish products, 2009***

Country	Sampling unit	Description	Units tested presence	*L. m.* presence in 25 g	Units tested enumeration	> detection but =< 100 cfu/g	*L. m.* > 100 cfu/g
			N	% Pos	N	%	%
Austria	Single	Smoked, at retail	273	10.3	273	0	0.7
Belgium[1]	Batch	Smoked, at retail	-	-	199	0.5	1.0
Bulgaria	Batch	Smoked, at retail	42	7.1	165	-	-
Cyprus	Single	Smoked, at processing plant	30	10.0	-	-	-
Czech Republic	Batch	Marinated, at retail	-	-	27	0	0
	Batch	Smoked, at processing plant	99	8.1	87	0	0
Finland[2]	Single	Gravad/slightly salted, at retail	64	28.1	64	28.1	0
	Single	Cold-smoked, at retail	49	18.4	49	18.4	0
Germany	Single	Smoked, at processing plant	219	4.1	153	1.3	0.7
	Single	Smoked, at retail	577	2.8	664	0.6	0.9
Hungary[3]	Single	Smoked, at retail	46	0	-	-	-
Ireland	Single	Smoked	117	10.3	-	-	-
Latvia	Single	Smoked	-	-	30	0	0
Poland	Batch	Smoked, at processing plant	419	5.3	173	28.3	0
Romania	Batch	Smoked, at processing plant	50	0	-	-	-
Slovenia[4]	Single	Smoked, at retail	40	35.0	40	32.5	2.5
United Kingdom	Single	Smoked, at retail	41	4.9	41	4.9	0
Total fish (14 MSs)			**2,066**	**7.0**	**1,965**	**5.0**	**0.6**

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

1. Sampling weight 1 g.
2. Only samples of fish products packaged in a vacuum or modified atmosphere.
3. Sampling weight 10 g or 25 g.
4. Pooled data of five samples.

***Figure LI6. Proportion of* L. monocytogenes*-positive units in ready-to-eat fishery products categories in EU, 2009*[1]**



Note: Test results obtained by detection and enumeration methods are presented separately.

Fish include data from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Finland, Germany, Hungary, Ireland, Latvia, Poland, Romania, Slovenia and United Kingdom (Detection: 12 MSs, Enumeration: 9 MSs).

Crustacean and molluscs include data from Bulgaria, Germany, Hungary and Netherlands (Detection: 2 MSs, Enumeration: 3 MSs).

Other fishery products include data from Austria, Estonia, Hungary, Ireland and Spain (Detection: 5 MSs, Enumeration: 3 MSs).

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

Other ready-to-eat products

A substantial number of investigations were reported on *L. monocytogenes* in other RTE products, such as salads, sandwiches, sauces and soups.

In the categories "RTE salads", "sandwiches" and "fruit and vegetables", findings of *L. monocytogenes* were quite commonly reported in most of the investigations using qualitative analyses, but findings of levels above 100 cfu/g were rare, and the highest frequencies of levels above 100 cfu/g were 1.9 % to 2.3 %, in samples of sandwiches from the Czech Republic (batches at retail) and Hungary (single samples), respectively.

For further information on reported data please refer to Level 3 tables.

3.3.3 *Listeria* in animals

In 2009, eight MSs and one non-MS (Norway) reported qualitative data on *Listeria* in animals. *L. monocytogenes* and *Listeria* spp. were detected by several MSs from different animal species. The highest proportions of positive findings were found in sheep, goats and cattle. Germany, Ireland and Italy reported most of the data.

Germany reported that 0 % of 266 broiler flocks, 0.2 % of 621 pig herds, 10.5 % of 564 cattle herds, 7.2 % of 97 goat herds and 7.6 % of 251 sheep herds were found positive for *L. monocytogenes*.

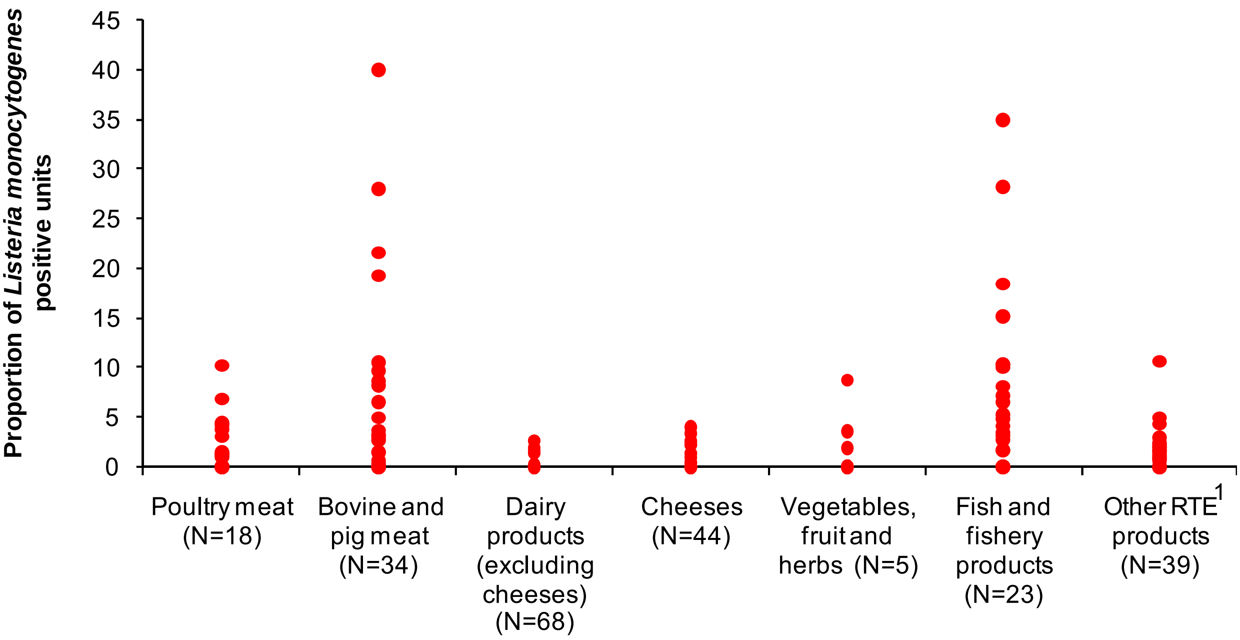
Ireland reported findings of *L. monocytogenes* in 0 % of 257 broilers, <0.1 % of 6,596 bovine animals (cattle), 1.0 % of 103 goats and 0.5 % of 1,279 sheep. Italy reported findings of *Listeria* spp. (unspecified) in cattle (2.1 % of 381 animals), goats (2.5 % in 122 flocks) and sheep (2.1 % in 380 flocks).

For further information on reported data please refer to Level 3 tables.

3.3.4 Overview of *Listeria* in food products

Figure LI7 provides an overview of the proportions of positive samples from the qualitative investigations of different food categories. The majority of samples were collected from meat products, cheeses and fishery products, as in previous years.

Figure LI7. Proportion of* L. monocytogenes*-positive samples by ready-to-eat food category, 2009



Note: Data are based on results obtained by detection method. Data are only presented for sample size ≥25.

Each point represents a MS investigation.

1. Other RTE products include sandwiches and other processed food, other RTE foods, nuts and nuts products, RTE salads, bakery products, confectionery products and pastes, cereals and meals, sweets, sauces and dressings, soups, fermented sausages from wild game/land animals, other products of animal origin including gelatin and collagen.

3.3.5 Discussion

Human listeriosis is a relatively rare but serious zoonotic disease, transmitted mainly via food, with high morbidity and mortality in vulnerable populations. In 2009, 1,645 confirmed human cases were reported in EU. The reported case-fatality rate was 17 % for those cases where this information was available. The majority of fatalities were reported in 45 year olds and older. The decrease in EU notification rate observed in 2007 and 2008 was unfortunately not continued in 2009 when instead a 19 % increase of confirmed cases was observed compared with 2008. A significant increasing trend over the past five years was also observed in six MSs.

Identified food-borne outbreaks due to *Listeria* are relatively rare and in 2009 only three verified *Listeria* outbreaks were reported. These three outbreaks however included eleven fatal cases, which represents almost half the number of deaths reported for all verified food-borne outbreaks in EU (23 fatal cases). The identified food vehicles were cheese and pig meat.

A wide range of different kinds of foodstuffs can be contaminated with *L. monocytogenes*. For a healthy human population, foods that contain less than 100 cfu/g are considered to pose a negligible risk, and therefore the Community microbiological criteria for *L. monocytogenes* in RTE food is set as ≤100 cfu/g for RTE products on the market.

Similar to previous years, MSs reported substantial numbers of food samples tested for *L. monocytogenes.* The proportion of samples exceeding the legal safety limit of 100 cfu/g was low as has been the case in earlier years. The highest proportions of units over the 100 cfu/g limit were observed in RTE fishery products, mainly in smoked fish, where up to 2.5 % of the samples were exceeding the limit at MS level, and an overall proportion of 0.6 % at EU level. RTE fishery products were also identified as the RTE food category having most often units exceeding the limit of 100 cfu/g in the previous years. In cheeses, RTE meat products and other RTE products analysed, such as RTE salads and sandwiches, the overall reported proportion of units over the 100 cfu/lg limit was at the same levels as the three previous years, generally at very low level of 0.3 % or less. In case of cheeses, a higher level of non-compliance was observed in soft and semi-soft cheeses (1.1 %).

In 2010 and 2011, an EU-wide survey on *L. monocytogenes* in RTE food is being carried out, and the food categories targeted in the survey are smoked and gravad fish, soft and semi-soft cheeses, and heat-treated meat products that have been handled between the heat treatment and packaging. During the same period, *Listeria* isolates are also collected from human cases in 18 MSs. This survey will provide further valuable information on the occurrence of *L. monocytogenes* in these RTE food categories perceived as being at high risk regarding *Listeria* contamination. The typing of both food and human isolates will also shed light on which strain characteristics that are important in food-borne listeriosis in EU.

L. monocytogenes was also reported from various animal species in 2009, demonstrating that animals, especially ruminants, act as a reservoir of *Listeria* bacteria although they rarely serve as a direct source of human infections.

3. INFORMATION ON SPECIFIC ZOONOSES

3.4 Tuberculosis due to *Mycobacterium bovis*

Tuberculosis is a serious disease of humans and animals caused by the bacterial species of the family *Mycobacteriaceae*, more specifically by species in the *Mycobacterium tuberculosis* complex. This group includes *Mycobacterium bovis* responsible for bovine tuberculosis. This agent is also capable of infecting a wide range of warm-blooded animals, including humans. In humans, infection with *M. bovis* causes a disease that is very similar to infections with *M. tuberculosis*, the primary agent of human tuberculosis. Furthermore, the recently defined *M. caprae* also causes tuberculosis among animals, and to a limited extent in humans.

The main transmission routes of *M. bovis* to humans are through contaminated food (especially raw milk and raw milk products) or through direct contact with infected animals. A number of wildlife animal species, such as deer, wild boar, badgers and the European bison, might contribute to the spread and/or maintenance of *M. bovis* infection in cattle.

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

Table TB1. Overview of countries reporting data for tuberculosis due to* Mycobacterium bovis *for humans (2008) and animals (2009)

Data	Total number of MSs reporting	Countries
Human[1]	25	**All MSs** except AT, DK **Non MSs:** CH, IS, NO
Animal	27	**All MSs** **Non MSs:** CH, NO

Note: In the following chapter, only countries reporting 25 samples or more have been included for analyses.

1. Includes 2008 data for *M. bovis* reported to TESSy. Data from 2009 were not available in TESSy at the time of production of this report

3.4.1 *M. bovis* in humans

Mycobacterium bovis cases in 2009 were not reported to the TESSy database by July 2010, at the time of the production of this report. Therefore, the figures set out below are based on 2008 data as available in TESSy.

The number of confirmed cases of human tuberculosis due to *M. bovis* increased by 7.5 % in 2008 (N=115) compared to 2007 (N=107) (Table TB2). Five countries, Germany, Ireland, the Netherlands, Spain and the United Kingdom accounted for 94.8 % of confirmed cases reported in 2008. Moreover, 15.7 % of confirmed cases, including a reported case in a one-year old male, were reported by the Netherlands that is officially bovine tuberculosis-free. As in previous years, the highest rate of tuberculosis due to *M. bovis* was in individuals aged 65 and over (0.12 confirmed cases per 100,000 population).

A wide variability in reporting exists between countries, thereby limiting meaningful data interpretation.

Table TB2. Reported tuberculosis cases due to* M. bovis *in humans and notification rates[1] for confirmed cases in 2008-2007 (TESSy), in 2006 (EuroTB), and reported cases from 2004-2005 (CSR and EuroTB). OTF[2] status is indicated

Country	Report type[3]	2008 (TESSy)			2007	2006	2005	2004
		Total cases	Confirmed cases	Confirmed cases/ 100,000	TESSy	EuroTB		Total no of cases (reported to EuroTB)
Austria (OTF)	-	-	-	-	2	4	6	4 (4)
Belgium (OTF)	C	2	2	0.02	0	2	3	5 (3)
Bulgaria	U	0	0	0	0	-	-	-
Cyprus	U	0	0	0	0	0	0	1 (1)
Czech Republic (OTF)	U	0	0	0	1	0	2	- (2)
Denmark (OTF)	-	-	-	-	1	3	0	2 (2)
Estonia	U	0	0	0	0	0	0	0
Finland(OTF)	U	0	0	0	0	0	0	0
France (OTF)	U	0	0	0	0	-	-	-
Germany (OTF)	C	52	48	0.06	41	50	53	51 (54)
Greece	U	0	0	0	1	-	-	0
Hungary	U	0	0	0	0	0	-	0
Ireland	C	11	11	0.25	6	5	4	5
Italy[4]	C	4	1	<0.01	6	9	7	5 (6)
Latvia	U	0	0	0	0	0	0	0
Lithuania	U	0	0	0	0	-	-	0
Luxembourg (OTF)	U	0	0	0	0	1	0	-
Malta	U	0	0	0	0	0	1	-
Netherlands (OTF)	C	18	18	0.11	9	13	-	- (13)
Poland	U	0	0	-	0	-	-	-
Portugal	C	1	1	0.01	0	0	0	0
Romania	U	0	0	0	0	0	-	-
Slovakia (OTF)	U	0	0	0	0	0	0	0
Slovenia	U	0	0	0	2	0	-	0 (1)
Spain	C	11	11	0.02	11	-	4	4
Sweden (OTF)	C	2	2	0.02	4	2	4	4 (4)
United Kingdom	C	21	21	0.03	24	31	39	21
EU Total		**122**	**115**	**0.02**	**108**	**120**	**123**	**102 (90)**
Iceland	U	0	0	0	0	1	0	-
Norway (OTF)	U	0	0	0	2	0	-	0 (0)

1. EU total is based on population in reporting countries.
2. OTF: Officially Tuberculosis Free.
3. C: case-based report; U: unspecified; –: No report.
4. In Italy, four regions and 20 provinces are OTF.

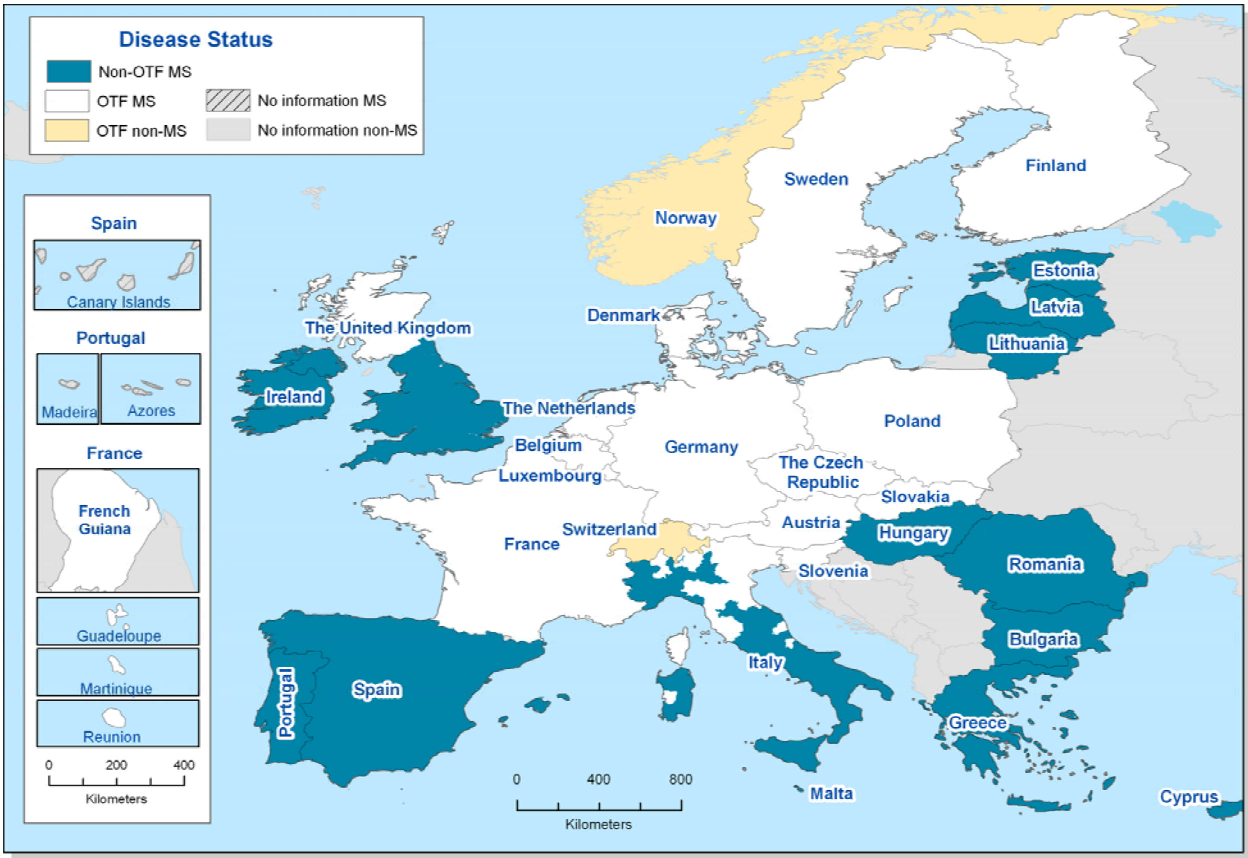
3.4.2 Tuberculosis due to *M. bovis* in cattle

The status regarding freedom from bovine tuberculosis (officially bovine tuberculosis-free, OTF) and the occurrence of the disease in MSs and non-MSs in 2009 are presented in Figures TB1 and TB2. As in 2008, Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Slovakia, Sweden, Norway and Switzerland were OTF in accordance with EU legislation. In 2009, Poland and Slovenia also obtained status as OTF (Decision 2009/342/EC)[28] In the United Kingdom, Scotland was declared to be OTF (Decision 2009/761/EC)[29] and in Italy, the province of Oristano in the Region Sardegna was declared OTF (Decision 2009/342/EC). Italy now has four OTF regions and 17 OTF provinces. More areas in Italy are under approval in 2010.

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

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

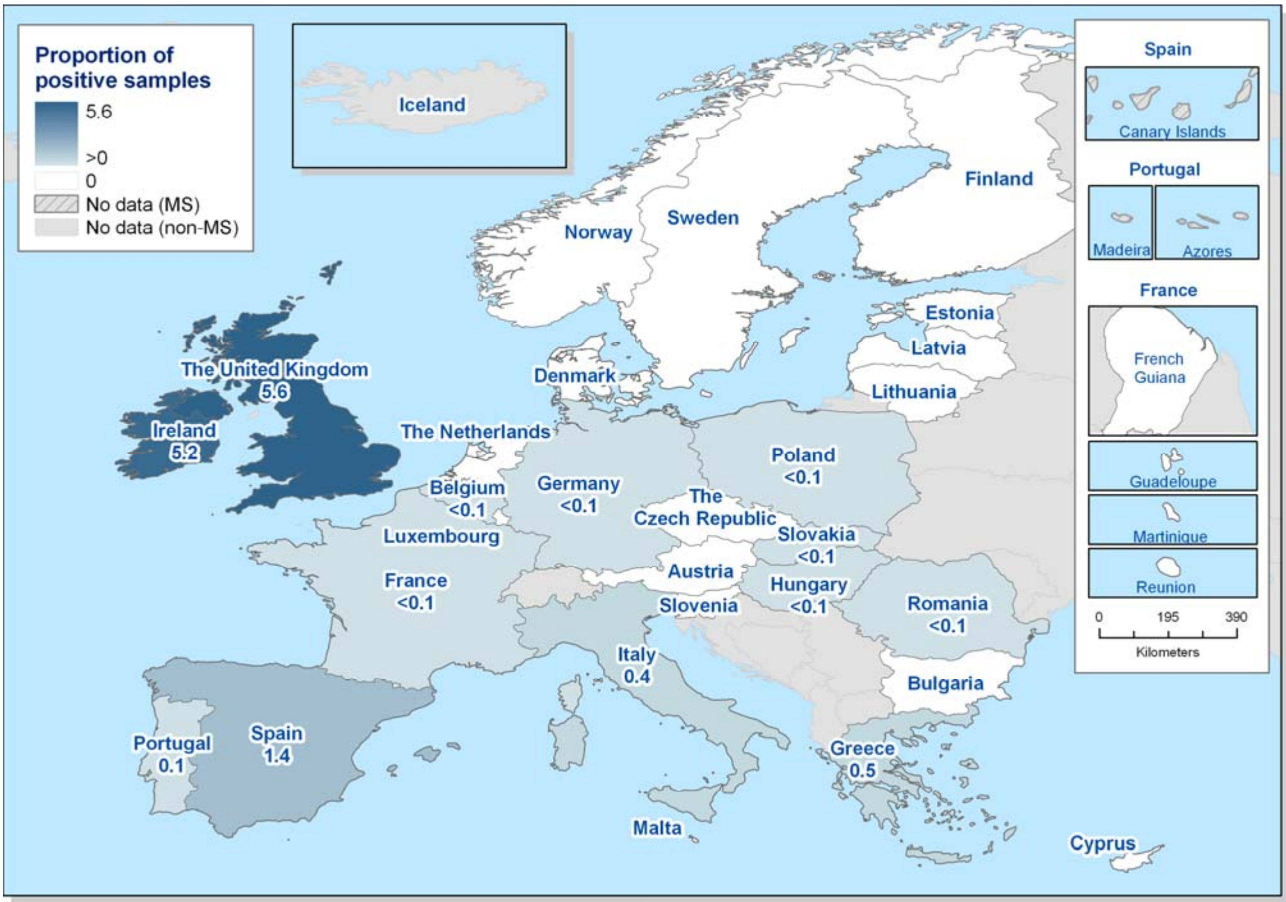
Figure TB1. Status of bovine tubercolosis, 2009



28 Commission Decision 2009/342/EC amending Decision 2003/467/EC as regards the declaration that certain administrative regions of Italy are officially free of bovine tuberculosis, bovine brucellosis and enzootic-bovine-leukosis, that certain administrative regions of Poland are officially free of enzootic-bovine-leukosis and that Poland and Slovenia are officially free of bovine tuberculosis. OJ L 104, 24.4.2009, p. 51–56.

29 Commission Decision 2009/761/EC amending Decision 2003/467/EC as regards the declaration that Scotland is officially free of bovine tuberculosis. OJ L 271, 16.10.2009, p. 34–35.

Figure TB2. Proportion of* M. bovis *infected/positive cattle herds, country based-data, 2009



Trend indicators for tuberculosis

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

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

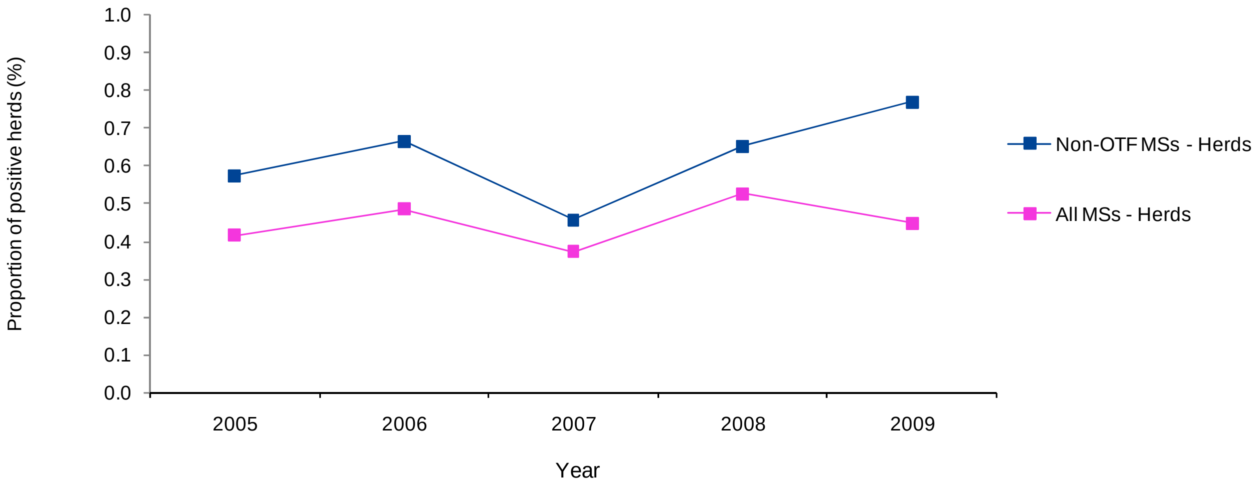
A second indicator **"% tested herds positive"** is "the number of test-positive herds" divided by "the number of tested herds". This indicator gives a more precise picture of the testing results and also estimates the herd prevalence during the whole reporting year. This information is only available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

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

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

During the years 2005 to 2009, the proportion of existing cattle herds infected or positive for *M. bovis* in EU has been relatively stable at a level of around 0.4-0.5 %, ranging from 0.37 % in 2007, when data from Romania was included for the first time, to 0.53 % in 2008 (Figure TB3). As Romania has approximately 1 million cattle herds of which very few are infected, in 2007 the inclusion of Romanian data lead to a decrease in the overall proportion of infected/positive herds in EU. In 2008, EU proportion increased compared to 2007 (0.53 % and 0.37 %, respectively), as well as the proportion of existing infected/positive herds in non-OTF MSs (from 0.46 % in 2007 to 0.65 % in 2008). In 2009, EU proportion of existing cattle herds infected or positive for *M. bovis* decreased from 0.53 % to 0.45 %, while the proportion in the non-OTF MSs slightly increased (from 0.65 % in 2008 to 0.77 % in 2009). However this development is primarily because the two former non-OTF MSs, Poland and Slovenia that were declared OTF during 2009 and had a very low number of infected herds, in 2009 no longer contribute to the non-OTF MSs figure (Figure TB3).

Figure TB3. Proportion of existing cattle herds infected with or positive for* M. bovis*, 2005-2009



Source: All reporting countries that are MSs during the current year are included.

Data from Bulgaria only for 2008 and 2009, Romania for 2007-2009. Data missing from Hungary (2005), Lithuania (2007), Malta (2006). Data from United Kingdom have been updated for the years 2005, 2006, 2007 and 2008.

Officially Tuberculosis-Free Member States and non-Member States

Bovine tuberculosis was not detected in cattle herds in eight of the 13 OTF MSs and Norway and Switzerland, during 2009. In total, out of the 1,439,322 existing herds in the OTF countries, 160 herds were positive for *M. bovis*; in Belgium (two herds), France (97 herds), Germany (23 herds), Poland (37 herds) and Slovakia (one herd). The infected herd from Slovakia originated from imported animals. These findings do not jeopardise the officially free status of these MSs.

Non-Officially Tuberculosis-Free Member States

All reporting non-OTF MSs have national eradication programmes for bovine tuberculosis in place. Table TB3 shows the reported results from MSs that did not receive EU co-financing for their eradication programmes in 2009, while Table TB4 shows results from those MSs with eradication programmes co-financed by EU. In 2009, Ireland, Italy, Portugal, and Spain received co-financing (Decision 2008/897/EC)[30]. Poland also received co-financing, but obtained OTF status during 2009. The proportion of herds under programme in the co-financed areas of non-OTF MSs varied from 64.0 % in Portugal to 100 % in Ireland.

30 Commission Decision 2008/897/EC approving annual and multi-annual programmes and the financial contribution from EU for the eradication, control and monitoring of certain animal diseases and zoonoses presented by the Member States for 2009 and following years. OJ L 322, 2.12.2008, p. 39–49.

Six non-OTF MSs: Bulgaria, Cyprus, Estonia, Latvia, Lithuania and Malta, did not report any infected herds during 2009 (Table TB3).

Slovenia, which has had no positive herds since 2004, was declared OTF in 2009 as well as Poland, which has had less than 0.1 % test-positive herds in the years from 2004 to 2008.

In total, the 14 non-OTF MSs reported 1,962,029 existing bovine herds. In 2009, 0.77 % of them were reported infected with *M. bovis* or positive for *M. bovis* compared to 0.65 % in 2008.

Compared to 2008, all non-co-financed non-OTF MSs, except Northern Ireland, reported approximately the same level or a decreased proportion of infected herds (Table TB3). In Northern Ireland, the number of infected herds more than doubled in 2009 compared to 2008. Both Northern Ireland and Great Britain reported the highest proportions of existing herds infected with bovine tuberculosis among the non-co-financed non-OTF MSs in 2009 (6.12 % and 5.41 % respectively). Ireland started receiving co-financing in 2009.

Table TB3. **Mycobacterium bovis** ***in cattle herds in non-co-financed non-OTF MSs, 2007-2009***

Non-officially free MSs	2009			2009	2008	2007
	No of existing herds	No of officially free herds	No of infected herds	% Existing herds infected		
Bulgaria	127,060	0	0	0	0	0
Cyprus	346	183	0	0	0	0
Estonia[1]	5,618	0	0	0	-	0
Greece	25,081	15,226	114	0.45	0.70	0.43
Hungary	18,500	18,487	3	0.02	0.04	0.03
Ireland[2]	-	-	-	-	5.97	4.37
Latvia	39,994	39,994	0	0	0	0
Lithuania	116,006	116,006	0	0	0	-
Malta	363	363	0	0	0	0
Romania	1,045,803	1,045,703	55	0.01	0	0
Slovenia[3]	-	-	-	-	0	0
United Kingdom (Great Britain)[4,5]	84,515	79,455	4,574	5.41	5.83	4.86
United Kingdom (Northern Ireland)	26,287	23,217	1,608	6.12	2.88	2.67
Total (10 MSs in 2009)	**1,489,573**	**1,338,634**	**6,354**	**0.43**	**0.78**	**0.66**

1. Estonia received co-financing in 2008, results from this year can be found in table TB4.
2. In 2009, Ireland received co-financing, results from this year can be found in table TB4.
3. Slovenia obtained status as OTF during 2009 (Decision 2009/342/EC).
4. During 2009, Scotland obtained status as OTF (Decision 2009/761/EC).
5. For United Kingdom in 2009, the overall proportion of infected/positive herds was 5.58 % (6,182 herds out of 110,802 existing herds). 2007 and 2008 data have been updated in comparison to published data following a recent communication received by United Kingdom.
6. In 2009, Northern Ireland reported data as receiving co-financing for their eradication programme. The number of infected herds presented in the table is the reported number of herds testing positive for *M. bovis*.

Compared to 2008, there was a substantial overall increase in both indicators (the proportions of positive herds among the existing herds and among the tested herds) in the co-financed non-OTF MSs (from 0.25 % and 0.64 % in 2008 to 1.85 % and 2.51 % in 2009, respectively). However, this increase was mainly due to the inclusion of data from Ireland, which in 2009 received co-financing for the first time and had the highest percentages of existing positive herds and herds testing positive (5.17 % and 5.27 %, respectively) (Table TB4). In Italy, both indicators seem to be decreasing, whereas Portugal and Spain observed a slight increase in both indicators, which however have remained at a level comparable to recent years. In Portugal, the percentage of tuberculosis-positive herds has been at very low levels since 2006 and bovine tuberculosis has been rare since 2008. In Italy, during the years 2006 to 2009 the proportion of positive herds among the tested herds has been low and the proportion of positive herds among existing herds also very low and decreasing during the years 2006 to 2009. In Spain, both indicators have been at low levels since 2007.

In 2009, the overall percentage of OTF herds in the co-financed MSs was 89 %. In 2008, this percentage was 49 %, but because different MSs were included, this proportion is not comparable between the two years, due to the inclusion of Ireland and the exclusion of Estonia and Poland in 2009. In Italy, Poland and Spain, the percentage of OTF herds remained stable or increased slightly in 2009 compared to 2008.

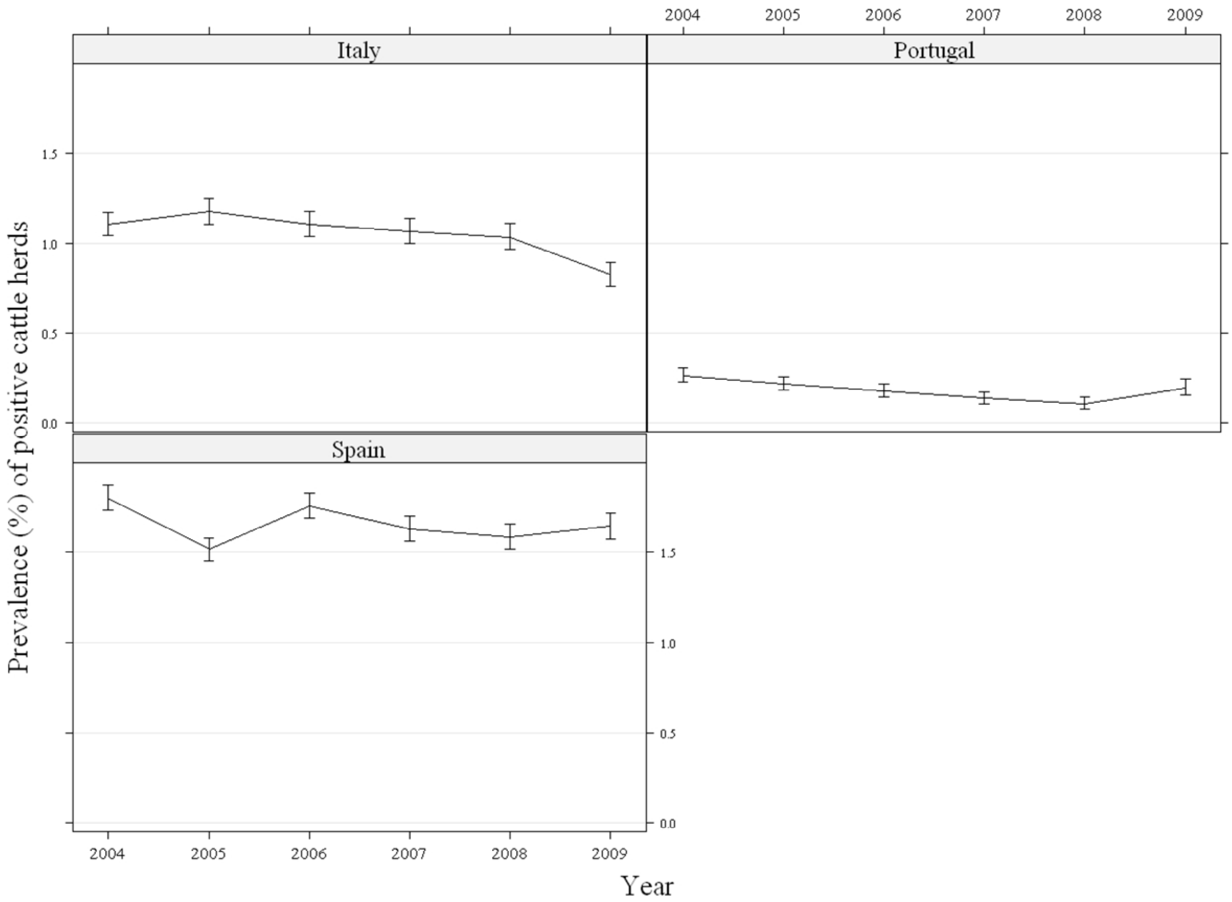
Table TB4.* Mycobacterium bovis *in cattle herds in co-financed non-OTF MSs[1], 2007-2009

Non-officially free MS	2009					2008		2007	
	No of existing herds	No of tested herds	No of positive herds	existing herds positive	tested herds positive	existing herds positive	tested herds positive	existing herds positive	tested herds positive
Estonia[2]	-	-	-	-	-	0	0	-	-
Ireland	117,287	115,142	6,065	5.17	5.27	-	-	-	-
Italy[3]	146,905	73,954	610	0.42	0.82	0.53	1.03	0.57	1.07
Poland[4]	-	-	-	-	-	0.01	0.03	0.01	0.04
Portugal[5]	68,268	38,807	76	0.11	0.20	0.08	0.11	0.10	0.14
Spain	139,996	119,664	1,970	1.41	1.65	1.39	1.59	1.17	1.63
Total (4 MSs in 2009)	**472,456**	**347,567**	**8,721**	**1.85**	**2.51**	**0.25**	**0.64**	**0.25**	**0.65**

1. Only tested and positive herds from regions that have co-financed eradication programmes are included. The number of existing herds include all herds in the MS.
2. Estonia did not receive co-financing in 2009 and 2007, but reported no infected herds among the 5,618 and 7,224 existing herds in 2009 and 2007, respectively.
3. In Italy, four regions and 17 provinces are officially tuberculosis-free. In the provinces that are OTF or do not have a co-financed eradication programme, a total of 10 of 36,120 existing herds were found infected.
4. Poland received co-financing in 2009, but was granted status as OTF during the year (Decision 2009/342/EC).
5. In Portugal, Madeira does not have a co-financed eradication programme and none of the 1,524 existing herds were found infected.

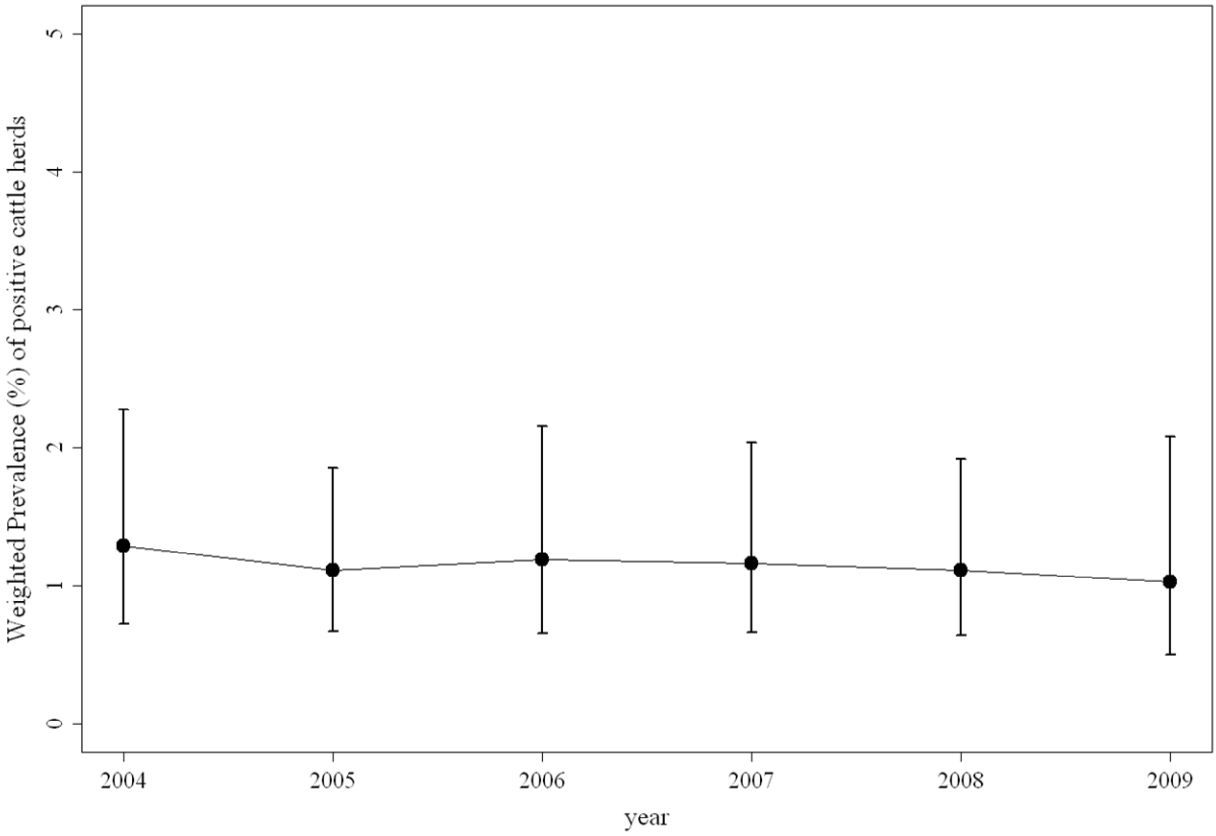
The MS-specific trends in test-positive herds in three co-financed non-OTF MSs from 2004 to 2009 are shown in Figure TB4. The trends seem slightly decreasing during the entire period in Italy, while a slight increase was observed in Portugal and Spain in 2009 following a decreasing trend until 2008. However, a logistic regression analysis showed that overall for this MS group (Italy, Portugal and Spain), the slightly decreasing trend of the weighted prevalence from 2004 to 2009 was statistically significant (Figure TB5). See section 6.2 in the Materials and methods chapter for a description of the statistical methodology.

Figure TB4. Prevalence and 95 % CI of* M. bovis *test-positive cattle herds, at MS level, in three co-financed non-OTF MSs, 2004-2009



Note: Vertical bars indicate exact binomial 95 % confidence intervals.

Figure TB5. Weighted prevalence[1] and 95 % CI of* M. bovis *test-positive cattle herds, overall for three co-financed non-OTF MSs, 2004-2009[2]



Note: Vertical bars indicate 95 % confidence intervals.

1. The MS group prevalence is estimated using weights. The MS-specific weight is the ratio between the number of existing herds and the number of tested herds, per year.
2. Data included from: Italy, Portugal and Spain

3.4.3 Tuberculosis due to *M. bovis* in animal species other than cattle

Surveillance of tuberculosis due to *M. bovis* in all animal species other than cattle is performed mostly by post-mortem meat inspection. In addition, results from clinical investigations are sometimes reported. Findings of *M. bovis* in all animals are notifiable in Denmark, Finland, Latvia, Norway, Portugal and Sweden.

In 2009 *M. bovis* was reported in sheep in Germany, Ireland and the United Kingdom, and in goats in France, Ireland, and Portugal. It was detected in pigs in France, Germany and the United Kingdom.

Surveillance of tuberculosis due to *M. bovis* in farmed deer is also carried out mainly through the post-mortem meat inspection, but some MSs apply also the intradermal tuberculin test in herds. *M. bovis* is notifiable in farmed deer in Austria, Denmark, Finland, Norway, Portugal, Sweden and the United Kingdom. A compulsory control programme is in place in Finland, Denmark, Norway and Sweden. In 2009 one herd of farmed deer was reported positive (France).

Tuberculosis in wildlife is notifiable in Denmark, Finland, Norway, Portugal and Sweden. In wildlife populations *M. bovis* was reported in deer (France, Hungary, Ireland, Portugal, Spain and the United Kingdom), badgers (France, Ireland, Spain and the United Kingdom) and wild boar (France, Italy, Portugal and Spain). *M. bovis* was also found in zoo animals (Ireland and Portugal) as well as in cats (France, Germany and the United Kingdom), dogs (the United Kingdom), foxes (Spain) and alpacas and antelopes (the United Kingdom).

For more detailed information, please see the Level 3 Tables.

The occurrence of *M. bovis* in wildlife and domestic animals other than cattle to a large extent reflects the status of the MSs regarding freedom from bovine tuberculosis, demonstrating the difficulties MSs might encounter, where a natural reservoir for *M. bovis* is present in wildlife, when eradicating this disease in the cattle population.

3.4.4 Discussion

In 2008, the number of reported human cases due to *Mycobacterium bovis* increased by 7.5 % compared with 2007 after a decrease observed between 2006 and 2007. This two-year fluctuation could be seen as part of an adaptation process to the new EU reporting system (TESSy) which was implemented for the *M. bovis* reporting starting from 2007. Five MSs, Germany, Ireland, the Netherlands, Spain and the United Kingdom, accounted for 95 % of the confirmed cases reported in EU in 2008, suggesting that human cases due to *M. bovis* are limited to a small proportion of countries. As in 2007, the majority of reported human cases occurred in people that were 65 years old or older, in both OTF and non-OTF countries. Among the reasons for this could be occupational-associated exposure and long incubation periods before clinical onset. The information on human cases from 2009 is not yet available.

Thirteen MSs are officially free of bovine tuberculosis (OTF) and five of these reported a few infected cattle herds. However, due to the very low number of positive herds, their status as OTF countries is retained.

Six of the 14 non-OTF MSs reported no infected cattle herds in 2009. Of the eight non-OTF MSs reporting positive herds, Ireland and the United Kingdom accounted for the highest prevalence. In Northern Ireland, the prevalence of positive herds increased clearly compared to 2008. In most of the non-OTF MSs the prevalence of bovine tuberculosis remained at a level comparable to 2008. A statistically significant, slightly decreasing trend was observed in the prevalence of cattle herds tested positive for tuberculosis in EU co-financed MSs of Italy, Portugal and Spain for the years 2004 to 2009.

In 2009, at EU level, there was a slight decrease in the proportion of existing infected/positive herds compared to 2008, while in the non-OTF MSs the proportion of existing infected/positive herds increased. However this development is primarily because the two former non-OTF MSs, Poland and Slovenia, which had a very low number of infected herds, were declared OTF during 2009 and therefore moved to the OTF category.

A number of MSs (mainly non-OTF MSs) reported findings of *M. bovis* in other animals than cattle, demonstrating the persistent presence of reservoirs for *M. bovis* in wild animals (badgers, deer, foxes and wild boar). A few findings of *M. bovis* in domestic animals (alpacas, cats, dogs, goats, pigs and sheep) were also reported.

3. INFORMATION ON SPECIFIC ZOONOSES

3.5 *Brucella*

Brucellosis is an infectious disease caused by some bacterial species of the genus *Brucella*. There are six species known to cause human disease and each of these has a specific animal reservoir: *B. melitensis* in goats and sheep, *B. abortus* in cattle, *B. suis* in pigs, *B. canis* in dogs and *B. ceti* and *B. pinnipedialis* in marine animals. Transmission occurs through contact with animals, animal tissue contaminated with the organisms, or through ingestion of contaminated products.

In humans, brucellosis is characterised by flu-like symptoms such as fever, headache and weakness of variable duration. However, severe infections of the central nervous system or endocarditis may occur. Brucellosis can also cause long-lasting or chronic symptoms that include recurrent fever, joint pain, arthritis and fatigue. Of the six species known to cause disease in humans, *B. melitensis* is the most virulent and causes the most severe illness in EU. Humans are usually infected from direct contact with infected animals or via contaminated food, typically raw milk.

In animals, the organisms are localised in the reproductive organs causing sterility and abortions, and are shed in large numbers in urine, milk and placental fluid.

Table BR1 presents the countries reporting data for 2009.

Table BR1. Overview of countries reporting* Brucella *data, 2009

Data	Total number of MSs reporting	Countries
Human	26	**All MSs** except DK **Non MSs:** CH, IS, NO
Food	4	**MSs:** BE, GR, IT, PT
Animal	27	**All MSs** **Non-MSs:** CH, NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP or own control are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis.

3.5.1 Brucellosis in humans

In 2009, 26 MSs provided information on brucellosis in humans. Ten MSs (Cyprus, the Czech Republic, Estonia, Finland, Ireland, Hungary, Latvia, Luxembourg, Malta and Slovakia) reported no human cases. In total, 401 confirmed cases of human brucellosis were reported in EU in 2009 (Table BR2). As in previous years, MSs with the status as officially free of brucellosis in cattle (OBF) as well as in sheep and goats (ObmF) reported low numbers of cases, whereas the non-OBF/non-ObmF MSs, Greece, Portugal and Spain, accounted for 74.8 % of all confirmed cases in 2009 (Table BR2). Italy and Greece were the countries which had the largest decrease (69.3 % and 64.9 % respectively) in confirmed cases in 2009 compared with 2008.

In EU, as the number of reported confirmed cases decreased by 35.2 % in 2009 compared to 2008, the notification rate of brucellosis decreased slightly from 0.1 cases per 100,000 population in 2008 to 0.08 cases per 100,000 population in 2009. A statistically significant decreasing trend was observed during a five-year period, from 2005 to 2009, at EU level. This was based on data received from 20 MSs that reported consistently during these years and were included in the trend analysis (Figure BR1). France, Germany, Italy, and Spain were the countries that had a significant decrease in the brucellosis notification rate. No country observed a significant increase.

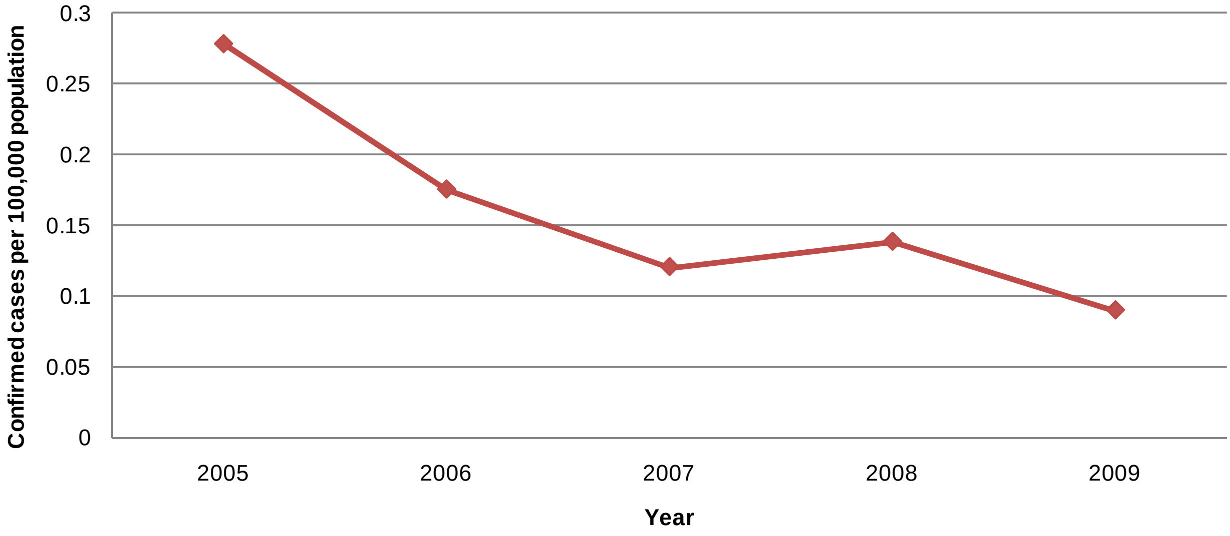
Table BR2. Reported brucellosis cases in humans, 2005-2009 and notification rates for confirmed cases in 2009, OBF and ObmF status* are indicated

Country	Report Type[1]	2009			2008	2007	2006	2005
		Cases	Confirmed Cases (Imported)	Confirmed cases/ 100,000	Confirmed cases			
Austria (OBF/ObmF) [8]	C	2	2 (2)	0.02	5	1	1	2
Belgium (OBF/ObmF)	A	1	1	0.01	1	3	2	2
Bulgaria	A	4	3	0.04	8	9	3	-
Cyprus	U	0	0	0	0	0	0	2
Czech Republic (OBF/ObmF)	U	0	0	0	1	0	-	1
Denmark[2] (OBF/ObmF)	-	-	-	-	-	-	-	-
Estonia	U	0	0	0	0	0	0	0
Finland (OBF/ObmF)	U	0	0	0	0	2	0	1
France[3](OBF)	C	21	19 (18)	0.03	21	14	24	35
Germany (OBF/ObmF)	C	18	18 (15)	0.02	24	21	37	31
Greece	C	110	106 (6)	0.94	302	100	119	127
Hungary (ObmF)	U	0	0	0	0	1	-	1
Ireland (ObmF)	C	0	0	0	2	7	4	7
Italy[6]	C	23	23	0.04	75	76	318	632
Latvia	U	0	0	0	0	0	0	0
Lithuania	A	1	1 (1)	0.03	0	0	0	0
Luxembourg (OBF/ObmF)	U	0	0	0	0	-	-	0
Malta	U	0	0	0	0	0	0	0
The Netherlands (OBF/ObmF)	C	4	3 (2)	0.02	3	5	0	2
Poland (ObmF)	C	3	2 (1)	0.01	1	1	0	3
Portugal[4]	C	81	80	0.75	56	74	76	147
Romania (ObmF)	C	3	3 (2)	0.01	2	4	1	-
Slovakia (OBF/ObmF)	U	0	0	0	1	0	0	0
Slovenia (ObmF)	C	2	2 (2)	0.10	2	1	0	0
Spain[7]	C	139	114	0.25	94	201	162	196
Sweden (OBF/ObmF)	C	7	7 (6)	0.08	8	8	4	6
United Kingdom (OBF/ObmF)[5]	C	17	17 (12)	0.03	13	13	16	12
EU Totals		**436**	**401**	0.08	**619**	**541**	**767**	**1,207**
Iceland	U	0	0	0	0	0	0	0
Liechtenstein	-	-	-	-	0	0	0	-
Norway (OBF/ObmF)	U	0	0	0	0	-	3	0
Switzerland (OBF/ObmF)	C	14	14 (14)	0.18	5	1	3	8

* OBF/ObmF: Officially Brucellosis free/Officially *B. melitensis* free in cattle or sheep/goat population.

1. A: aggregated data report; C: case-based report; –: No report; U: unspecified.
2. No surveillance system exists.
3. In France, 64 departments are ObmF and no cases of brucellosis have been reported in small ruminants since 2003.
4. In Portugal, the Azores are OBF/ObmF.
5. In the United Kingdom, only Great Britain is OBF.
6. In Italy, ten regions and five provinces are OBF and nine regions and seven provinces are ObmF.
7. In Spain, the two provinces of the Canary Islands are ObmF.
8. New electronic reporting system in place since 2009.

Figure BR1. Notification rate of reported confirmed cases of human brucellosis in EU 2005-2009



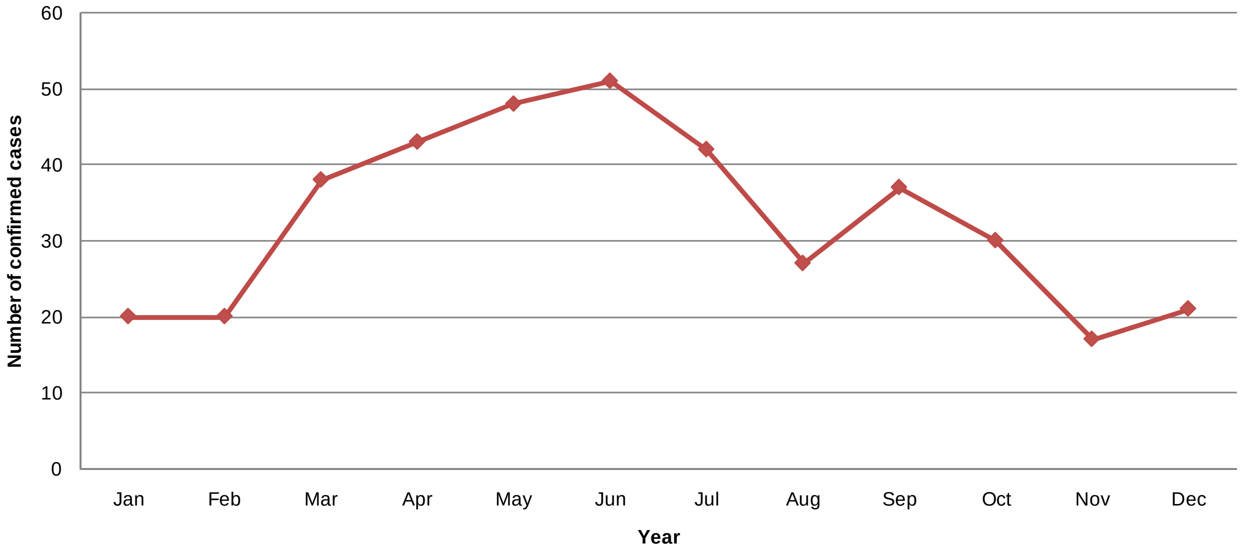
Note: Includes total number of confirmed cases from 2005-2009, data source: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Lithuania, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom

In 2009, the highest number of confirmed cases was in the 25 to 44 year old age group (1.2 per 1,000,000 population) followed by the 45 to 64 year old age group (0.9 per 1,000,000 population). Poland reported a confirmed case due to *Brucella melitensis* in a baby girl less than a year old.

Brucella melitensis was responsible for 14.6 % of confirmed cases followed by *Brucella abortus* in 2.3 % of cases while no cases due to *B. suis* were reported in EU in 2009. The species information was however, reported as unknown or missing in 83.1 % of confirmed cases.

Brucellosis exhibited a seasonal pattern in 2009 with an increasing trend from March to June (Figure BR2). This time of the year coincides with the lambing season in sheep and goats in extensive farming systems in most European countries.

Figure BR2. Seasonal distribution of reported confirmed human cases of brucellosis in reporting MSs, 2009



Note: Includes data from Austria, France, Germany, Greece, Italy, Lithuania, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, United Kingdom (N=394)

Fifteen MSs provided information about whether the confirmed cases were imported or domestically acquired in 2009. On average, 55 % were domestically-acquired infections, with higher percentages in countries that are not brucellosis free in their domestic ruminant populations such as Spain and Greece. The geographical origin was reported as unknown for 17 % of confirmed cases of brucellosis.

3.5.2 *Brucella* in food

Three MSs provided information on *Brucella* in milk, cheese and dairy products in 2009. The majority of samples were from raw cow's milk, where nine samples from Greece were found positive (Table BR3). No positive samples from cheese or dairy products were reported by MSs.

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

Table BR3. Milk[1] and cheese samples tested for* Brucella*, 2009

Country	Description	Units	N	% Pos
Raw milk from cows				
Belgium	Milk for manufacture	Batch	60,031	0
Greece	Milk for manufacture	Single	1,207	0.7
Italy[1]	-	Batch	401	0
Italy[1]	-	Single	25	0
Raw milk from sheep				
Italy[1]	-	Single	188	0
Raw milk from other animal species or unspecified				
Italy[1]	-	Single	39	0
Cheese made from milk from cows				
Italy	-	Single	26	0
Cheese made from milk from other animals/unspecified				
Italy	Sheep's milk	Single	337	0
Italy	Mixed milk from cows, sheep and/or goats	Single	114	0
Italy	Unspecified milk or other animal milk	Single	192	0
Dairy products, unspecified				
Italy	-	Single	447	0

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

1. Not indicated whether the milk was raw or pasteurised. It is assumed, that all milk samples were from raw milk.

3.5.3 *Brucella* in animals

Cattle

The status regarding freedom of bovine brucellosis (OBF) and the occurrence of the disease in MSs and non-MSs in 2009 are presented in Figures BR3 and BR4. As in 2008, Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Slovakia, Slovenia, Sweden, Norway and Switzerland, were officially free of brucellosis in cattle (OBF). In addition, Ireland and Poland were granted status as OBF during 2009 (Decision 2009/600/EC)[31]. In the United Kingdom, Great Britain is OBF. In Italy, some new officially free areas were recognised during 2009 (the remaining provinces in the regions of Marche and Piemonte) (Decision 2009/342/EC) and there are now ten OBF regions and five OBF provinces in Italy. In Portugal, two new islands of the Azores were declared OBF during 2009 (Decision 2009/600/EC), resulting in six (of the nine) islands of the Azores having OBF status. In Spain, the two provinces of the Canary Islands obtained status as OBF during 2009 (Decision 2009/600/EC).

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

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

Figure BR3. Status of bovine brucellosis, 2009

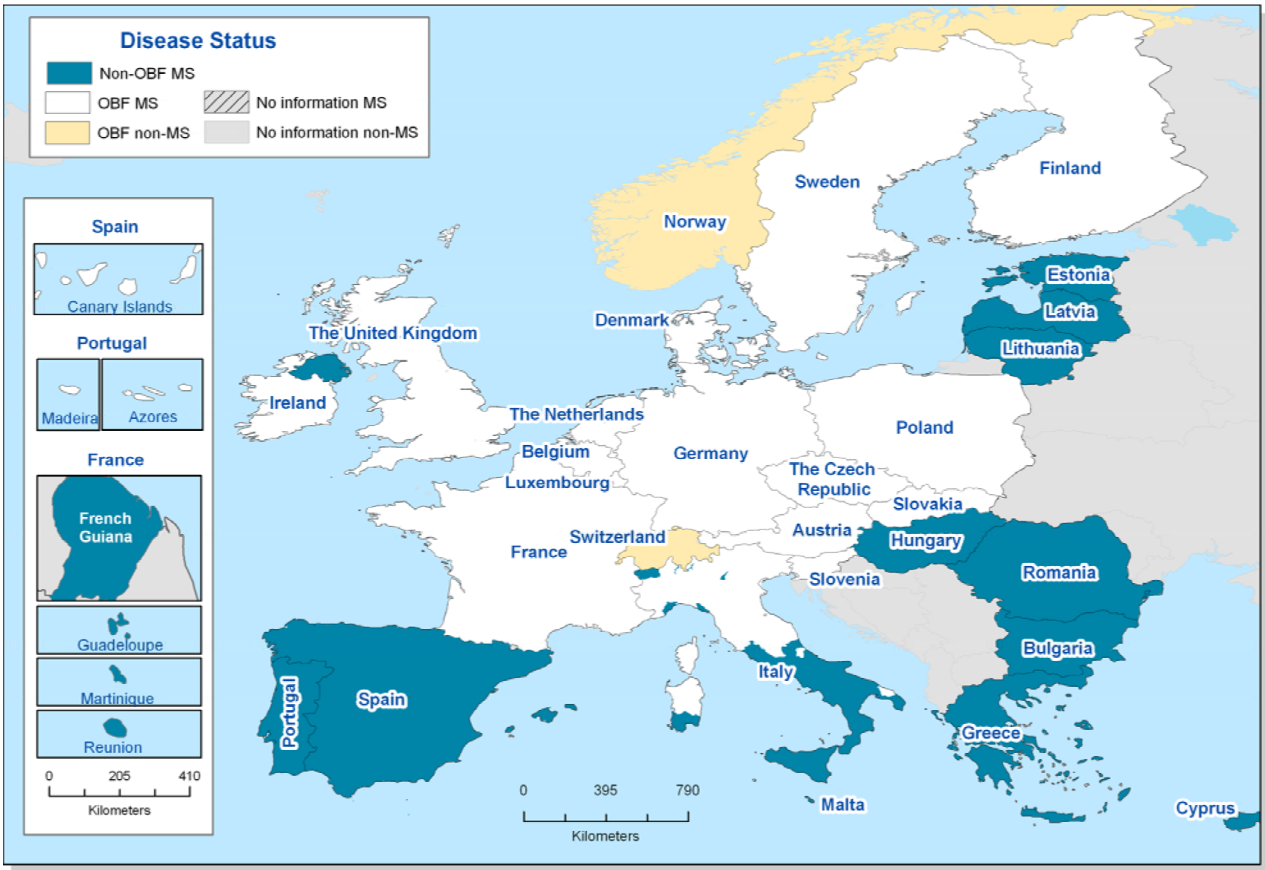


Figure BR4. Proportion of* Brucella *infected/positive cattle herds, country based-data, 2009

Trend indicators for brucellosis

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

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

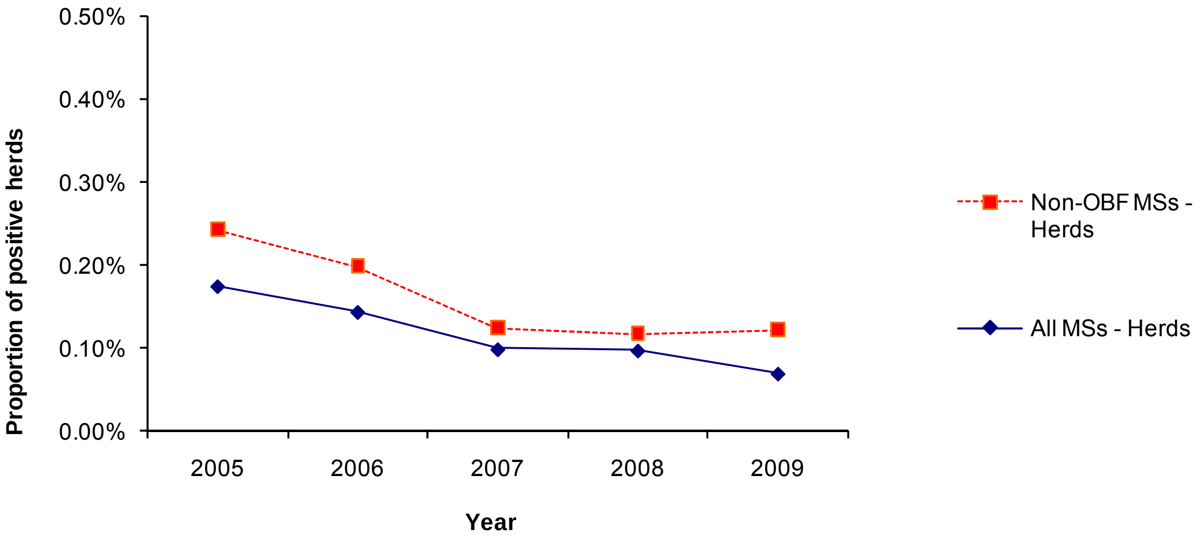
The second indicator **" % tested herds positive"** is "the number of herds test-positive" divided by "the number of tested herds". This indicator gives a more precise picture of the testing results and also estimates the herd prevalence during the whole reporting year. This information is only available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

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

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

During the years 2005 to 2009, the overall proportion of existing bovine brucellosis-infected or positive cattle herds in EU has been steadily decreasing to very low levels, and the last three years it has been very rare with a proportion of 0.07 % positive herds in 2009 (Figure BR5). During the same period, a decreasing trend was observed for the percentage of existing infected/positive herds in the non-OBF MSs, where the proportion seems to have stabilised at 0.12 % in 2007 to 2009.

***Figure BR5. Proportion of existing cattle herds infected with or positive for* Brucella*, 2005-2009*[1]**



1. Missing data from OBF MSs: Germany (2008) and non-OBF MSs: Hungary (2005), Malta (2006), Bulgaria (2007) and Lithuania (2007).

Romania included data for the first time in 2007 and Bulgaria in 2008.

Officially Bovine Brucellosis-free MSs and non-MSs

With the exception of four herds in Germany and 13 herds in Poland, infection was not detected in any cattle herd in the 14 OBF MSs or in Norway and Switzerland during 2009. However in Ireland, 100 herds were reported as having false sero-positive reactions.

Non-OBF Member States and non-MSs

In 2009, the 13 non-OBF MSs reported a total population of 1,819,898 bovine herds, of which 0.12 % was found infected with or positive for bovine brucellosis, which was comparable to the level reported in 2007 and 2008.

When comparing data from non-OBF MSs (Figure BR5) it is worthwhile to mention that the observed decrease from 2006 to 2007 was mainly due to the inclusion of data from Romania. Romania joined EU in 2007, including more than 1.2 million cattle herds (35 % of all herds in EU), where none of these herds were reported infected with bovine brucellosis.

In 2009, Greece was the only non-OBF MSs without an EU co-financed eradication programme, where positive herds were detected. The percentage of positive existing cattle herds in Greece was 0.81 %.The remaining six non-co-financed non-OBF MSs: Bulgaria, Estonia, Hungary, Latvia, Lithuania and Romania, reported no positive cattle herds out of 1,352,981 existing bovine herds in 2009.

Two of the six non-OBF MSs with EU co-financed eradication programmes, Cyprus and Malta, reported no positive cattle herds in 2009 (Table BR4). Overall, the percentage of existing positive herds remained at a level comparable with the previous year (0.57 % in 2009 compared to 0.60 % in 2008), while the percentage of herds tested positive increased slightly from 0.78 % in 2008 to 0.85 % in 2009. In all non-OBF MSs both indicators decreased or remained at a level comparable to 2008. A relatively marked decrease in both indicators was observed in the United Kingdom (Northern Ireland) and in Italy. In 2009, the highest proportion of existing positive herds was reported from the co-financed areas in Italy, although still considered to be low. Portugal, Spain and Northern Ireland all reported a very low prevalence, below 1 %.

In all the co-financed non-OBF MSs with no OBF regions, the majority (69-100 %) of the existing cattle herds were under control programmes. For further details see Level 3 tables.

Table BR4. **Brucella** ***in cattle herds in six co-financed non-OBF MSs[1], 2007-2009***

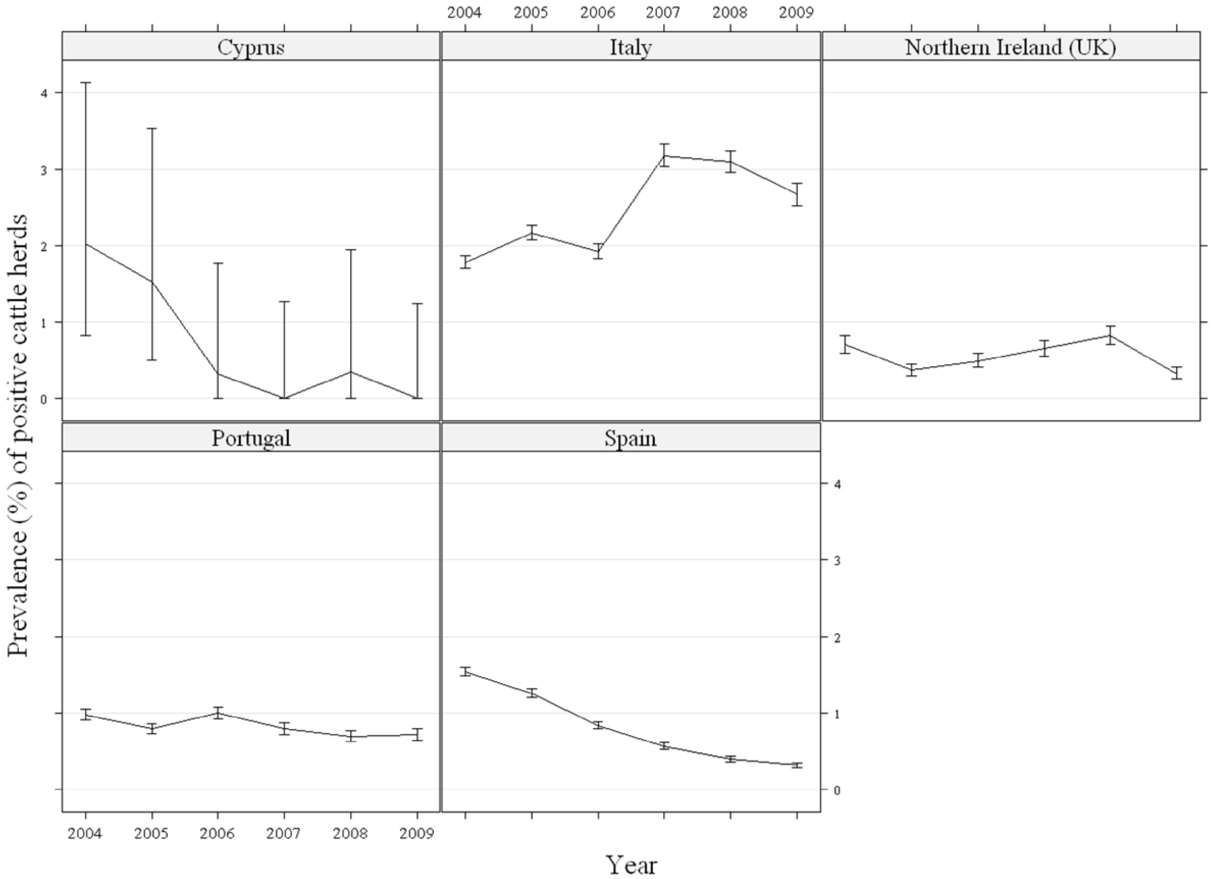
Non-officially free MSs	2009					2008		2007	
	No of existing herds	No of tested herds	No of positive herds	% existing herds positive	% tested herds positive	% existing herds positive	% tested herds positive	% existing herds positive	% tested herds positive
Cyprus	346	294	0	0	0	0.29	0.35	0	0
Ireland[2]	-	-	-	-	-	0.09	0.10	0.13	0.14
Italy[3]	119,061	45,885	1,225	1.03	2.67	1.29	3.09	1.30	3.18
Malta	363	363	0	0	0	-	-	-	-
Portugal[4]	70,976	49,009	351	0.49	0.72	0.61	0.69	0.63	0.79
Spain[5]	140,288	118,869	379	0.27	0.32	0.35	0.40	0.39	0.57
United Kingdom (Northern Ireland)	26,287	23,135	76	0.29	0.33	0.72	0.82	0.58	0.65
Total (6 MSs)	**357,321**	**237,555**	**2,031**	**0.57**	**0.85**	**0.60**	**0.78**	**0.60**	**0.85**

1. Only tested and positive herds from regions that have co-financed eradication programmes are included. The number of existing herds include all herds in the MS.
2. Ireland was declared OBF during 2009 (Decision 2009/600/EC).
3. In Italy, ten regions and five provinces are officially brucellosis-free. In the provinces that are OBF or do not have a co-financed eradication programme, three of the 60,635 existing herds were found infected.
4. In Portugal, Madeira does not have a co-financed eradication programme, and during 2009 two more island of the Azores were declared OBF and now six islands of the Azores are OBF. In these areas, none of the 4,232 existing herds were found infected.
5. In Spain, the two provinces of the Canary Islands, Santa Cruz de Tenerife and Las Palmas, obtained OBF status during 2009 (Decision 2009/600/EC).

The MS-specific trends in test-positive herds in five co-financed non-OBF MSs from 2004 to 2009 are shown in Figure BR6.

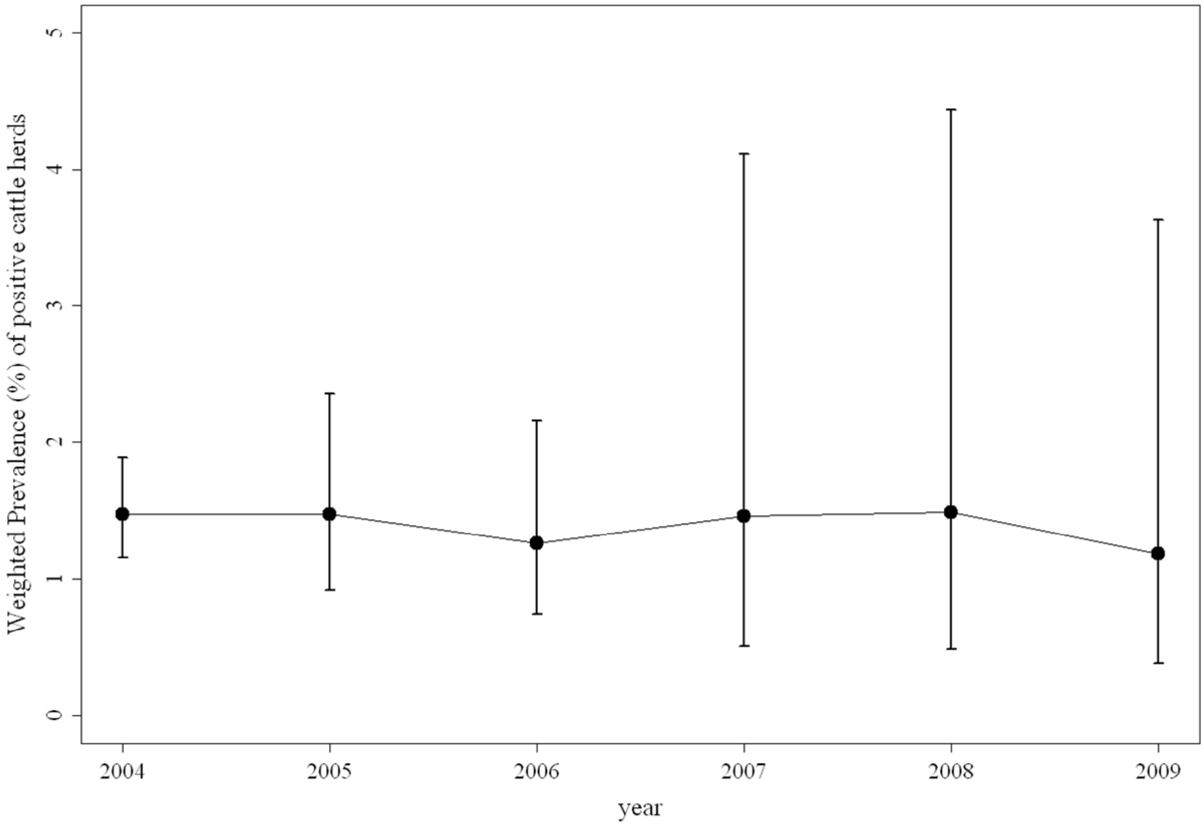
Since 2004, the prevalence of brucellosis test-positive cattle herds (the second epidemiological indicator) appears to have decreased or remained at a low level in most of the co-financed non-OBF MSs (Cyprus, Portugal, Northern Ireland and Spain). The exceptions are Italy, where a considerable increase of the prevalence from 2006 to 2007 was observed, followed by a decrease since 2008. In Italy, several provinces were declared OBF in 2004 to 2009, and in some other provinces the occurrence was so low that they did not receive co-financing for eradication programmes. Therefore, Italian data reflect the results of regions having the highest prevalence instead of the situation in the whole country. The results of a logistic regression analysis indicated that overall for this MS-group there was no significant trend in the weighted prevalence of brucellosis test-positive cattle herds from 2004 to 2009 (Figure BR7). See Section 6.2 in the Materials and methods chapter for a description of the statistical methodology.

Figure BR6. Prevalence and 95 % CI[1] of* Brucella *test-positive cattle herds, at MS level, in five non-OBF co-financed MSs, 2004-2009



1. Vertical bars indicate exact binomial 95 % confidence intervals.

Figure BR7. Weighted prevalence[1] and 95 % CI[2] of* Brucella *test-positive cattle herds, overall for five co-financed non-OTF MSs[3], 2004-2009



1. The MS group prevalence is estimated using weights. The MS specific weight is the ratio between the number of existing herds and the number of tested herds per MS per year.
2. Vertical bars indicate exact binomial 95 % confidence intervals.
3. Includes data from: Cyprus, Italy, Portugal, Spain and United Kingdom (Northern Ireland).

Sheep and goats

The status of the countries regarding freedom from ovine and caprine brucellosis caused by *B. melitensis* (ObmF) and the occurrence of the disease in MSs and non-MSs in 2009 are presented in Figures BR8 and BR9. In 2009, as in 2008, 16 MSs (Austria, Belgium, the Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Luxembourg, the Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden and the United Kingdom) as well as Norway and Switzerland, were ObmF. Regions have been granted status as ObmF in France (64 departments), Italy (nine regions and seven provinces), Portugal (all the Azores Islands) and Spain (the two provinces of the Canary Islands).

All data submitted by MSs are presented in the Level 3 tables of the report.

Figure BR8. Status of ovine and caprine brucellosis, 2009

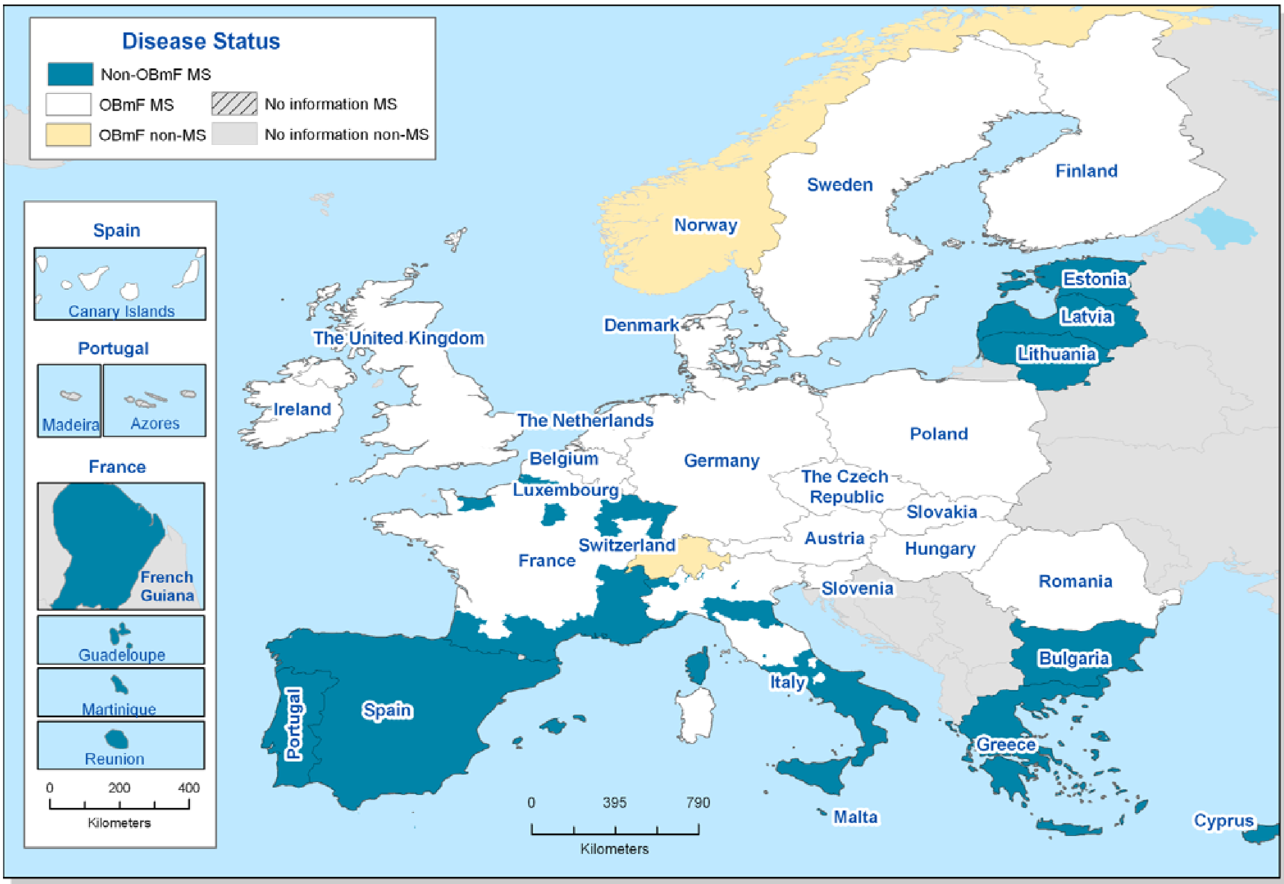
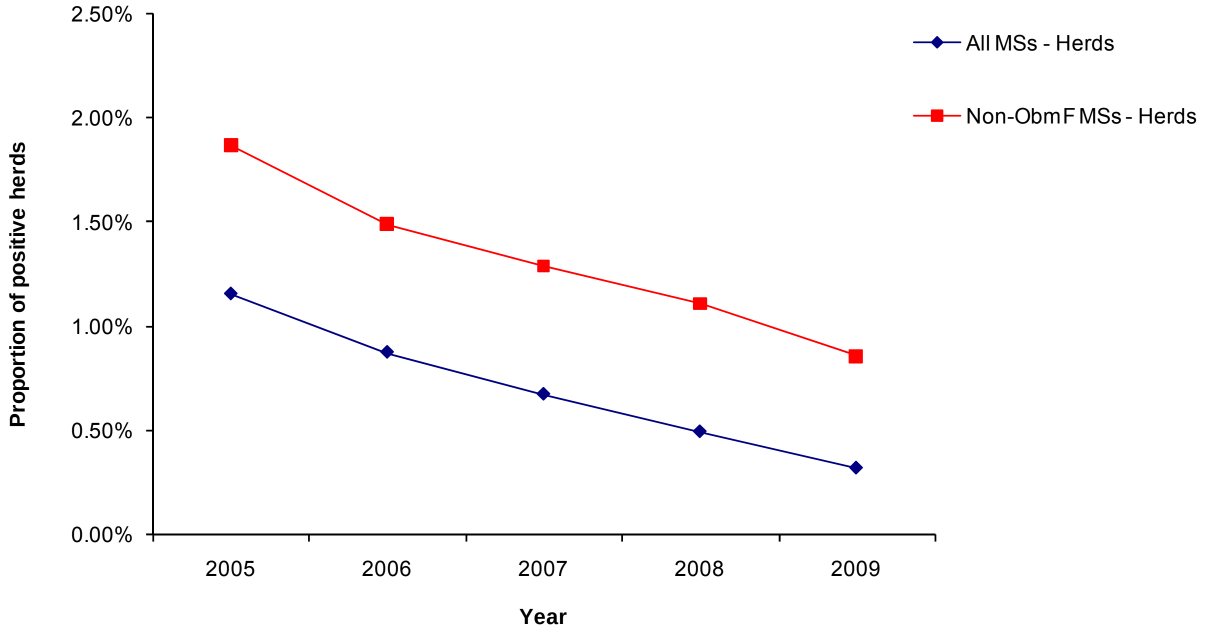


Figure BR9. Proportion of* Brucella*-infected/positive sheep and goat herds, country-based data, 2009

During the years 2005 to 2009, the proportion of existing infected/positive sheep and goat herds infected with *B. melitensis* in EU has been decreasing from 1.16 % in 2005 to a very low level of 0.32 % in 2009. A similar general decreasing trend was observed for the proportion of existing infected/positive herds in the non-ObmF MSs ranging from 1.9 % in 2005 to 0.9 % in 2009 (Figure BR10).

When evaluating the trend it must be noted that the observed decrease from 2006 to 2007 was mainly due to the inclusion of data from Romania, who joined EU in 2007 as an ObmF MS. In 2007, Romania had more than 0.5 million sheep and goat herds (39 % of all herds in EU) of which very few were infected (0.6 %). On the contrary, data for Romania were not included in EU proportion in 2008, because data were not reported for herds but only for 2,029,095 animals, of which none tested positive.

***Figure BR10. Proportion of existing sheep and goat herds infected with or positive for* Brucella*, 2005-2009*[1]**



1. Missing data from Bulgaria (2007), Germany (2005-2007), Hungary (2005), Lithuania (2005, 2007), Luxembourg (2005-2006, 2008-2009), Malta (2005-2006) and Romania (2008). Romania reported data at animal level in 2008.

Officially *B. melitensis*-Free Member States, non-MSs and regions

In the ObmF MSs, Norway and Switzerland, no positive herds were detected, except in Romania where 175 herds were found infected with *B. melitensis*.

Italy reported five positive herds from ObmF regions or non-OBmF regions with ObmF provinces. However, these findings do not jeopardise the ObmF status of these regions and provinces.

Non-ObmF Member States

In 2009, the 11 non-ObmF MSs reported a total population of 506,197 sheep and goat herds, of which 0.9 % were found infected with or positive for *B. melitensis*. This continues the steady decrease in the occurrence of *B. melitensis* observed in this group of MSs since 2004 (Figure BR10).

In 2009, no infected herds out of 181,326 existing ovine and caprine herds were reported from the six non-ObmF MSs without EU co-financed eradication programmes (Bulgaria, Estonia, France, Latvia, Lithuania and Malta).

Among the non-ObmF MSs with EU co-financed eradication programmes in 2009, the overall percentage of existing positive herds and tested positive herds decreased compared to 2008 (Table BR5). Also, in the individual MSs in this group, both indicators decreased in all MSs, except in Italy, where the proportion of existing positive herds remained at almost the same level as in 2008. In 2009, the proportion of existing positive herds was at a very low level in Cyprus and Greece and at low levels in Italy, Portugal and Spain. However, the proportion of herds testing positive was relatively high in Greece and Italy, and in Cyprus, Portugal and Spain the levels were higher but comparable to the first indicator. In Greece, the eradication zone only covers the islands of the country; in the mainland, a control programme including mass vaccination is ongoing. Vaccination is also applied in some areas of Portugal, and can also be allowed in high incidence areas in Spain.

Table BR5. **Brucella** ***in sheep and goat herds in co-financed non-ObmF MSs[1], 2007-2009***

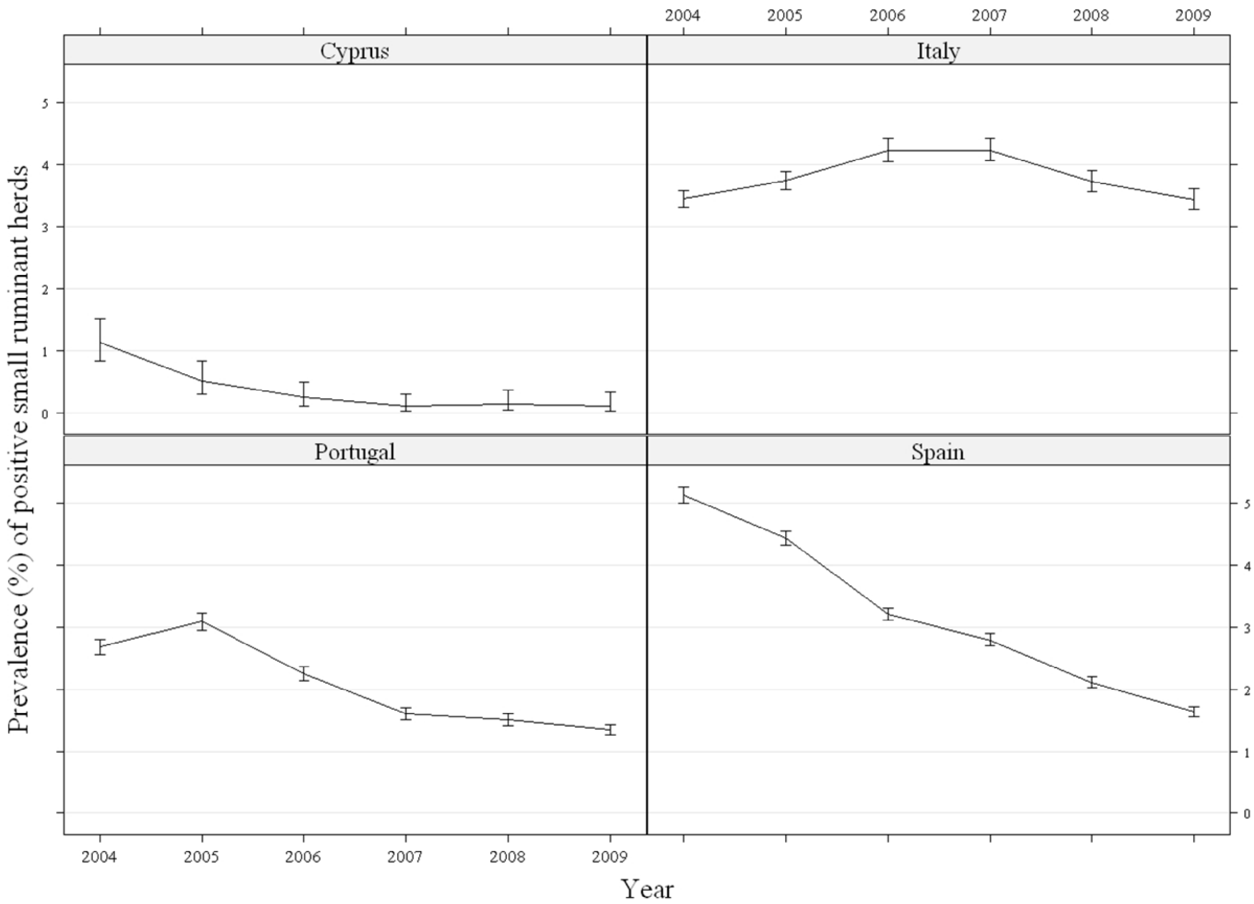
Non-officially free MSs	2009					2008		2007	
	No of existing herds	No of tested herds	No of positive herds	% existing herds positive	% tested herds positive	% existing herds positive	% tested herds positive	% existing herds positive	% tested herds positive
Cyprus	3,413	2,677	3	0.09	0.11	0.11	0.14	0.08	0.10
France[2]	-	-	-	-	-	-	-	0	0
Greece	24,609	715	24	0.10	3.36	-	-	0.15	3.04
Italy[3]	101,608	46,031	1,585	1.56	3.44	1.51	3.73	1.92	4.23
Portugal[4]	72,538	68,252	919	1.27	1.35	1.40	1.51	1.42	1.60
Spain[5]	122,703	110,140	1,801	1.47	1.64	1.94	2.11	2.50	2.79
Total (5 MSs in 2009)	**324,871**	**227,815**	**4,332**	**1.33**	**1.90**	**1.64**	**2.23**	**1.32**	**2.58**

1. Only tested and positive herds from regions that have co-financed eradication programmes are included. The number of existing herds include all herds in the MS.
2. In France, 64 departments are officially free of *B. melitensis*. In 2009, in the ObmF departments, none of the 101,995 existing herds were found infected. In the rest of France, no infected herds have been reported since 2004.
3. In Italy, nine regions and seven provinces are officially free of *B. melitensis*. In the provinces that are ObmF or do not have a co-financed eradication programme, five of the 50,212 existing herds were found infected.
4. In Portugal, the Azores are ObmF and Madeira is not co-financed. In Madeira none of the 289 existing herds were found infected. In 2009, no data were available for the Azores.
5. In Spain, the two provinces of the Canary Islands are ObmF. In 2009, none of the 4,116 existing herds in these areas were found infected.

Since 2004, the prevalence of sheep and goat herds positive for *B. melitensis* has decreased in Cyprus, and more markedly in Spain. Since 2005, a decrease in the proportion of positive tested herd was observed in Portugal. In Italy, an increase has been observed from 2004 to 2007 followed by a decrease in 2008 and 2009 (Figure BR11). The increase in Italy from 2004 to 2006 in tested herds positive was due to progress made in the eradication programme where the declared ObmF provinces and regions are no longer counted in co-financed programmes. Therefore, Italian data reflect the results of regions having the highest prevalence instead of the situation in the whole country.

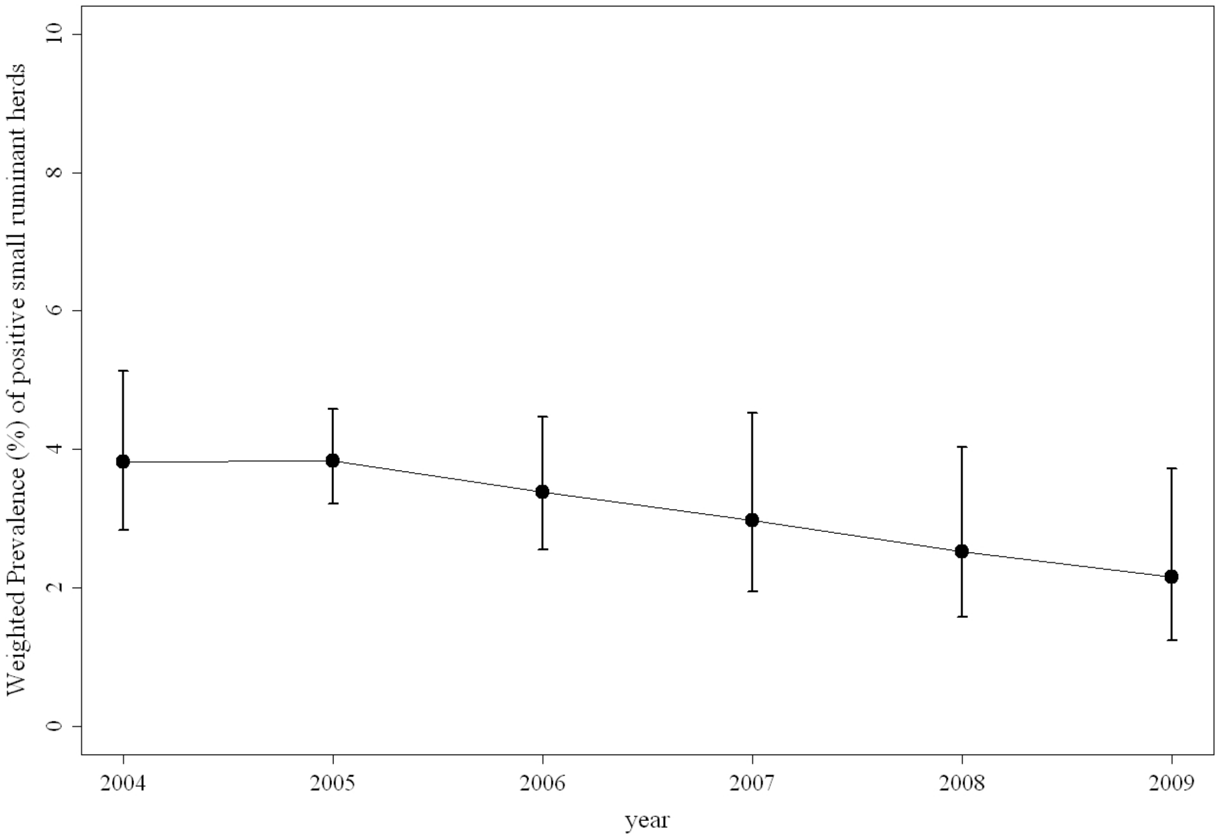
During the period from 2004 to 2009 a decreasing trend in the overall weighted prevalence was observed in the MS group of four co-financed non-ObmF countries (Cyprus, Italy, Portugal, Spain) (Figure BR12). However, the logistic regression analysis indicated the absence of a statistically significant linear trend. In this specific case, the detection of non-significant trend at MS group level might be due to the fact that at MS level, trends of brucellosis in small ruminants are not always linear, as observed for example in Italy. See Section 6.2 in the Materials and methods chapter for a description of the statistical methodology.

Figure BR11. Prevalence and 95 % CI[1] of* Brucella melitensis *test-positive sheep and goat herds, at MS level, in four non-ObmF co-financed MSs, 2004-2009



1. Vertical bars indicate exact binomial 95 % confidence intervals.

Figure BR12. Weighted prevalence[1] and 95 % CI[2] of* Brucella melitensis *test-positive sheep and goat herds, overall for four co-financed non-Obmf MSs[3], 2004 –2009



1. MS group prevalence is estimated using weights. The MS specific weight is the ratio between the number of existing herds and the number of tested herds per MS per year.
2. Vertical bars indicate exact binomial 95 % confidence intervals.
3. Includes data from: Cyprus, Italy, Portugal and Spain.

Other animals

In 2009, 23 MSs and two non-MSs provided data on the occurrence of *Brucella* spp. in animals other than cattle, goats and sheep. Data were from a wide range of sources including surveillance, monitoring, surveys, control and eradication programmes and clinical investigations.

In domestic animals, *Brucella* spp. was isolated from pigs in several MSs (Bulgaria, France, Germany, Italy, Poland, Portugal and Romania) and one non-MS (Switzerland), and from water buffalo in one MS (Italy). When only considering investigations including more than 25 units, the overall proportion of positive samples from pigs was 0.33 % (N=160,074).

Brucella spp*.* was found in a wide range of wildlife including deer (Spain), hares (the Czech Republic, France and Germany), goats (Italy), mountain goats (Spain), Pyrenean chamois (Spain), wild boar (France, Germany and Spain) and unspecified wild animals (Italy).

In 2009, findings of *Brucella* spp. in dogs was reported by four MSs (Germany, Hungary, Italy and Romania). *Brucella* were isolated from marine mammals in two MSs (France and the United Kingdom) and from zoo animals in two other MSs (Bulgaria and Portugal).

Isolates from hares, pigs and wild boar were mainly *B. suis*, isolates from marine mammals were *B. pinnipedialis* and *B. ceti*, whereas isolates from other animal species were mainly reported as *Brucella* spp. Findings of *B. abortus* were reported in dogs and wild boar, while *B. melitensis* in one case was isolated from a zoo animal.

3.5.4 Discussion

In 2009, the number of confirmed reported cases of human brucellosis in EU decreased by 35 % compared to 2008. Human brucellosis is generally decreasing in EU, as shown by a statistically significant declining five-year trend from 2005 to 2009 for EU as a whole as well as in seven MSs. No MS had a significant increasing trend. Three southern EU MSs that were not free from animal brucellosis (Greece, Portugal and Spain) accounted for 74.8 % of the total number of confirmed cases. Information about the *Brucella* species involved in the human infections was missing in 83 % of reported confirmed cases, which means that there is very little information about the species distribution in EU.

Brucellosis in humans exhibited a seasonal pattern in 2009 with an increasing trend from March to June. This time of the year coincides with the lambing season in sheep and goats in extensive farming systems in most European countries.

In 2009, only one MS reported findings of *Brucella* in raw milk, indicating that while findings are rare events, the health risk related to raw milk or products thereof might still be relevant and particularly in the MSs not free of animal brucellosis.

At EU level, the prevalence of bovine brucellosis in cattle herds has been steadily decreasing to very low levels during the past five years and in 2009, together, 0.07 % of the herds were positive. Also, in EU co-financed MSs that were not free of bovine brucellosis (non-OBF), the prevalence of bovine brucellosis declined in 2009 or remained at a very low level. Two of the co-financed MSs, Cyprus and Malta, reported no positive cattle herds in 2009, and all co-financed MSs observed a slight decrease in the proportion of existing positive herds. Overall, in EU co-financed non-OBF MSs in the years 2004 to 2009, using logistic regression analysis, no significant trend in the proportion of cattle herds tested positive was apparent. However, since bovine brucellosis may spread rapidly between herds if left uncontrolled, the keeping the prevalence at a low level is already an achievement.

The total proportion of existing sheep and goat herds in EU positive for *B. melitensis* has decreased since 2005 and was at a level of 0.32 % in 2009. An analogous decreasing trend has been observed in the non-ObmF MSs, reaching a prevalence of 0.86 % in 2009. In EU co-financed non-Obmf MSs, both indicators (the proportion of existing herds positive and the proportion of tested herds positive) decreased compared to 2008. Also, during the whole period from 2004 to 2009, the trend in the prevalence of positive small ruminant herds in the co-financed non-ObmF MSs has steadily decreased.

3. INFORMATION ON SPECIFIC ZOONOSES

3.6 Rabies

Rabies is a disease caused by a rhabdovirus of the genus *Lyssavirus*. This virus can infect all warm-blooded animals and is transmitted through contact with saliva from infected animals, typically from foxes and stray dogs, e.g. via animal bites. The disease causes swelling in the central nervous system of the host and is usually fatal. The majority of rabies cases are caused by the classical rabies virus (genotype 1). In addition, two sub-types of rabies virus, *Lyssavirus* genotypes five and six, also known as European Bat *Lyssavirus* (EBLV-1 and -2, respectively), are detected in bats in Europe. In rare cases, the infection from bats can be transferred to other mammals, including humans.

Symptoms in humans include a sense of apprehension, headache, fever and death. Human cases are extremely rare in industrialised countries. However, those working with bats and other wildlife are encouraged to seek advice on preventive immunisation.

In animals, pathogenicity and infectivity of the disease vary greatly among different species. Infected animals may exhibit a wide range of symptoms, including drooling, difficulty in swallowing, irritability, strange behaviour, alternating rage and apathy, and increasing paralysis of the lower jaw and hind parts. Animals may excrete the virus during the incubation period, up to 14 days prior to the onset of clinical symptoms.

Table RA1 presents countries reporting data in 2009.

Table RA1. Overview of countries reporting data on* Lyssavirus*, 2009

Data	Total number of MSs reporting	Countries
Human	25	**All MSs** except DE, GR **Non-MSs:** IS, NO
Animal	24	**All MSs** except CY, IE, MT **Non-MSs:** CH, NO

3.6.1 Rabies in humans

Generally, very few rabies cases in humans are reported in EU, and most MSs have not had any indigenous cases for decades. In 2009, only one case of rabies was reported in EU, from Romania (Table RA2). The case was a 69 year old woman who lived in a rural village close to the forest who got bitten by a rabid fox. As the woman neither sought any medical assistance nor reported it to the Romanian veterinary authorities, the case was fatal.

Table RA2. Human rabies cases, 2005-2009

Year	Country	Case
2005	Germany	4 cases in total: 3 patients became ill after receiving organs from a rabies infected donor. The donor was infected during a trip to India.
2006	-	No cases.
2007	Finland	1 case from the Philippines who was bitten by a dog in his home country, fell ill with rabies when working on a ship in the Baltic Sea and was hospitalised in Finland and died there.
	Germany	1 case imported from Morocco.
	Lithuania	1 case imported from India after contact with dog.
2008	France	1 case (French Guyana).
	Netherlands	1 case imported from Kenya (fatal).
	Romania	1 case (fatal).
	United Kingdom	1 imported case.
2009	Romania	1 fatal case, 69 year old female from a rural area bitten by a fox. The patient did not visit a hospital or reported it to the veterinary authorities.

3.6.2 Rabies in animals

All MSs except Cyprus, Ireland and Malta provided information on rabies cases in animals. Nine MSs reported rabies in other animals than bats and ten MSs reported infected bats (Table RA3).

According to Directive 64/432/EEC[32] rabies is a notifiable disease in bovine animals and pigs. The wildlife animal species form the reservoir of rabies in EU and control measures are specifically targeted to the wildlife population. In 2009, Austria, Bulgaria, the Czech Republic, Estonia, Finland, Germany, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia had eradication programmes approved and co-financed by the European Commission (Decision 2008/897/EC). Within the framework of these programmes, oral vaccinations for wildlife are performed through the distribution of bait. Vaccination of carnivorous pets, such as dogs and cats, is compulsory in 15 MSs. For more detailed information on vaccination programmes, please refer to Appendix Table RA1.

The majority of sampling of domestic animals and wildlife are based on suspicion of a rabies infection. However, countries carrying out wildlife vaccinations have monitoring programmes in place among wildlife to survey the efficiency of the vaccinations.

The total number of rabies findings in animals decreased from 1,473 in 2008 to 837 in 2009 (Figure RA2) mainly due to fewer positive samples reported by Romania. However, Romania still reported 63.9 % of all positive samples from animals other than bats and the Romanian decrease is mainly due to fewer foxes being examined: 1,173 and 2,350 animals tested in 2009 and 2008 respectively. Bulgaria, Italy, Latvia and Lithuania each reported 7.1-8.3 % of positive samples.

In domestic animals, six MSs, Bulgaria, Italy, Latvia, Lithuania, Romania and Slovenia, reported the occurrence of classical rabies or unspecified *Lyssavirus* in 2009, which is similar to findings in previous years (Figure RA3). In wildlife, nine MSs reported cases in 2009; the MSs with positive animals were the same as in 2008 (Figure RA4). Foxes are the most important carrier of classical rabies in EU and the five MSs reporting classical rabies or unspecified *Lyssavirus* in other animal species reported positive cases from foxes. In 2009, 86.8 % of rabies cases in wildlife other than bats were reported in foxes. Romania reported the majority of cases. In total, 20 MSs reported data on rabies in foxes. Austria, Belgium, the Czech Republic, Finland, France, Germany, Luxembourg, the Netherlands, Slovakia, Spain and the United Kingdom found no positive animals (Table RA3). This is similar to findings in previous years (Table RA4). In 2009, more MSs provided information at species level as eight out of nine MSs reported cases to be classical rabies rather than unspecified *Lyssavirus* compared to five out of nine in 2008.

For the first time in several years, no rabies in imported animals (legally or illegally) was reported in 2009.

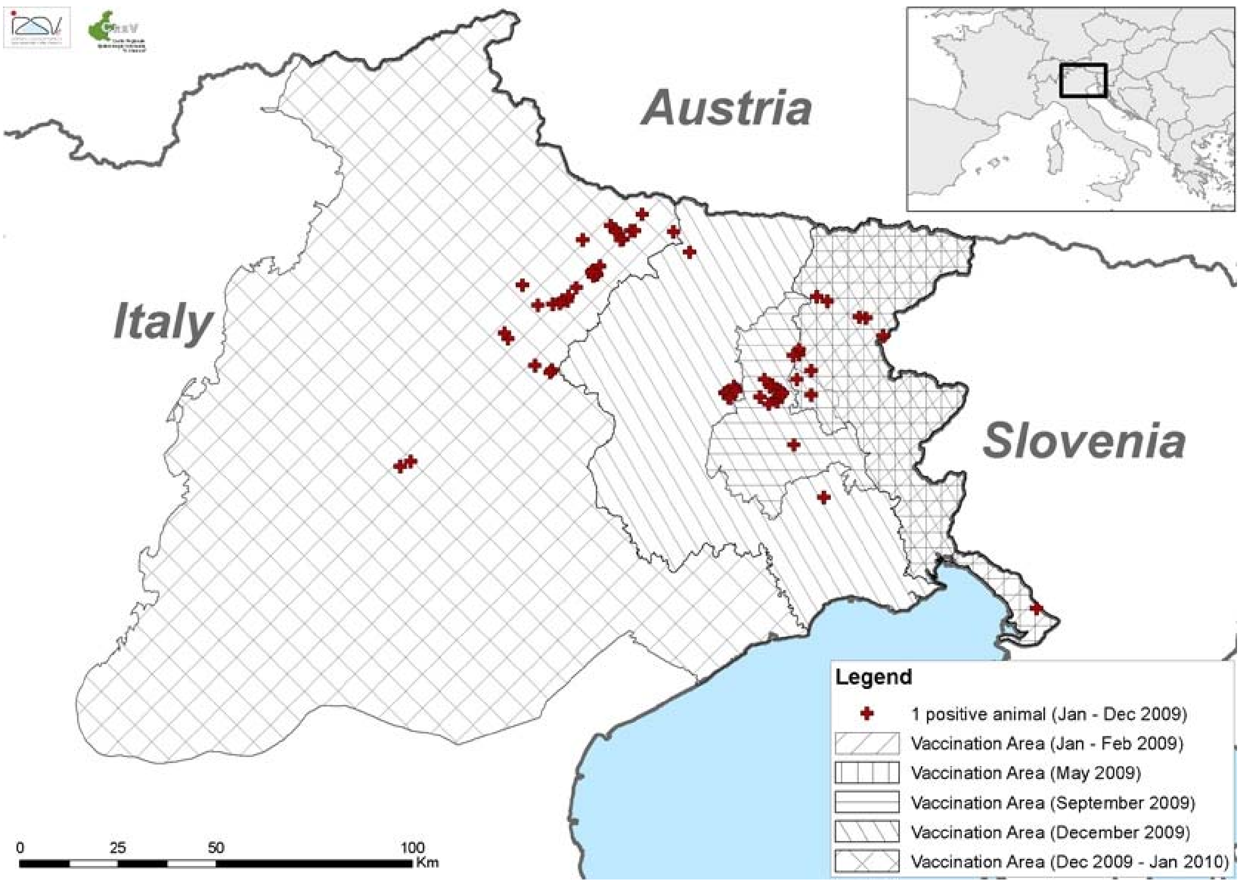
> The Czech Republic initiated their vaccination programme in foxes in 1989 and it has been running continuously since then. The results have been very good and by the end of 2009 it was decided to terminate the programme. In case of emergency, there is a possibility to perform oral emergency vaccination according to the epidemiological situation.

As in previous years, Latvia and Lithuania, reported the majority of positive cases from raccoon dogs. The raccoon dog is spreading westward in Europe and as it often seems to be infected with rabies, it is important to monitor this animal species along with the foxes in endemic areas.

32 Council Directive 64/432/EEC on animal health problems affecting intra-EU trade in bovine animals and swine. OJ 121, 29.7.1964, p. 1977-2012.

In North-eastern Italy, rabies reappeared in the wildlife population in 2008 when nine positive badgers and foxes were reported. The epidemic spread westward during 2009 and a total of 64 cases were reported, mainly in foxes (61 cases) (Figure RA1). In coordination with the Slovenian and Austrian authorities, the Italian authorities have taken the necessary measures to control the outbreak, by implementing compulsory vaccination of dogs and farm animals at risk (cows, horses, sheep and goats kept outdoors), prohibiting hunting with dogs, obliging dogs to be kept on a leash, enhancing passive surveillance in the wild animal populations, and most importantly, implementing four oral vaccination campaigns of foxes in high risk areas during 2009. Additionally, information campaigns concerning the risk to public health have been implemented and protocols with post-exposure treatment and pre-exposure immunisation for individuals at high risk have been sent to all health care facilities in the affected areas.

Figure RA1. Classical rabies in Italy, 2009



Source:Istituto Zooprofilattico Sperimentale delle Venezie, Italian national reference laboratory for rabies. http://www.izsvenezie.it

An increasing number of MSs reported findings of European Bat *Lyssavirus* (EBLV) or unspecified *Lyssavirus*, although generally at very low numbers (Figure RA5). In 2009, ten MSs reported findings compared to five MSs in 2008: Denmark, Finland, France, Germany, Hungary, the Netherlands, Poland, Romania, Spain and the United Kingdom. France, Sweden and the United Kingdom are the only MSs to report data from passive surveillance programmes for EBLV in bats. In Finland, the EBLV was found for the first time in bats. In France, 11 infected bats were positive for EBVL-1 in the metropolitan territory, and one bat was positive for classical rabies virus in overseas area (French Guyana). Six out of the 11 bat cases recorded in France were diagnosed in animals from a colony located in North East of the country.

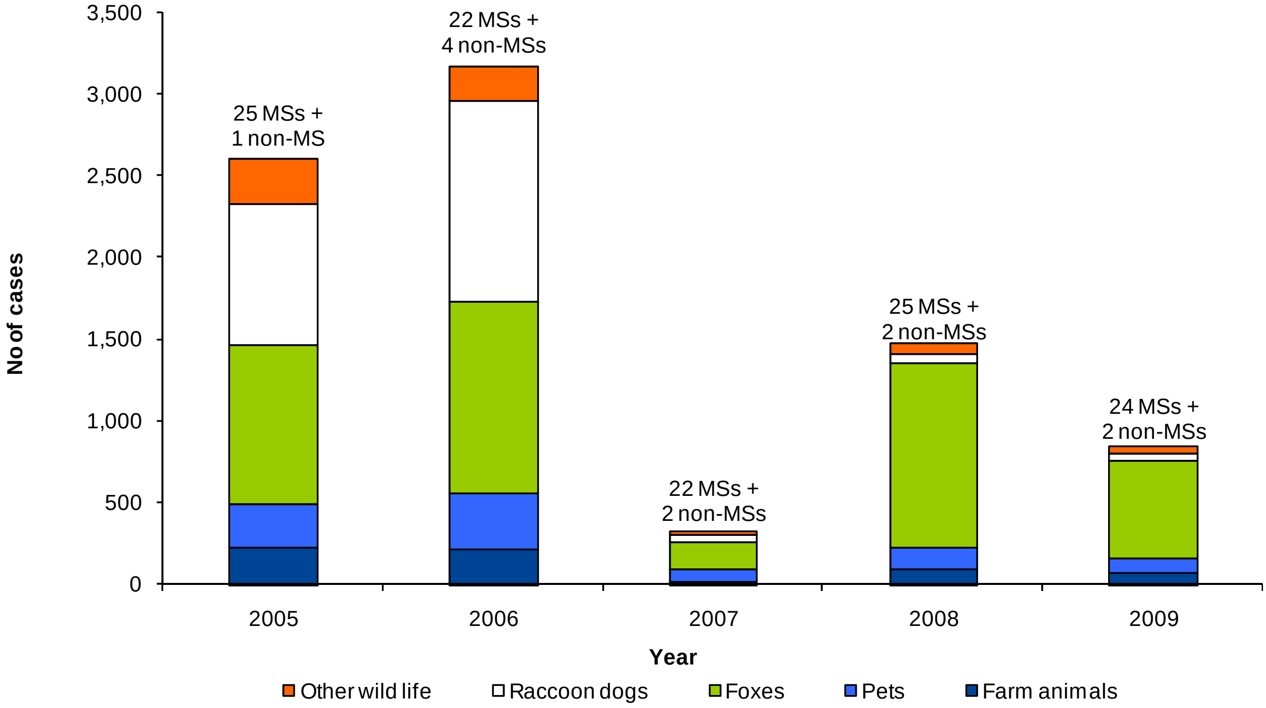
For additional information on rabies in animals, please refer to Level 3 tables.

Table RA3. Number of tested animals and positive cases of rabies in domestic animals and wildlife, 2009

Country	Classical rabies virus or unspecified Lyssavirus												Unspecified European Bat *Lyssavirus* or unspecified *Lyssavirus*	
	Farm animals[1]		Cats (pets)		Dogs (pets)[2]		Foxes		Raccoon dogs		Other[3]		Bats[4]	
	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos
Austria	15	0	65	0	70	0	7,515	0	-	-	801	0	360	0
Belgium	299	0	13	0	12	0	183	0	-	-	46	0	29	0
Bulgaria	43	4	6	2	23	3	397	47	-	-	37	3	1	0
Czech Republic	5	0	198	0	149	0	7,844	0	1	0	97	0	12	0
Denmark	-	-	-	-	2	0	-	-	-	-	-	-	9	1
Estonia	14	0	39	0	24	0	72	3	64	0	16	0	1	0
Finland	4	0	12	0	16	0	198	0	181	0	116	0	24	1
France[5]	21	0	668	0	-	-	63	0	-	-	779	0	323	11
Germany	-	-	-	-	-	-	15,636	0	-	-	-	-	5	5
Greece	-	-	-	-	5	0	-	-	-	-	8	0	3	0
Hungary	53	0	337	0	252	0	7,019	2	9	0	136	0	10	1
Italy	11	1	198	0	431	3	2,921	61	-	-	1,051	3	7	0
Latvia[5]	20	0	56	1	56	5	304	24	138	24	144	15	-	-
Lithuania	48	8	103	1	137	5	348	17	315	28	140	2	-	-
Luxembourg	1	0	-	-	-	-	23	0	-	-	1	0	-	-
Netherlands	-	-	6	0	5	0	2	0	-	-	1	0	165	11
Poland	58	0	856	0	620	0	23,153	6	75	0	589	0	109	2
Portugal	-	-	2	0	14	0	-	-	-	-	-	-	-	-
Romania	475	48	36	29	474	38	1,173	404	-	-	17	16	1	1
Slovakia	9	0	150	0	241	0	3,203	0	-	-	99	0	2	0
Slovenia	112	1	68	0	55	0	2,482	33	-	-	92	0	-	-
Spain	-	-	26	0	42	0	2	0	-	-	38	0	31	1
Sweden[5]	-	-	3	0	3	0	-	-	-	-	-	-	164	0
United Kingdom[5]	-	-	9	0	14	0	2	0	-	-	2	0	1,095	1
EU Total	**1,188**	**62**	**2,851**	**33**	**2,645**	**54**	**72,540**	**597**	**783**	**52**	**4,210**	**39**	**2,351**	**35**
Norway	-	-	-	-	3	0	64	0	-	-	3	0	1	0
Switzerland	4	0	10	0	16	0	31	0	-	-	8	0	41	0

1. Data include cattle, sheep, goats, solipeds, unspecified poultry and pigs.
2. Additionally, Spain reported three dogs from the Spanish cities of North Africa positive for rabies (classical rabies virus).
3. Data include alpine chamois, badgers, beavers, chinchillas, chipmunks, deer, dormice, ferrets, hares, hedgehogs, jackals, lynx, martens, mice, mink, moose, unspecified mustelides, otter, other pets (five animals tested, no positive), polar bear, polecats, rabbit, rats, squirrels, stray cats, stray dogs, weasel, wild boar, wild cat (*Felis silvestris*), wolverines and wolves.
4. In Denmark, France and Spain, the infected bats were positive with EBVL-1. In Finland and the United Kingdom, the infected bats were positive with EBVL-2. In Germany, two of the five infected bats were positive with unspecified EBLV, the rest were positive with unspecified *Lyssavirus*. In Hungary, the Netherlands and Poland, the infected bats were positive with unspecified EBLV. In Romania, the infected bat was positive with unspecified *Lyssavirus*. Additionally France reported one bat from French Guyana positive for classical rabies virus.
5. Latvia, France, Sweden (since 1998) and the United Kingdom (since 1987) have a passive surveillance programme for EBLV in bats. In Latvia, cases of rabies in bats were not registered.

Figure RA2. Reported cases[1] of classical rabies or unspecified* Lyssavirus *in animals in the MSs and other reporting countries, 2005-2009



Note: The number of reporting MSs and non-MSs are indicated at the top of each bar.

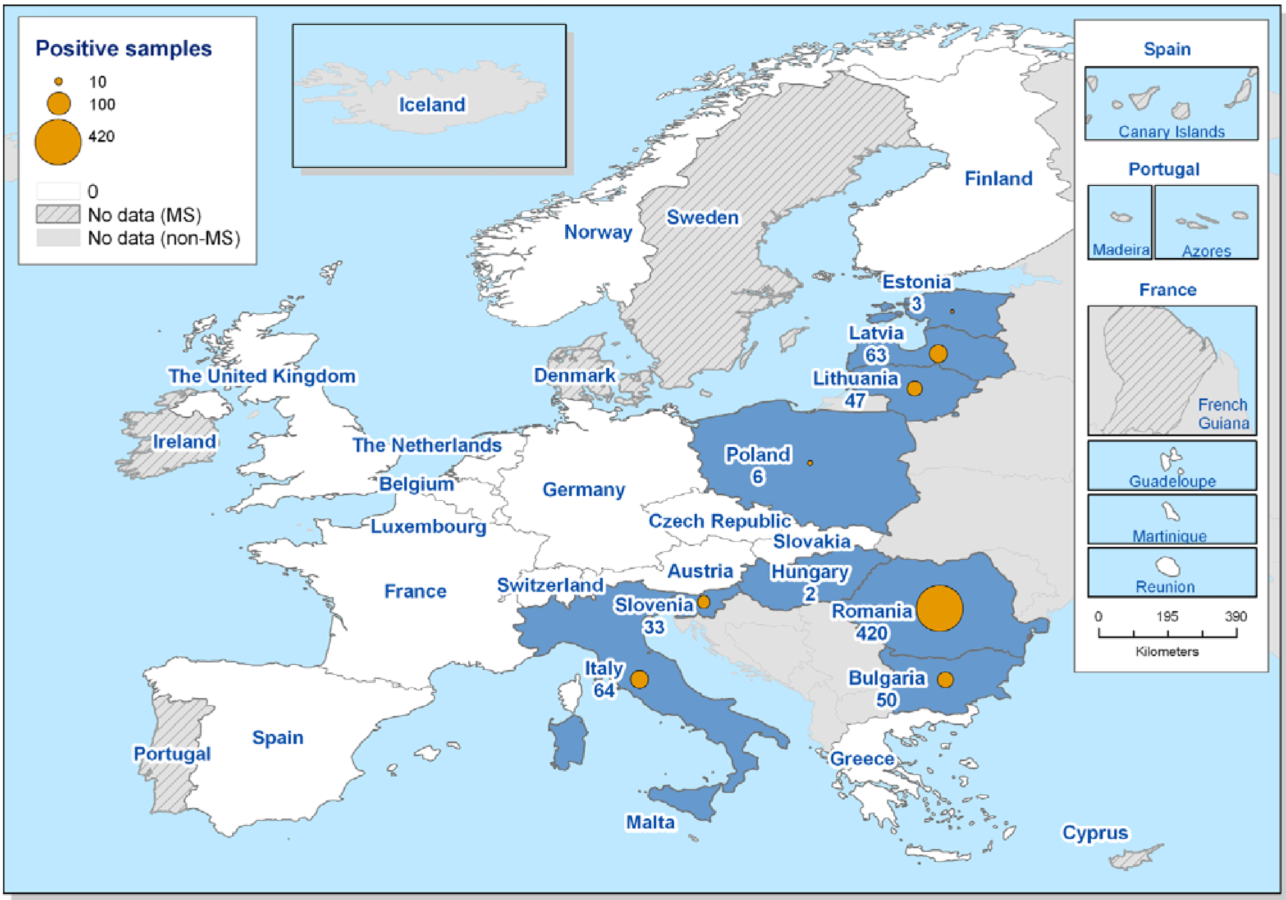
1. Imported cases are not included

Figure RA3. Classical rabies or unspecified **Lyssavirus** ***cases in domestic animals, 2009***

Note: All data provided were based on suspect sampling or other convenience type sampling.

Findings in the following species are included: broilers, cats (not stray cats), dogs (not stray dogs), cattle (bovine animals), ferrets (pet animals), goats, hamsters (pet animals), rats (pet animals), sheep, solipeds and pigs.

Figure RA4. Classical rabies or unspecified* Lyssavirus *cases in wild animals other than bats, 2009



Note: All cases were sufficiently typed to exclude EBLV infections.

Most data provided were based on suspicious sampling or other convenience type sampling, except Finland, Luxembourg, Poland and Slovakia who also provided data from a monitoring programme on foxes.

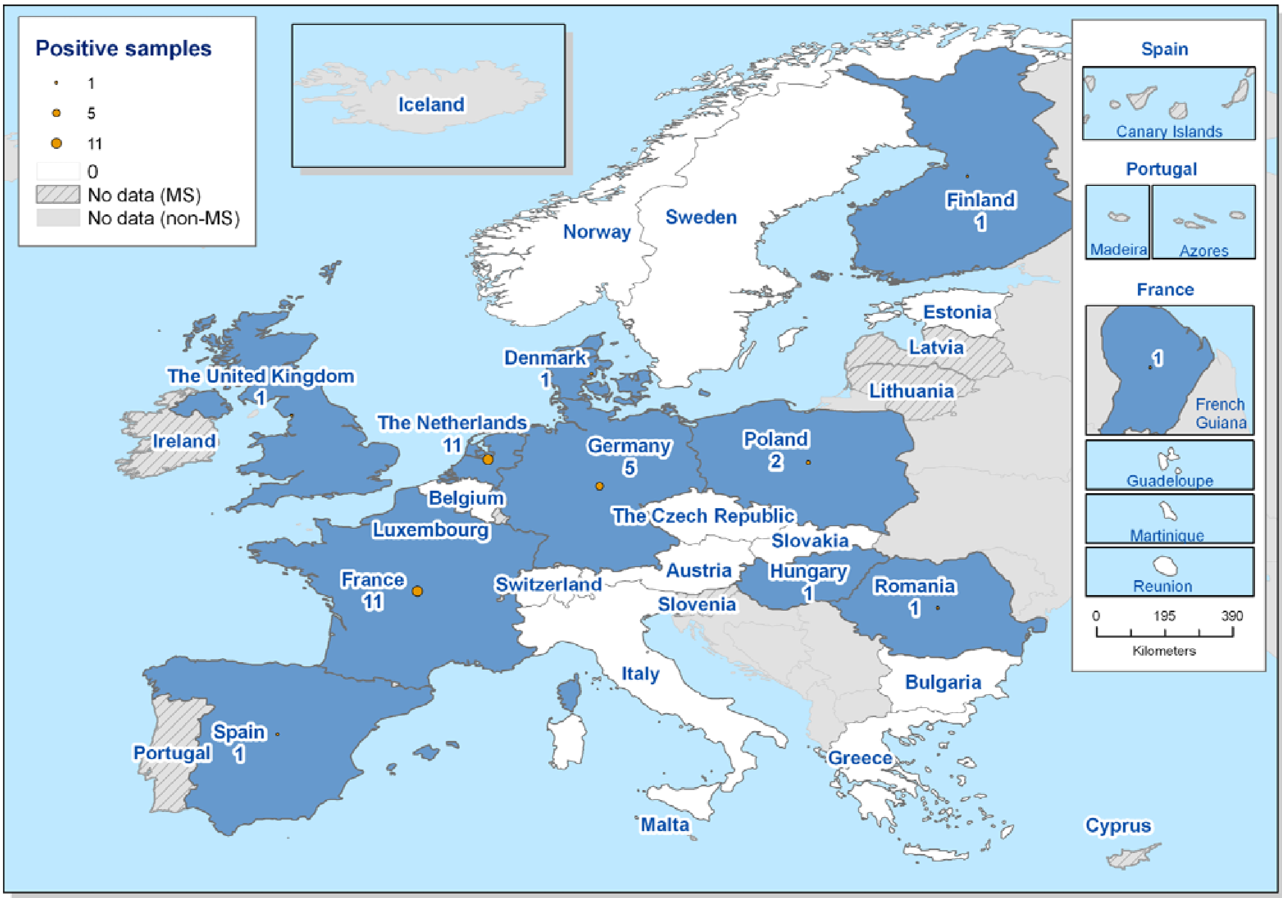
Findings in the following species are included: alpine chamois, badgers, beavers, chipmunks, cats (stray cats), deer, dogs (stray dogs), dormice, ferrets (not pets), foxes, hamsters (not pets), hares, hedgehogs, jackals, lynxes, martens, mice, minks, moose, other mustelides, otters, polar bears, polecats, rabbits (not pets), raccoons, raccoon dogs, rats, squirrels, weasels, wild boar, wild cats, wolverines, wolves.

Table RA4. Number of tested animals and positive cases of classical rabies from countries providing continuous data from foxes, 2007-2009

Country	2009		2008		2007		Species level
	N	Pos	N	Pos	N	Pos	
Austria	7,515	0	8,244	0	8,190	0	
Belgium	183	0	245	0	141	0	
Bulgaria	397	47	74	34	40	24	
Czech Republic	7,844	0	8,259	0	4,424	0	
Estonia	72	3	80	1	83	0	
Finland	198	0	437	0	261	0	
France	63	0	228	0	220	0	
Germany	15,636	0	12,561	0	14,845	0	
Greece	-	-	1	0	1	0	
Hungary	7,019	2	8,542	6	4,496	3	2008 and 2007: unspecified *Lyssavirus.*
Italy	2,921	61	1,865	8	2,143	0	
Latvia	304	24	397	44	5,124	95	2009: 18 cases were unspecified *Lyssavirus.*
Lithuania	348	17	314	13	-	-	2009 and 2008: unspecified *Lyssavirus.*
Luxembourg	23	0	20	0	23	0	
Netherlands	2	0	7	0	10	0	
Poland	23,153	6	21,293	19	16,044	42	2008: unspecified Lyssavirus. 2007: 13 cases were unspecified *Lyssavirus.*
Portugal	-	-	12	0	53	0	
Romania	1,173	404	2,350	951	-	-	
Slovakia	3,203	0	3,422	0	3,747	0	
Slovenia	2,482	33	2,329	51	1,884	3	In 2007, unspecified *Lyssavirus.*
United Kingdom	2	0	5	0	3	0	
Total (19 MSs in 2009)	**72,538**	**597**	**70,685**	**1,127**	**61,732**	**167**	
Switzerland	31	0	46	0	41	0	

Note: Norway tested 15, 2 and 64 polar foxes in 2007, 2008 and 2009, respectively. In 2007, additional 14 red foxes were tested. No positive findings

Figure RA5. European Bat* Lyssavirus *(EBLV) or unspecified* Lyssavirus *cases in bats*[1]*, 2009



Note: Most data provided were based on suspicious sampling or other convenience type sampling, except for Sweden and the United Kingdom where passive surveillance is carried out.

1. In Denmark and Spain, the infected bats were positive with EBVL-1. In France, 11 infected bats were positive for EBVL-1 and one bat positive for the classical rabies virus. In Finland and the United Kingdom, the infected bats were positive with EBVL-2. In Germany, two of the five infected bats were positive with unspecified EBLV, the rest were positive with unspecified *Lyssavirus.* In Hungary, the Netherlands and Poland, the infected bats were positive with unspecified EBLV. In Romania, the infected bat was positive with unspecified *Lyssavirus*.

3.6.3 Discussion

Human rabies is a rare and vaccine-preventable zoonosis in Europe. However, the potential burden of the disease is high as rabies is invariably fatal in infected unvaccinated humans. In 2009, there was an indigenous case in EU where a rabid fox bit a 69 year old woman living in rural Romania. Romania was the MS with the highest proportion of rabies-positive foxes in 2009 (34 %). The woman and her family neither reported it to the health or veterinary authorities nor sought medical attention. This case highlights the importance of public information and education about rabies and also the continuous monitoring for this disease in wildlife reservoirs.

In animals, most MSs have reported no or very few cases of classical rabies for a number of years. However, the sylvatic rabies is still prevalent in wildlife in the Baltic and some south-eastern European MSs and thus cases may also occur in farm and pet animals in these countries. In wildlife, most cases of rabies were reported in foxes and raccoon dogs. As a result of a high rabies infection rate in the western Balkan peninsula, rabies is still present in Slovenia and in Northern Italy where it reappeared in 2008.

For 2009, the total number of animals with rabies decreased compared to 2008, confirming a general steady decreasing trend over the previous years.

Estonia, Latvia, Lithuania and Poland have reported large reductions in the number of positive animal samples during the past years, especially in foxes and raccoon dogs. These four MSs implement vaccination programmes for foxes and raccoon dogs with EU co-financing. The results achieved by the programmes are monitored among the wildlife population. The observed reductions are likely to result from these successful vaccination campaigns. Slovenia reported also a slightly decreased number of foxes with rabies compared to 2008. However, in Italy an increased number of cases in foxes and other wildlife was recorded, and stringent measures have been taken in coordination with Slovenia and Austria to tighten rabies control in the north-eastern corner of the country.

For the first time in several years, no rabies cases in imported animals in EU (legally or illegally) were reported in 2009. However, illegal importations of infected animals (particularly pets) from enzootic rabies areas remain an important risk factor for the introduction of the disease in EU.

An increased number of MSs provided information on European Bat *Lyssavirus* (EBLV) infection and the United Kingdom and Sweden reported data from specific monitoring programmes. In total, 10 MSs reported rabies findings from bats; Finland recorded its first positive finding in these animal species.

A scientific report was submitted to EFSA concerning the development of harmonised schemes for the monitoring and reporting of rabies in animals in the European Union[33]. This report was an outcome of a grant project co-funded by EFSA and it was prepared by a consortium of MS institutes lead by ANSES[34]. The report recommends MSs to implement adequate and harmonised surveillance systems for rabies. These systems should be in place in all countries, whatever the rabies status (rabies-free and infected countries), and should target animals suspected of having contracted the disease. For countries involved in oral rabies vaccination programmes (infected as well as rabies-free countries), the monitoring of rabies vaccination, based on investigating hunted animals from vaccinated areas, should be undertaken for assessing the efficacy of these programmes. The standardisation of diagnostic reference techniques and new confirmatory tests (such as Polymerase Chain Reaction) used in EU is recommended. Additionally, the report recommends the implantation of a passive surveillance network for bat rabies (Bat *Lyssavirus*) in all MSs based on the testing of sick, rabies-suspect or dead bats of all bat species for *Lyssavirus* infections.

33 Scientific report submitted to EFSA. Development of harmonised schemes for the monitoring and reporting of rabies in animals in the European Union. Question No EFSA-Q-2010-00078.

34 Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (ANSES), France.

3. INFORMATION ON SPECIFIC ZOONOSES

3.7 Verotoxigenic *Escherichia coli*

Verotoxigenic *Escherichia coli* (VTEC) are a group of *E. coli* that are characterised by the ability to produce toxins that are designated verocytotoxins[35]. Human pathogenic VTEC usually harbour additional virulence factors that are important for the development of the disease in man. A large number of serogroups of *E. coli* have been recognised as verocytotoxin (VT) producers. Human VTEC infections are, however, most often associated with a minor number of O:H serogroups. Of these, the O157:H7 and the O157:H- serogroups (VTEC O157) are the ones most frequently reported to be associated with human disease.

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

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

Animals are the reservoir for VTEC, and VTEC (including VTEC O157) has been isolated from many different animal species. The gastrointestinal tract of healthy ruminants seems to be the foremost important reservoir for VTEC and foods of bovine and ovine origin are frequently reported as a source for human VTEC infections. Other important food sources include faecally contaminated vegetables and drinking water. The significance of many VTEC serogroups that can be isolated from animals and foodstuffs for infections in humans is, however, not yet clear.

Table VT1 presents the countries reporting data for 2009.

Table VT1. Overview of countries reporting data for 2009

Data	Total number of MSs reporting	Countries
Human	24	**All MSs** except CZ, GR, PT **Non-MSs**: CH, IS, NO
Food	20	**All MSs** except CY, DK, FI, GR, LT, LV, MT **Non-MS:** NO
Animal	15	**MSs**: AT, BG, DE, DK, EE, ES, FI, IE, IT, LV, NL, PL, PT, SE, SI **Non-MS**: NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP or own control are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis.

35 Verocytotoxin producing *E. coli* (VTEC) is also known as shiga toxin producing *E. coli* (STEC).

3.7.1. VTEC in humans

In 2009, the total number of confirmed VTEC cases in EU reported to TESSy was 3,573, representing a 13.1 % increase compared to 2008 (N=3,159) (Table VT2). Although, an increase in confirmed reported cases has been observed since 2008, the five-year trend from 2005 to 2009 on the notification rate in EU was not statistically significant. By country, there was a significant increasing five-year trend in the notification rate in Austria, Belgium, Ireland, and the Netherlands while the five-year trend was significantly decreasing in Estonia, Germany, Hungary, and Malta.

When interpreting information on VTEC cases it is important to note that data from different investigations are not directly comparable, especially between countries. This is mainly due to differences in applied analytical methods.

The most widely used analytical method only aims at detecting *E. coli* O157, and not all MSs use methodologies aiming at detecting other VTEC serotypes.

Table VT2. Reported VTEC cases in humans, 2005-2009 and notification rates for confirmed cases, 2009

Country	Report Type[1]	2009			2008	2007	2006	2005
		Cases	Confirmed cases	Confirmed cases/ 100,000	Confirmed cases			
Austria[3]	C	91	91	1.09	69	82	41	53
Belgium	C	96	96	0.90	103	47	46	47
Bulgaria	U	0	0	0	0	0	-	-
Cyprus	U	0	0	0	2	-	-	-
Czech Republic	-[2]	-	-	-	-	-	-	-
Denmark	C	173	160	2.90	161	156	146	154
Estonia	C	4	4	0.30	3	3	8	19
Finland	C	29	29	0.54	8	12	14	21
France	C	93	93	0.14	85	57	67	-
Germany	C	878	878	1.07	876	870	1,183	1,162
Greece	-	-	-	-	0	1	1	-
Hungary	C	1	1	<0.1	0	1	3	5
Ireland	C	240	237	5.33	213	115	153	125
Italy	C	71	51	0.08	24	27	*17*	
Latvia	U	0	0	0	0	0	0	0
Lithuania	U	0	0	0	0	0	0	-
Luxembourg	C	5	5	1.01	4	1	2	8
Malta	C	8	8	1.93	8	4	21	23
Netherlands	C	313	313	1.90	92	88	41	64
Poland	U	0	0	0	3	2	4	4
Portugal	-[2]	-	-	-	-	-	-	-
Romania	U	0	0	0	4	-	-	-
Slovakia	C	14	14	0.26	8	6	8	61
Slovenia	C	12	12	0.59	7	4	30	-
Spain	C	14	14	<0.1	21	18	13	16
Sweden	C	228	228	2.46	304	262	265	336
United Kingdom	C	1,339	1,339	2.19	1,164	1,149	1,294	1,171
EU Total		**3,609**	**3,573**	**0.75**	**3,159**	**2,905**	**3,357**	**3,269**
Iceland	C	8	8	2.50	4	13	1	-
Liechtenstein	-	-	-	-	0	-	-	-
Norway	C	108	108	2.25	22	26	50	18
Switzerland	C	42	42	0.54	67	53	47	52

1. C: case-based report; –: No report; U: unspecified.
2. No surveillance system exists.
3. New electronic reporting system in place since 2009.

More than half (51.7 %) of the reported confirmed human VTEC infections in 2009 were associated with the O157 serogroup (Table VT3). As in previous years, the majority of O157-associated confirmed cases (79.8 %) were reported by the United Kingdom and Ireland.

Table VT3. Reported confirmed VTEC cases in humans by serogroup (top 10), 2008-2009

2009			2008		
Serogroup	No of cases	% total	Serogroup	No of cases	% total
O157	1,848	51.7	O157	1,673	53.0
NT[1]	1,008	28.2	NT	819	25.9
O26	192	5.4	O26	166	5.3
O103	82	2.3	O103	88	2.8
O91	48	1.3	O145	49	1.6
O145	47	1.3	O91	50	1.6
O146	31	0.9	O111	43	1.4
O128	26	0.7	O128	28	0.9
O111	25	0.7	O146	25	0.8
O113	22	0.6	O117	20	0.6
Other[2]	244	6.8	Other	198	6.3
Total	**3,573**		**Total**	**3,159**	

1. NT = untyped/untypeable.

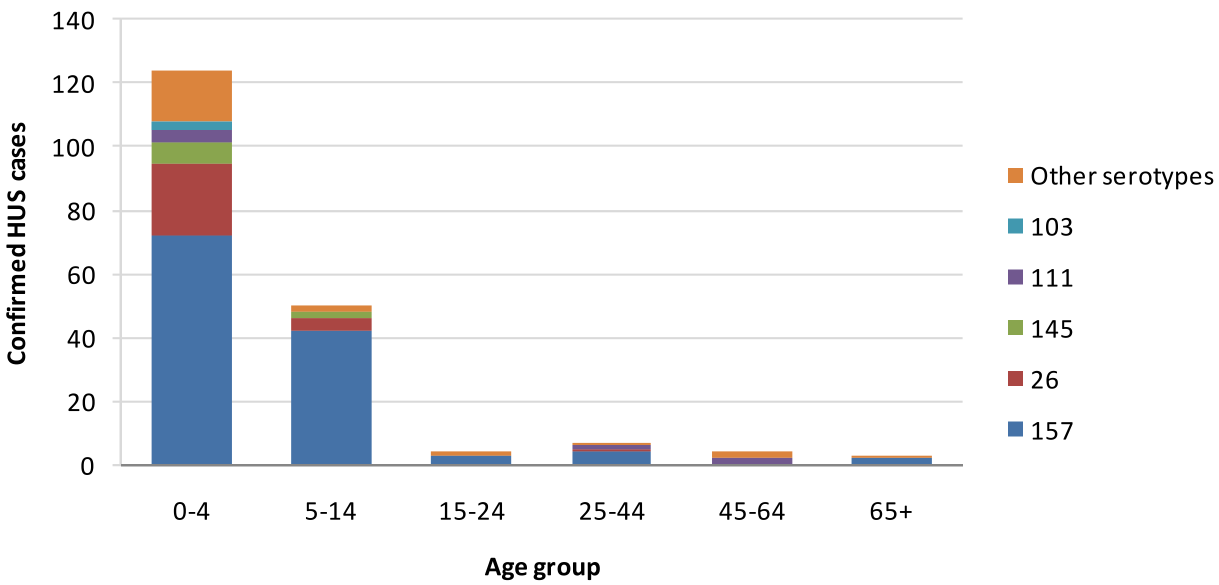
2. 'Other' includes 12 confirmed cases where the O-antigen was reported as unknown.

Source: Austria, Belgium, Cyprus (only 2008), Denmark, Estonia, Finland, France, Germany, Hungary (only 2009), Ireland, Italy, Luxembourg, Malta, Netherlands, Poland (only 2008), Romania (only 2008), Slovakia, Slovenia, Spain, Sweden, United Kingdom.

As in previous years, the highest notification rate occurred in the age group 0 to 4 years old (7.2 per 100,000 population) followed by children aged between 5-14 (1.8 per 100,000).

A total of 242 confirmed cases developed HUS. This represents an increase of 66 % compared with the number of HUS cases reported in 2008 (146). The VTEC O157 serotype was identified in 47 % of reported HUS cases in 0-4 year old children followed by VTEC O26 serotype in 15 % of cases (Figure VT1).

Figure VT1. Haemolytic Uremic Syndrome (HUS) by age and serogroup in reporting MSs, 2009

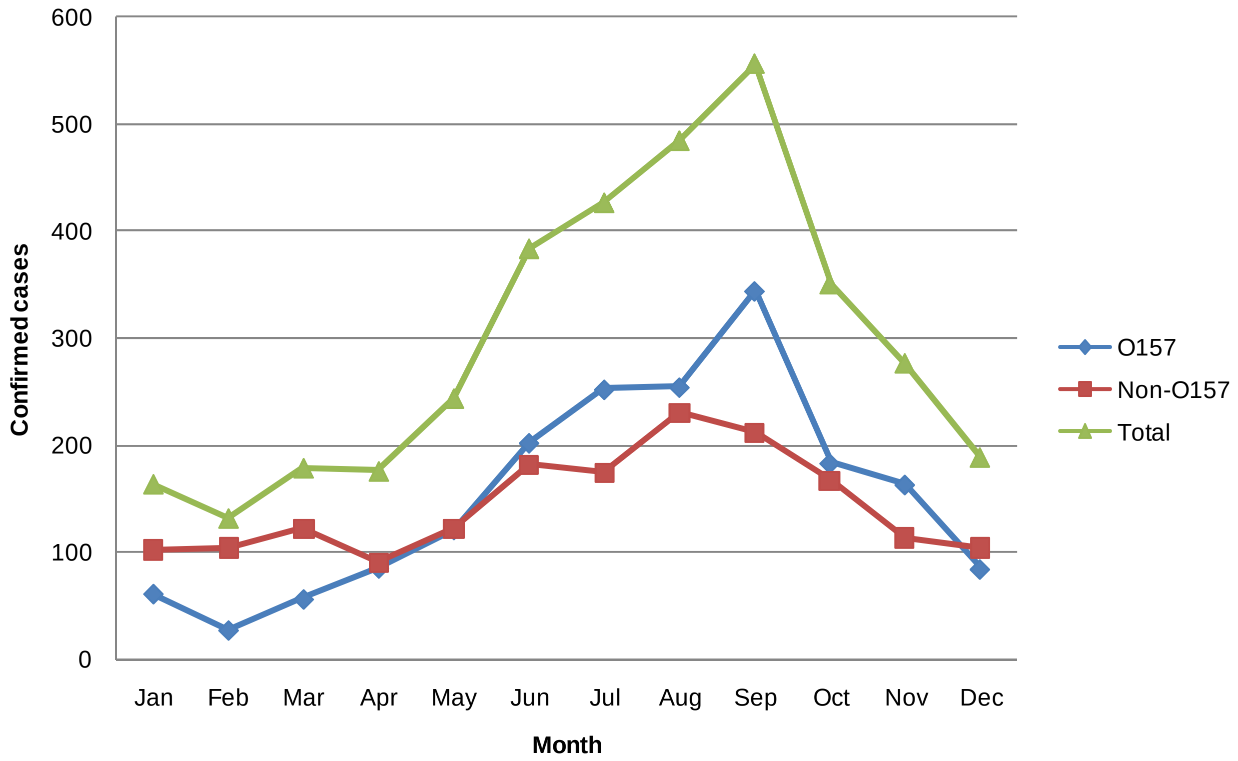


Source: Austria, Belgium, Denmark, France, Germany, Italy, Ireland, Netherlands, Slovenia, Sweden, United Kingdom (N=242).

As in previous years, the distribution of VTEC infections in 2009 followed a seasonal pattern, with a rise in case counts over the summer and autumn months, peaking in September (Figure VT2). This seasonal pattern was largely influenced by the increases in VTEC O157 infections during these months. The VTEC non-O157 confirmed cases also increased in June to October but had the highest peak in August.

In 2009, transmission was unknown in 98 % of the confirmed reported cases in EU. Consumption of bovine meat was the associated vehicle of transmission in 15 confirmed cases followed by drinking tap water in 12 confirmed cases.

Figure VT2. Number of reported confirmed cases of VTEC infection in humans by month, TESSy data for reporting MSs, 2009



Source: Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Malta, Netherlands, Slovakia, Slovenia, Sweden, United Kingdom (N=3,553).

3.7.2. VTEC in food

Twenty MSs reported data on VTEC in food for 2009. Bovine meat is believed to be a major source of food-borne VTEC infections for humans. Overall 9,285 bovine meat samples were investigated by MSs of which 2.3 % were VTEC-positive and 0.7 % was VTEC O157-positive (Table VT4). The proportion of VTEC and VTEC O157-positive samples in reporting MSs ranged from 0 % to 48.5 % and from 0 % to 14.9 %, respectively. Spain and Ireland were the only countries that reported VTEC O157-positive proportions above 1 % in bovine meat (14.9 % of fresh meat samples and 4.7 % of bovine carcasses, respectively). Concerning the other important human pathogenic VTEC serogroups (O26, O91, O111, O103 and O145), O26 was detected in bovine meat by Germany and O103 by France.

Raw cow's milk is also considered a source of human VTEC infections, and in the four MSs reporting on investigations of raw cow's milk (25 samples or more), VTEC was detected at farm levels in Germany and Slovakia (Table VT5). No additional information on serogroups was provided. VTEC was not detected in samples, where it was indicated that the milk was intended for direct human consumption (Germany) or intended for manufacture of raw or low heat-treated products (Hungary).

Only a few MSs reported data on fresh sheep meat (Table VT6). The overall proportion of VTEC-positive fresh sheep meat samples was 3.2 %. Only Germany reported positive samples for VTEC (10.5 %); however VTEC O157 was not detected in any sample.

Several MSs reported additional data on VTEC from different food categories and different animal species. Please refer to Level 3 tables for this additional information. Furthermore, Norway investigated more than 460 samples from animals; more than 740 samples from food, feed and environment were investigated due to the follow-up of human cases.

Table VT4. VTEC in fresh bovine meat, 2009

Country	Description	Sample weight	N	VTEC	VTEC O157	Additional information / serotype
				% pos	% pos	
At slaughter, cutting/processing plant						
Belgium	Fresh	1,600 cm^2	995	1.0	1.0	
	Fresh	25 g	294	0	0	
	Minced meat	25 g	293	0	0	Intended to be eaten raw.
Czech Republic	Fresh	25 g	220	0	0	
Estonia	Fresh	25 g	75	0	0	
Germany	Fresh	25 g	48	6.3	-	No serotype information.
	Minced meat	25 g	68	1.5	-	Intended to be eaten raw. No serotype information.
Hungary	Fresh	25 g	264	0	0	
	Minced meat	25 g	34	0	0	
Ireland	Carcass	-	86	4.7	4.7	
Poland	Fresh	400 cm^2	254	12.6	-	No serotype information.
	Fresh	400 cm^2	130	48.5	-	Samples from dairy cows. No serotype information.
Romania	Fresh	25 g	113	0	0	Processing plant.
	Fresh	25 g	617	0	0	Slaughter house.
	Fresh	25 g	127	0	0	Cutting plant.
	Minced meat	25 g	44	0	0	
Spain	Fresh	25 g	303	14.9	14.9	
At retail						
Bulgaria	Fresh	-	77	0	0	
France	Minced meat	25 g	1,527	0.1	<0.1	Chilled product, intended to be eaten raw, O157:H7 and O103:H2.
Germany	Fresh	25 g	150	3.3	-	One sample reported as O26-positive.
	Minced meat	25 g	336	4.2	-	Intended to be eaten raw. No serotype information.
	Veal, fresh[1]	25 g	361	5.8	-	No serotype information.
Hungary	Fresh	25 g	71	0	0	
	Minced meat	25 g	57	0	0	
Luxembourg	Fresh	-	307	0.3	0.3	
Netherlands	Fresh	25 g	206	0.5	0.5	
	Minced meat	25 g	292	0	0	
	Minced meat	25 g	1,288	0	0	Intended to be eaten raw.
Poland	Fresh	25 g	162	2.5	-	No serotype information.
Romania	Fresh	25 g	220	0	0	
Spain	Fresh	25 g	35	0	0	
Level of sampling not specified						
Germany	-	25 g	231	3.9	-	One sample reported as O26-positive. No serotype information on the other isolates.
Total (13 MSs)			**9,285**	**2.3**	**0.7**	

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

1. Germany: Monitoring

Table VT5. VTEC in raw cow's milk, 2009

Country	Description	N	VTEC	VTEC O157
			% pos	% pos
Germany	At farm	88	6.8	0
	Intended for direct human consumption	178	0	0
	Monitoring at farm[1]	337	1.5	0
Hungary	Intended for manufacture of raw or low heat-treated products	126	0	0
Italy	-	173	0	0
	Surveillance	821	0	0
Slovakia	Monitoring at farm	269	0.4	0.4

Note: Data are only presented for sample size ≥25. No additional information on serotypes.

1. Germany: Raw milk, intended for manufacture of pasteurised/UHT products

Table VT6. VTEC in fresh meat from sheep, 2009

Country	Description	Sample weight	N	VTEC	VTEC O157
				% pos	% pos
At slaughter, cutting/processing plant					
Ireland	Carcass	-	31	0	0
Poland	Fresh	1 g	107	0	0
At retail					
Germany	Fresh	25 g	38	10.5	0
Netherlands	Fresh	25 g	33	0	0
Total (5 MSs)			**248**	**3.2**	**0**

Note: Data are only presented for sample size ≥25. No additional information on serotypes.

3.7.3. VTEC in animals

Fifteen MSs reported data on VTEC in animals for 2009. The majority of VTEC data from cattle was obtained by analysing faecal samples from single animals. The average proportion of VTEC-positive samples, based on the investigation of 5,555 animals, was 6.8 %, ranging from 0 % to 48.5 % between MSs, and the average proportion of VTEC O157-positive samples was 2.7 %, ranging from 0 % to 13.2 % (Table VT7). Austria reported data from cattle that included complete serogroup information. The proportion of VTEC-positive calves and cattle over one year of age was 27.7 % and 32.1 %, respectively. As regards the other important human pathogenic serogroups (O26, O91, O111, O103 and O145), Austria detected O26, O91 and O103 from calves and O91 from cattle (unspecified). In addition, Italy reported VTEC O157 in 13.2 % of the tested water buffalo. Sweden investigated 500 ear bovine samples and 1,993 faecal samples collected from rectum, both sample types were retrieved at slaughter. Ear samples were 2.5 times more positive than the faecal samples.

The reported mean proportion of VTEC and VTEC O157-positive cattle herds/holdings in the three reporting MSs (Germany, Ireland and the Netherlands) was 6.1 % and 3.6 %, respectively, ranging from 0 % to 16.0 %. The Netherlands investigated 175 herds, of which 16.0 % were positive for VTEC O157. Spain reported that 20.2 % of samples taken from the colon of animals from different slaughter batches were positive for VTEC O157. Germany found O26 and O103 serogroups from herds of cattle and calves (Table VT7).

Sheep are considered to be an important reservoir for VTEC along with cattle. Data on sheep are shown in Table VT8. Austria conducted two investigations of sheep; one, where the samples consisted of fleece from the basis of an ear, and one where the samples consisted of rectal swabs. The proportion of VTEC-positive samples was 2.5 % and 70.5 % respectively. These differences were in line with the results from cattle investigations reported by Sweden and indicate the potential strong impact of sample type on the results of VTEC investigations. VTEC O157 was not detected. Austria also detected the serogroup O91 from sheep. Several MSs reported additional VTEC data from other animal species. Please refer to Level 3 tables.

Table VT7. VTEC in cattle, 2009

Country	Sample unit	N	VTEC	VTEC O157	Additional information/ serotype (no. of isolates)
			% pos	% pos	
Calves					
Austria	Animal	94	27.7	2.1	Calves less than one year. O8:HNT, O17:H18, O26:H- (3), O55:H11, O55:H12 (2), O91:H-, O103:H-, O103:H2, O113:H-, O116:H-, O116:H21, O118:H16, O125ac:H4, O128abc:HNT, O130:H11, O150:H-, O157:H- (2), O168:H8, O168:HNT, O178:H19, O181:H49, Orough:H-, Orough:HNT, NT.
Germany	Herd	156	2.6	0	O26, O103, NT (2).
	Animal[1]	303	13.5	-	No serotype information.
Netherlands	Herd	175	16.0	16.0	
Spain	Slaughter batch	258	20.2	20.2	Samples from colon.
Dairy cows					
Ireland	Herd	86	2.3	2.3	Dairy cows.
Netherlands	Herd	155	1.9	1.9	
Poland	Animal	130	48.5	-	Dairy, no serotype information.
Meat production animals					
Ireland	Herd	31	0	0	
Water buffalo					
Italy	Animal	53	17.0	13.2	Non-O157 serotypes not specified.
Not specified					
Austria	Animal	78	32.1	0	Cattle older than one year. O22:H8 (2), O23:H15, O39:H12, O39:HNT, O76:H19, O84:HNT, O84;Hrough, O91:H21, O100:H8, O104:H12, O104:H21, O113:H21, O134:H-, O153:H25, O166:H28, O168:H5, O172:H8, O174:H12, O177:H- (2), O177:H11, O179:H12, O181:H49 (3) ONT:H18, ONT:H19, ONT:H28 (2).
Denmark	Animal	263	8.7	8.7	
Estonia	Animal	253	0.4	0.4	
Finland	Animal	1,538	0.6	0.6	
Germany[2]	Herd	322	5.9	0	O26 (2), O103, NT (16).
Italy	Animal	296	24.7	-	No serotype information.
Portugal	Animal	54	0	0	
Sweden	Animal	500	8.2	8.2	Ear samples.
	Animal	1,993	3.3	3.3	Rectal samples.
Total (12 MSs)	**Animal/single**	**5,555**	**6.8**	**2.7**	
	Herd/holding	**925**	**6.1**	**3.6**	
	Slaughter batch	**258**	**20.2**	**20.2**	

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

More than one serotype can be reported from the same sample.

NT: Not typeable.

1. Germany: monitoring.

2. Germany: all cattle.

Table VT8. VTEC in sheep, 2009

Country	Sample unit	N	VTEC	VTEC O157	Additional information/ serotype (no. of isolates)
			% pos	% pos	
Austria	Animal	81	2.5	0	Fleece from the basis of an ear. O128abc:H-, O166:H28
	Animal	88	70.5	0	Rectal swabs. O5:H- (11), O55:H-, O70:HNT, O75:H-, O75:H8 (3), O75:H12, O75:HNT, O76:H- (3), O76:H19 (5), O86:H19, O86:H28 (2), O87:H10 (2), O87:H16 (2), O87:HNT, O91:H- (6), O112ab:H2, O113:H4, O128abc:H2, O142:H16, O146:H- (3), O146:H21 (4), O154:H34, O166:H28 (4), O174:H8, O176:H- (2), O176:H4 (2) O177:H11, O181:H-, ONT:H4, ONT:H8, ONT:H21 (2), ONT:H19 (2), ONT;H- (2), Orough:H-, NT
Germany	Herd	60	6.7	0	At farm
Portugal	Animal	49	0	0	
Slovenia	Animal	106	0.9	0.9	Faeces

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

More than one serotype can be reported from the same sample.

NT: Not typeable.

3.7.4 Discussion

As in previous years, confirmed cases of VTEC in humans reported at EU level were dominated by *E. coli* O157, mainly occurring in 0-4 year old children. Confirmed reported human cases of VTEC have increased since 2008. The number of cases that developed HUS, which is a very severe disease with a rapid loss of kidney function, increased by 66 % in 2009 (242) compared with 2008 (146). The VTEC serogroup O157, followed by O26, was the cause for the majority of reported HUS cases but, in addition, 18 more serogroups were reported from HUS cases. In order to understand better the pathogenicity of serotypes belonging to non-O157 serogroups, it is vital that the serotyping of VTEC isolates is performed routinely. It was therefore somewhat discomforting that the percentage of not serotyped VTEC strains increased from 26 % (N=3,159) in 2008 to 28 % (N=3,573) in 2009.

When interpreting VTEC data from food and animals, it is important to note that data from different investigations are not directly comparable, especially between countries. This is mainly due to differences in sampling strategies and applied analytical methods. The most widely used analytical method only aims at detecting *E. coli* O157, whereas fewer investigations have been conducted with analytical methods aiming at detecting all or selected serotypes of VTEC.

Most data received on VTEC in food and animals are of the VTEC O157 serogroup that is also the serogroup most often reported from human cases. Most of the findings of VTEC, and in particular of VTEC O157, in foodstuffs are from bovine meat and meat from other ruminants. This is in line with the information reported on food-borne outbreaks in 2009, where approximately half of the verified VTEC outbreaks, for which information on the food vehicle was available, were linked to bovine meat, sheep meat or red meat and products thereof.

In 2009, most MSs did not detect VTEC O157 or only found it at low levels in meat from bovine animals and sheep. However, some MSs reported higher prevalence, up to 14.9 % positive. The same pattern applies to findings from animals, cattle and sheep, where mostly low to moderate prevalence were found, while some MSs reported that up to 16 % of the investigated cattle herds tested positive.

According to the opinion from EFSA's Biological Hazards (BIOHAZ) panel on the monitoring of VTEC[36], the serogroups that are currently considered the most important regarding pathogenicity to humans are: O26, O91, O103, O111, O145 and O157. Four MSs already provided data on the VTEC serogroups other than O157 in 2009, and detected O26, O91 and O113 from bovine meat or cattle.

In order to improve the quality of the data from VTEC monitoring in EU, EFSA has issued technical specifications for the monitoring and reporting of VTEC in animals and food[37]. These guidelines are developed to facilitate the generation of data that can enable a more thorough analysis of VTEC in food and animals in the future. The specifications encourage MSs to monitor and report data on serogroups defined by BIOHAZ panel as most important regarding human pathogenicity.

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

37 EFSA (European Food Safety Authority), 2009. Scientific Report of EFSA on technical specifications for the monitoring and reporting of verotoxigenic *Escherichia coli* (VTEC) on animals and food (VTEC surveys on animals and food). EFSA Journal 2009, 7(11):1366, 43 pp.

3. INFORMATION ON SPECIFIC ZOONOSES

3.8 *Yersinia*

The bacterial genus *Yersinia* comprises three main species that are known to cause human infections: *Yersinia enterocolitica, Y. pseudotuberculosis* and *Y. pestis* (plague). The last major human outbreak of *Y. pestis* in Europe was in 1720, and today it is believed to no longer exist in Europe. *Y. pseudotuberculosis* and specific types of *Y. enterocolitica* cause food-borne enteric infections in humans. This chapter describes only infections caused by *Y. enterocolitica* and *Y. pseudotuberculosis*.

Yersiniosis caused by *Y. enterocolitica* most often causes diarrhoea, at times bloody, and occurs mostly in young children. Symptoms typically develop four to seven days after exposure and last an average of one to three weeks. In older children and adults, right-sided abdominal pain and fever may be the predominant symptoms and can often be confused with appendicitis. Other symptoms such as a rash, joint pain and/or bacteraemia may occur. Infection is most often acquired by eating contaminated food, particularly raw or undercooked pig meat. The bacterium is able to grow at +4°C and makes contaminated refrigerated food a probable source of infection. Untreated water can also transmit the organism.

Yersiniosis caused by *Y. pseudotuberculosis* shows many similarities with the disease pattern of *Y. enterocolitica*. Infections are caused by the ingestion of the bacteria from raw vegetables, fruit or other foodstuffs via water or direct contact with infected animals.

Y. enterocolitica is closely related to a large array of *Yersinia* spp. without any reported public health significance. Within *Y. enterocolitica*, the majority of isolates from food and environmental sources are non-pathogenic types. It is, therefore, crucial that investigations discriminate between which strains are pathogenic for humans. Biotyping of the isolates is essential to determine the pathogenicity to humans, and this method is ideally complimented by serotyping. Pathogenicity can also be determined by PCR methods. In Europe, the majority of human pathogenic *Y. enterocolitica* belong to biotype 4 (serotype O:3) or less commonly biotype 2 (serotype O:9, O:5,27).

Pigs are considered to be the primary reservoir for the human pathogenic types of *Y. enterocolitica*; mainly for biotype 4 (serotype O:3). Biotype 2 (serotype O:9) has been isolated from also other animal species, such as cattle, sheep and goats. Clinical disease in animal reservoirs is uncommon.

In 2009, an overview of data reported is given in tables and figures. Additional information on the data provided by MSs on *Yersinia* in 2009 is presented in Level 3 tables.

Table YE1 presents the countries reporting *Yersinia* data for 2009.

Table YE1. Overview of countries reporting data on Yersinia spp., 2009

Data	Total number of MSs reporting	Countries
Human	24	**All MSs** except GR, NL, PT **Non-MS**: NO
Food	11	**MSs**: AT, BE, DE, EE, ES, IT, LT, PL, PT, RO, SE
Animal	13	**MSs**: DE, EE, ES, HU, IE, IT, LV, NL, PT, SE, SI, SK, UK **Non-MSs**: CH, NO

Note: The overview table includes all data reported by MSs. However, in the following chapter, data reported as HACCP, own control or import are not included in the detailed tables, and unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also only countries reporting 25 samples or more have been included for analysis.

3.8.1 Yersiniosis in humans

A total of 7,595 confirmed cases of yersiniosis was reported in EU in 2009. The number of reported yersiniosis cases in humans continued to decrease since 2005 (statistically significant decreasing EU trend) (Figure YE1) although yersiniosis is still the third most numerously reported zoonosis in EU with a notification rate of 1.65 per 100,000 population. In individual MSs, statistically significant decreasing trends were noted in Belgium, Germany and Sweden, while increasing trends were observed in France, Luxembourg, and Poland. *Yersinia enterocolitica* was again the most common species reported in human cases by MSs and was isolated from 93.7 % of all confirmed cases in 2009 followed by Y. *pseudotuberculosis* which only represented 1.3 % of all isolates. Most of the confirmed cases were domestic, 79.0 %, compared to only 4.0 % imported.

Table YE2. Reported cases of yersiniosis in humans in 2005-2009, and notification rates in 2009

Country	Report Type[1]	2009			2008	2007	2006	2005
		Cases	Confirmed Cases	Confirmed cases/ 100,000	Confirmed cases			
Austria [4]	C	140	140	1.68	93	142	158	143
Belgium	C	238	238	2.23	273	248	264	303
Bulgaria	A	8	8	0.11	10	8	5	-
Cyprus	U	0	0	0	0	0	-	-
Czech Republic	C	463	463	4.42	557	576	534	498
Denmark	C	238	238	4.32	331	274	215	241
Estonia	C	54	54	4.03	42	76	42	31
Finland	C	633	633	11.88	608	480	795	638
France	A	208	208	0.32	213	195	158	171
Germany	C	3,700	3,700	4.51	4,352	4,988	5,161	5,624
Greece	-	-	-	-	-	-	-	0
Hungary	C	51	51	0.51	40	55	38	41
Ireland	C	3	3	0.07	3	6	1	3
Italy	C	11	11	0.02	-	-	0	-
Latvia	C	70	66	2.92	50	41	92	51
Lithuania	A	483	483	14.42	536	569	411	501
Luxembourg	C	36	36	7.29	17	11	5	1
Malta	U	0	0	0	0	0	-	0
Netherlands	-	-	-	-	-	-	-	-
Poland	C	288	288	0.76	204	182	110	132
Portugal	-[2]	-	-	-	-	-	-	-
Romania	C	32	32	0.15	9	-	-	-
Slovakia	C	168	167	3.09	68	71	82	63
Slovenia	C	27	27	1.33	31	32	80	0
Spain[3]	C	291	291	0.63	315	381	375	318
Sweden	C	397	397	4.29	546	567	558	684
United Kingdom	C	61	61	0.10	48	86	58	65
EU Totals	**-**	**7,600**	**7,595**	**1.65**	**8,346**	**8,988**	**9,142**	**9,508**
Iceland	-[2]	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	0	-	-	-
Norway	C	60	60	1.25	50	71	86	125

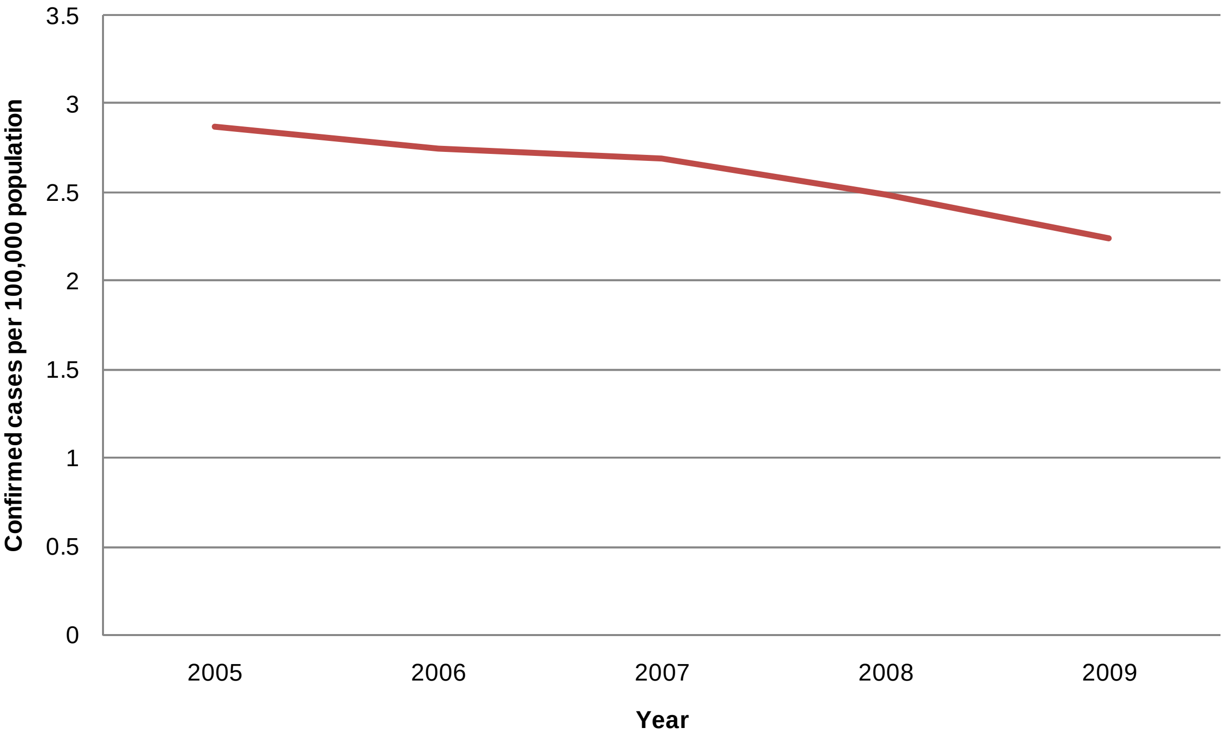
1. A: aggregated data report; C: case-based report; –: No report; U: unspecified.

2. No surveillance system exists.

3. Sistema de Informacion Microbiologica (SIM), notification rates calculated on estimated coverage, 25 %.

4. New electronic reporting system in place since 2009.

Figure YE1. Notification rate of reported confirmed cases of human yersiniosis in EU, 2005-2009



Source: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Poland, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

3.8.2 *Yersinia* in food and animals

The most important food and animal sources for *Yersinia* infection in humans are assumed to be pig and pig meat and products thereof. The results in these animal and food categories are presented in Tables YE3 and YE4, respectively. In 2009, eight MSs reported data on investigations on *Yersinia* in pigs and pig meat. As in previous years, *Y. enterocolitica* was detected both from pig meat and pigs by some MSs.

In 2009, only three MSs reported positive findings in pig meat and products thereof. Overall, 4.9 % and 4.8 % of pig meat samples tested were positive for *Yersinia* spp. and *Y. enterocolitica*, respectively. The highest proportions of positive samples were reported by Spain and Portugal, with 48 % and 40 % positive for *Y. enterocolitica*, respectively (Table YE3). Pig herds were found positive for *Y. enterocolitica* by one reporting MS with 1 % prevalence. Two MSs reported *Y. enterocolitica* from slaughter batches of pigs with high prevalence of 19.8 % to 48.4 % positive. No positive results were reported by Ireland and Italy (Table YE4).

A few MSs reported isolation of *Y. enterocolitica* serotypes and biotypes recognised as pathogenic for humans. In particular the serotype O:3 was reported in pig meat and products thereof by Germany and in pigs by Germany and Spain. According to the opinion from the Biological Hazard Panel in 2007[38], the majority of human pathogenic *Y. enterocolitica* strains in Europe belong to biotype 4 (serotype O:3), followed by biotype 2 (serotype O:9). Also, biotypes 1B, 3 and 5 are human pathogenic, while the biotype 1A is not.

For additional information refer to Level 3 tables.

Table YE3.* Yersinia *spp. in pig meat and products thereof, 2009

Country	Description	Sample weight	N	*Yersinia* spp.	*Y. enterocolitica*	*Y. enterocolitica* serotypes/biotypes (no of isolates)
				% pos	% pos	
At slaughter						
Estonia	Fresh	swabs	80	0	0	
Romania	Fresh	25 g	457	0	0	
Spain	Fresh	25 g	83	0	0	
At processing plant						
Portugal	Fresh	25 g	61	1.6	0	
	Meat products	25 g	33	0	0	
Romania	Fresh	25 g	358	0	0	
At retail						
Portugal	Minced meat	25 g	25	40.0	40.0	
Romania	Fresh	25 g	81	0	0	
Spain	Fresh	25 g	25	48.0	48.0	
Sampling level not stated						
Germany	Fresh	25 g	395	9.4	9.4	O:3 (30)
	Meat products	25 g	233	5.2	5.2	O:3 (1)
	Minced meat	25 g	43	2.3	2.3	
Italy	Fresh	-	135	0	0	
	Meat products	-	31	0	0	
Portugal	Fresh	25 g	61	1.6	1.6	
	Meat products	25 g	33	0	0	
Total (6 MSs)			**2,134**	**4.9**	**4.8**	

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

38 EFSA (European Food Safety Authority), 2007. Scientific Opinion of the Panel on Biological Hazard (BIOHAZ) on monitoring and identification of human enteropathogenic *Yersinia* spp. The EFSA Journal, 595, 1-30.

Table YE4. Yersinia *spp. in pigs, animal-based data, 2009*

Country	Unit	N	*Yersinia* spp.	*Y. enterocolitica* (all serotypes)	*Y. enterocolitica* serotypes/biotypes (no of isolates)
			% pos	% pos	
Germany	Herd	525	1.0	1.0	O:3 (1)
Slovenia	Slaughter Batch	131	19.8	19.8	
Spain	Slaughter Batch	277	48.4	48.4	O:3 (134)
Ireland	Animal	391	0	0	
Italy	Animal	34	0	0	

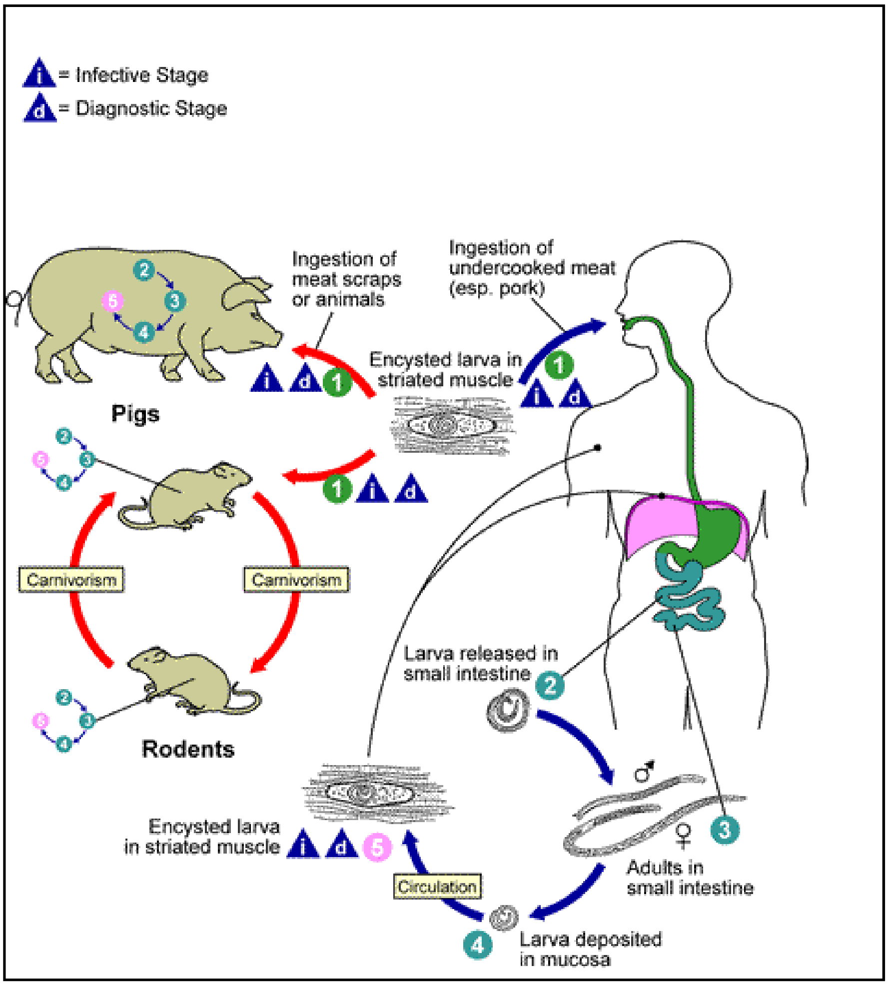
Note: Data are only presented for sample size ≥25.

3. INFORMATION ON SPECIFIC ZOONOSES

3.9. *Trichinella*

Trichinellosis is a zoonotic disease caused by parasitic nematodes of the genus *Trichinella*. The parasite has a wide range of host species, mostly mammals. *Trichinella* spp. undergo all stages of the life cycle, from larva to adult, in the body of a single host (Figure TR1).

Figure TR1. Lifecycle of **Trichinella**



Source: http://www.dpd.cdc.gov/dpdx

In Europe, trichinellosis has been described as an emerging and/or re-emerging disease during the past decades. Worldwide, eight species and three genotypes have been described: *T. spiralis, T. nativa*, *T. britovi, T. murelli, T. nelsoni, T. pseudospiralis, T. papuae* and *T. zimbabwensis, Trichinella* T6, *Trichinella* T8 and *Trichinella* T9. The majority of human infections in Europe is caused by *T. spiralis*, *T. britovi* and *T. nativa*, while a few cases caused by *T. pseudospiralis* and *T. murelli* have been described as well.

Humans typically acquire the infection by eating raw or inadequately cooked meat contaminated with infectious larvae. The most common sources of human infection are pig meat, wild boar meat and other game meat. Horse, dog and many other animal meats have also transmitted the infection. Horse meat was identified as the source of infection in a number of human outbreaks recorded in EU from the mid-1970s until 2005, including some of the largest outbreaks recorded in decades. Freezing of the meat minimizes the infectivity of the parasite, even though some *Trichinella* species/genotypes (*T. nativa, T. britovi* and *Trichinella* genotype T6) have demonstrated resistance to freezing in game meats.

The clinical signs of acute trichinellosis in humans are characterised by two phases. The first phase of trichinellosis symptoms may include nausea, diarrhoea, vomiting, fatigue, fever and abdominal discomfort. However, this phase is often asymptomatic. Thereafter, a second phase of symptoms including muscle pains, headaches, fevers, eye swelling, aching joints, chills, cough, itchy skin, diarrhoea or constipation may follow. In more severe cases, difficulties with coordinating movements as well as heart and breathing problems may occur. A small proportion of cases die from trichinellosis infection. Systematic clinical signs usually appear about 8-15 days after the consumption of contaminated meat.

An overview of the data reported in 2009 is presented in the following tables and figures. Since the EUSR 2009 focus on zoonotic parasites, this chapter is more extensive than usual.

Table TR1. Overview of countries reporting data on* Trichinella *spp., 2009

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

3.9.1 Trichinellosis in humans

The number of reported trichinellosis cases in humans is presented in Table TR2. In 2009, there were 1,073 reported cases of trichinellosis of which 69.9 % (748 cases) were reported as confirmed. This difference in case classification reporting may be because in outbreaks only one or two clinical cases of the total number of cases are laboratory confirmed and the rest are considered epidemiologically linked to the confirmed case/s.

In 2009, confirmed cases of trichinellosis increased with 11.6 % compared with 2008. The highest change was observed in Bulgaria where the number of reported confirmed cases (407 cases) increased over 500 % compared to 2008 (67 cases). As in 2008, Bulgaria and Romania accounted for 89.8 % of confirmed reported cases. The majority of cases in Romania, Lithuania and Poland can be explained by the reported food-borne *Trichinella* outbreaks: in Romania (31 outbreaks with a total of 406 cases), Lithuania (2 outbreaks with a total of 114 cases) and Poland (3 outbreaks with a total of 33 cases).

In 2009, *Trichinella* species was reported for only a small proportion (12.1 %) of confirmed cases (39/321). *T. spiralis* was reported in 34 cases and the species was not specified for 272 cases. In 2009, no cases due to *T. nativa* or *T. pseudospiralis* were reported.

The highest notification rate of reported cases occurred in people aged 25-44 and 15-24 years old with 1.6 per 1,000,000 population in both age groups. There were 8 confirmed cases reported in children aged 0-4 year old from Romania. Of cases infected through food, consumption of pork was the main suspected vehicle in 90.1 % of confirmed reported cases while other meat accounted for the rest of the cases (N=304).

The mean notification rates for trichinellosis during the year 2007-2009 in MSs are presented in Figure TR2. Romania and Bulgaria had clearly the highest mean notifications rates.

Table TR2. Reported cases of trichinellosis in humans 2005-2009, and notification rate for confirmed cases, 2009

Country	Report Type[1]	2009			2008	2007	2006	2005
		Cases	Confirmed Cases (Imported)	Confirmed cases per 100,000	Total Confirmed cases (Imported)			
Austria[3]	C	0	0	0	0	0	0	0
Belgium	U	0	0	0	5	3	-	0
Bulgaria	A	443	407	5.35	67	62	180	-
Cyprus	U	0	0	0	0	0	-	0
Czech Republic	U	0	0	0	0	0	-	0
Denmark	-[2]	-	-	-	-	-	-	-
Estonia	C	1	0	0	0	0	-	1
Finland	U	0	0	0	0	0	-	0
France	C	9	9 (9)	<0.01	3	1 (1)	10	20 (20)
Germany	C	1	1	<0.01	1 (1)	10 (7)	22 (1)	0
Greece	-	-	-	-	0	0	-	-
Hungary	C	9	9 (1)	0.1	5 (3)	2 (2)	-	0
Ireland	C	0	0	0	0	2 (2)	0	0
Italy	C	1	1	<0.01	0	1	-	-
Latvia	C	9	9	0.40	4	4	11	62
Lithuania	A	115	20	0.60	31	8	20	13
Luxembourg	U	0	0	0	0	-	-	0
Malta	U	0	0	0	0	0	-	0
Netherlands	C	1	1	0.01	1 (1)	0	-	0
Poland	C	36	18	0.05	4	217	89	70
Portugal	U	0	0	0	0	0	-	0
Romania	C	440	265	1.23	503	432	350	-
Slovakia	U	0	0	0	18	8	5	0
Slovenia	C	1	1 (1)	0.05	1 (1)	0	1	0
Spain	C	7	7	0.02	27	29	18	9 (3)
Sweden	U	0	0	0	0	1	-	0
United Kingdom	U	0	0	0	0	0	0	0
EU Total		**1,073**	**748**	**0.16**	**670 (6)**	**780 (12)**	**706 (1)**	**175 (23)**
Iceland	-[2]	-	-	-	-	-	-	0
Norway	C	0	0	0	0	0	-	0
Switzerland	C	4	4 (3)	0.05	-	-	-	-

1. A: aggregated data report; C: case-based report; –: No report; U: unspecified reported.
2. No surveillance system exists.
3. New electronic reporting system in place since 2009.

Figure TR2. Mean trichinellosis notification rates in humans in EU (per 100,000 population), 2007-2009

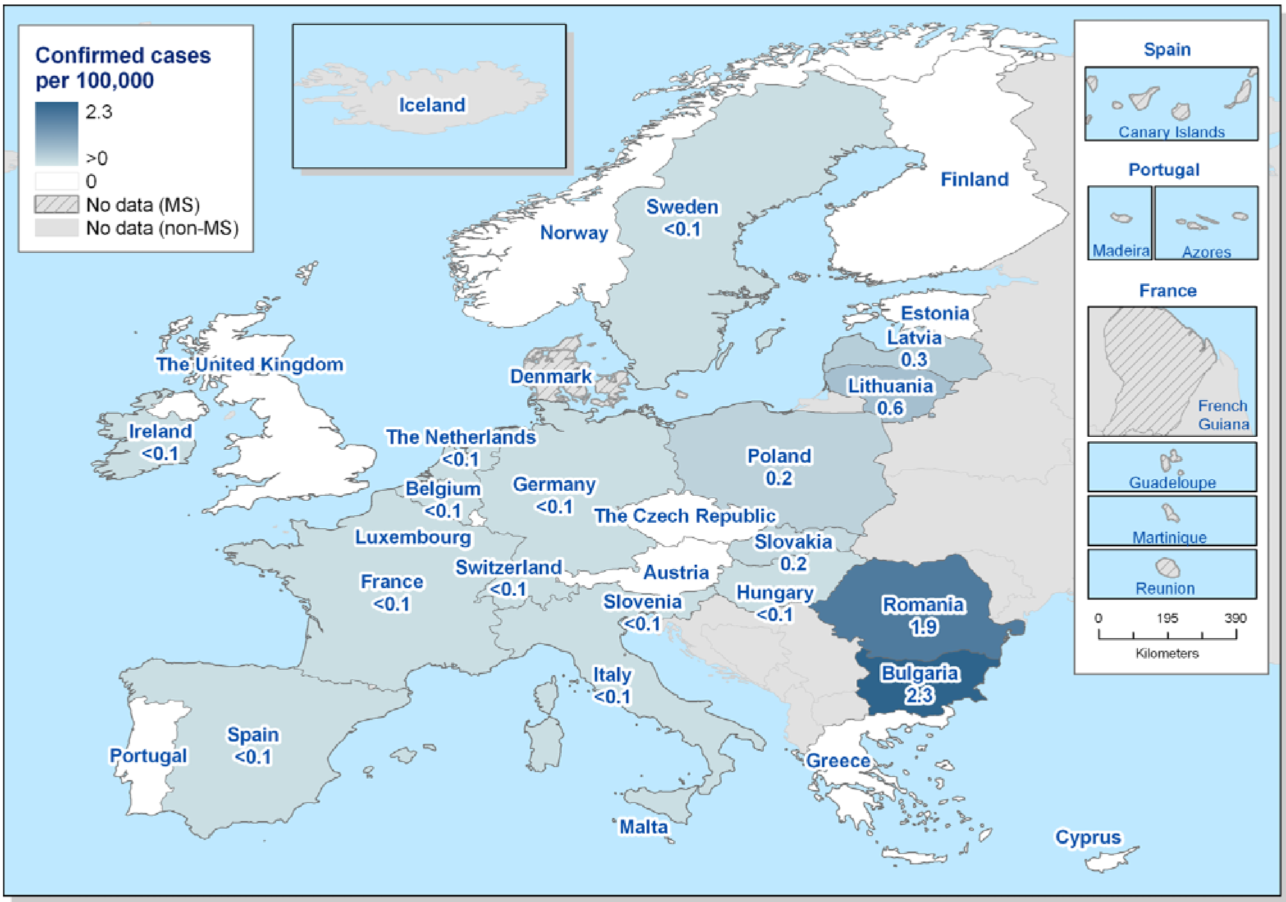
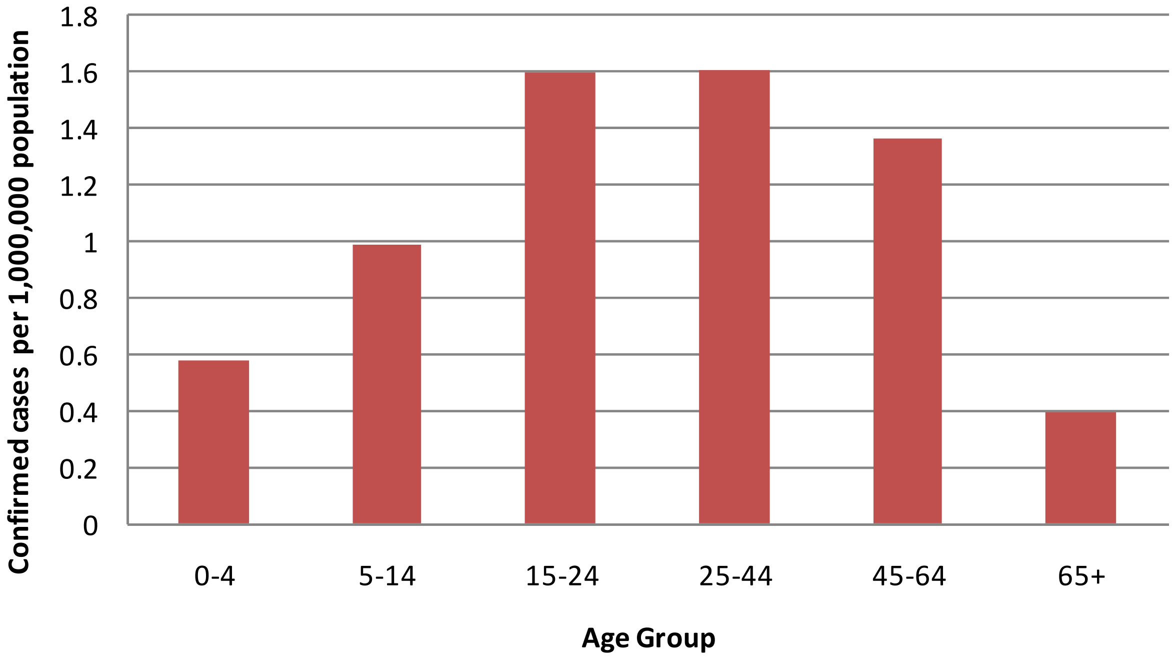


Figure TR3. Age-specific distribution of reported confirmed cases of human trichinellosis per 1,000,000 population for reporting MSs, 2009



Source: France, Germany, Hungary, Italy, Latvia, Netherlands, Poland, Romania, Slovenia and Spain (N= 323)

3.9.2 *Trichinella* in animals

Data submitted by all MSs and the two non-MSs on *Trichinella* in animals are presented in Figures TR4-TR7 and Tables TR3-TR6. The results are given for the most important animal species that serve as sources of human trichinellosis cases in MSs. According to Commission Regulation (EC) No 2075/2005[39], carcasses of domestic swine, horses, wild boar and other farmed or wild animal species susceptible to *Trichinella* infestation shall be systematically sampled at slaughter as part of meat inspection and tested for *Trichinella*. Thus, most of the data reported derives from meat inspections. Another source of data is the monitoring of *Trichinella* in wildlife animal species not intended for human consumption.

During the years 2007-2009, all MSs and two non-MSs provided information regarding *Trichinella* in farm animals (pigs, farmed wild boar and solipeds) and the total EU *Trichinella* prevalence in these animal species was 0.0004 %. Eleven MSs reported findings of *Trichinella* in farm animals; Romania reported 79.2 % of all the findings, while Spain, Poland and Bulgaria reported 8.0 %, 7.6 % and 3.9 % of the findings, respectively. These four countries were the only MSs to report *Trichinella* in farm animals in each of the years covered. The remaining seven MSs reported *Trichinella* in farm animals occasionally during the three years.

The total EU *Trichinella* prevalence in pigs (breeding and fattening pigs) has been very low for many years (<0.001 %) (Table TR3). During the years 2007-2009, Bulgaria, France, Germany, Lithuania, Poland, Romania, Slovakia and Spain reported *Trichinella* findings in pigs; Romania reported 80.3 % of the findings. France, Germany and Slovakia found only one to three pigs positive per year, while the other countries recorded higher numbers of infected pigs (Figure TR4).

For the period 2007 to 2009, all MSs except Cyprus, Norway and Switzerland reported data on solipeds, mostly horses or unspecified solipeds. Data from donkeys were only reported in 2008 by Italy. Almost 500,000 solipeds have been tested for *Trichinella* during the period and only one positive horse imported from Poland was reported by Italy in 2008.

During the years 2007 to 2009, 11 MSs provided information about testing of farmed wild boar and only a few positive animals were reported by Austria, Bulgaria, Finland and Greece (Table TR4). Bulgaria reported the highest proportion of positive farmed wild boar, 1.7 % in 2007. At EU level, 0.05 % of the tested farmed wild boar were positive for *Trichinella* during 2007 to 2009, which is a higher prevalence when compared to pigs. In Austria, Bulgaria and France, the number of farmed wild boar tested each year varied considerable; e.g. Bulgaria tested 67 animals in 2009 and 22,884 in 2008.

In total, 23 MSs and two non-MSs reported data on hunted wild boar from 2007 to 2009 and 19 MSs provided data for all three years (Table TR5). In 2008 and 2009, the proportion of positive animals increased almost twofold compared to 2007 mainly due to an increased number of positive animals from Poland. However, for all three years, the highest proportion of positive animals was reported from Finland (3.8 % positive, only 52 samples) followed by Latvia (1.1 %), Poland (0.6 %) and Romania (0.6 %) (Figure TR5). At EU level, *Trichinella* was reported more often in hunted wild boar (0.14 %) compared to pigs (0.0004 %) and farmed wild boar (0.05 %) (Tables TR3-TR5). The Czech Republic, Luxembourg, the Netherlands, Portugal and the United Kingdom reported no *Trichinella* findings in hunted wild boar during the three years.

For pigs as well as farmed and hunted wild boar, MSs reported the majority of positive results as *Trichinella* spp. However, some information was provided at species level and *T. spiralis* dominated the findings in both pigs and wild boar, however in wild boar especially in hunted animals, some findings of *T. pseudospiralis, T. britovi* and *T. nativa* were reported as well.

Data on *Trichinella* in wildlife other than wild boar are presented as pooled data for the years 2007 to 2009 and all MSs except Malta, and the two non-MSs, have reported data (Table TR6). Overall, 19 MSs reported findings in wildlife, mainly in foxes, raccoon dogs and bears, but findings in badgers, beavers, deer, hedgehogs, lynxes, mustelidae, polecats, rats, wild minks and wolves were also reported. Finland, Slovakia and Latvia reported 57.5 %, 12.7 % and 9.1 % of all findings, respectively. In 2007 to 2009, 21 MSs reported data on *Trichinella* in foxes, and 15 MSs had positive findings (Table TR6). The total proportion of foxes positive with *Trichinella* in 2007 to 2009 was 1.9 %; Latvia had an extremely high proportion of positive

39 Commission Regulation (EC) No 2075/2005 of 5 December 2005 laying down specific rules on official controls for *Trichinella* in meat. OJ L 338, 22.12.2005, p. 60 -82.

animals (71.2 %), followed by Finland (19.0 %) and Slovakia (17.1 %). The majority of positive foxes was reported as *Trichinella* spp., but findings of *T. spiralis, T. britovi* and *T. nativa* were reported as well.

Five MSs and one non-MS tested raccoon dogs for *Trichinella* from 2007 to 2009 (Table TR6). Latvia had an extremely high proportion of positive raccoon dogs (73.8 %) and Finland had 28.6 % positive raccoon dogs. These two MSs had the highest proportions of positive samples in foxes as well. Denmark, Slovakia, Sweden and Norway did not find *Trichinella*-positive raccoon dogs.

Eight MSs and one non-MS reported data on *Trichinella* in bears in 2007 to 2009 with a total proportion of positive animals of 5.9 % (Table TR6). During the three-year period, 37.8 % of all bears investigated were from Sweden, however only one sample was found positive. Romania, Estonia and Finland reported 14.9 %, 13.7 % and 5.9 % of investigated bears positive, respectively. Slovakia and Slovenia had no findings in bears nor did Bulgaria, Germany and Norway, but these latter countries only tested one or two bears. Finland, Italy, Sweden and Portugal reported data on wolves from 2007 to 2009 with 36.6 %, 9.1 %, 7.5 % and 0 % of the animals being positive, respectively. In total, 208 wolves were tested and 20.2 % were positive.

All MSs except Malta, and Norway and Switzerland provided information about *Trichinella* in some wildlife species including hunted wild boar and the total number of positive samples from 2007 to 2009 is presented in Figure TR6.

Figure TR4. Findings of* Trichinella *in pigs, 2007-2009 (pooled data)

Table TR3. Findings of* Trichinella *in pigs, 2007-2009

Country	Species	2009		2008		2007	
		N	Pos	N	Pos	N	Pos
Austria		5,537,389	0	5,491,872	0	5,521,439	0
Belgium		11,677,883	0	11,547,720	0	11,512,404	0
Bulgaria	*T. spiralis*	384,296	9	342,942	12	57,388	3
	T. spp.		42		0		2
Cyprus		717,383	0	-	-	-	-
Czech Republic		3,289,761	0	3,401,215	0	3,955,887	0
Denmark		23,230,324	0	18,935,880	0	21,391,000	0
Estonia		405,456	0	474,859	0	452,170	0
Finland		2,331,712	0	4,872,522	0	4,904,447	0
France[2]	*T.* spp.	602,165	0	16,548,576	2	526,362	1
Germany	*T. spiralis*	56,415,489	0	54,848,000	3	53,310,844	0
Greece		823,534	0	848,620	0	351,036	0
Hungary[1]		4,445,592	0	4,575,737	0	4,745,000	0
Ireland		2,403,896	0	2,561,293	0	2,526,483	0
Italy		9,241,075	0	9,786,611	0	8,802,675	0
Latvia		323,588	0	405,460	0	504,680	0
Lithuania	*T. spiralis*	549,146	7	688,603	-	-	-
	T. spp.				9	-	-
Luxembourg		1,955	0	2,305	0	2,387	0
Malta		100	0	-	-	6,162	0
Netherlands		12,186,453	0	13,999,301	0	14,766,589	0
Poland	*T. spiralis*	17,799,002	-	20,027,092	-	36,921,307	60
	T. spp.		13		69		37
Portugal		786,839	0	78,369	0	52,941	0
Romania	*T. spiralis*	3,400,571	71	3,030,926	407	4,381,214	-
	T. britovi		2		8		-
	T. spp.		222		590		577
Slovakia	*T. britovi*	153,585	0	1,124,256	2	1,063,448	0
Slovenia		295,960	0	385,195	0	425,323	0
Spain	*T.* spp.	39,990,011	64	38,897,604	77	41,273,693	48
Sweden		2,969,690	0	3,015,835	0	3,015,991	0
United Kingdom		1,936,234	0	1,673,775	0	209,488	0
EU Total		**201,899,089**	**430 (0.0002 %)**	**217,564,568**	**1179 (0.0005 %)**	**220,680,358**	**728 (0.0003 %)**
Norway		1,522,300	0	1,497,200	0	1,470,100	0
Switzerland		2,420,000	0	2,360,000	0	2,418,732	0

1. In Hungary in 2009, an additional 159 fattening pigs not raised under controlled housing conditions in integrated production systems were tested for *Trichinella* in an outbreak investigation. In total, 24 pigs tested positive (*T. spiralis:* 4, *Trichinella* spp.: 20).
2. In France, reported data only represent samples tested at the French NRL. All positive samples have to be sent to the NRL.

Table TR4. Findings of Trichinella *in wild boar - farmed, 2007-2009*

Country	Species	2009		2008		2007	
		N	Pos	N	Pos	N	Pos
Austria	*T.* spp.	10,347	1	546	0	-	-
Bulgaria	*T. spiralis*	67	0	22,884	1	1,450	2
	T. spp.	-	-	-	-		22
Denmark		1,079	0	1,946	0	-	-
Finland	*T.*	267	5	118	0	382	0
France		11,321	0	1,083	0	1,364	0
Greece	*T. britovi*	2,892	1	790	0	1,236	0
	T. spp.		1	-	-		-
Italy[1]		594	0	2,813	0	1,892	0
Netherlands		-	-	27	0	-	-
Poland		-	-	-	-	-	-
Portugal		-	-	-	-	291	0
Romania		13	0	17	0	-	-
United Kingdom		1,011	0	1,567	0	-	-
Total (9 MSs in 2009)		**27,591**	**8 (0.03 %)**	**31,791**	**1 (<0.01 %)**	**6,615**	**24 (0.36 %)**

Note: The following data have been reported without information regarding farmed/hunted status. In 2007 and 2008, Sweden reported all data as hunted wild boar including farmed wild boar. Data are presented in the table for hunted wild boar.

1. In Italy, in 2008 additional 20,722 wild boars were tested with no information about the farmed/hunted status and two were positive (*T. britovi*: 1, *Trichinella* spp.: 1). In 2007, an additional 24 wild boar with no information on their farmed/hunted status were tested and all were negative.

Table TR5. Findings of* Trichinella *in hunted wild boar, 2007-2009

Country	Species	2009		2008		2007	
		N	Pos	N	Pos	N	Pos
Austria		-	-	11,555	0	-	-
Belgium	*T.* spp.	10,744	0	15,177	0	13,713	1
Bulgaria	*T. spiralis*	6,780	0	4,307	34	563	-
	T. spp.		-		-		2
Cyprus		-	-	-	-	-	-
Czech		75,000	0	78,911	0	71,525	0
Denmark		-	-	-	-	-	-
Estonia	*T. spiralis*	4,380	5	4,255	-	2,717	-
	T. britovi		21		3		4
	T.		2				-
	T. spp.		12		9		6
Finland	*T. nativa*	19	0	12	1	21	1
France[1]	*T.* spp.	23,596	0	44,708	0	22,775	1
Germany	*T. spiralis*	164,178	12	173,642	11	134,757	4
	T. britovi		1	-	-		-
	T.		-	-	1		1
	T. spp.		1	-	3		2
Greece		192	0	-	-	-	-
Hungary	*T. spiralis*	37,455	1	61,870	1	39,349	-
	T. spp.		-		-		2
Ireland		-	-	-	-	-	-
Italy[2]	*T.* spp.	42,294	3	7,978	29	19,421	11
Latvia	*T.* spp.	2,214	31	2,040	17	1,546	15
Lithuania	*T. spiralis*	24,680	86	18,150	-	-	-
	T. spp.		-		62	-	-
Luxembourg		883	0	877	0	544	0
Malta		-	-	-	-	-	-
Netherlands[3]		2,010	0	3,585	0	881	0
Poland	*T. spiralis*	50,583	50	103,612	-	86,146	183
	T. spp.		569		524		52
Portugal		1,852	0	2,152	0	450	0
Romania	*T. spiralis*	7,911	1	7,313	4	4,371	-
	T. britovi		1		-		-
	T. spp.		52		23		31
Slovakia	*T. britovi*	12,605	4	12,960	2	11,978	3
	T. spp.	-	-	-	-	-	2
Slovenia	*T.* spp.	847	1	1,496	1	1,196	0
Spain	*T.* spp.	64,557	104	81,248	182	51,718	103
Sweden[4]	*T. spiralis*	47,902	1	27,131	-	17,545	2
	T. britovi		1		-		-
	T. spp.		-		1		-
United		159	0	31	0	2,023	0
EU Total		**580,841**	**959 (0.2 %)**	**663,010**	**908 (0.1 %)**	**443,890**	**424 (0.1 %)**
Norway		-	-	1	0	-	-
Switzerland[5]		2,558	0	-	-	2,475	0

1. In France in 2009, animals have been tested during the hunting season from September 2009 to February 2010. The reported number of animals tested is probably underestimated, as data from private laboratories are not reported.
2. In Italy, in 2008 an additional 20,722 wild boar were tested with no information about the farmed/hunted status and two were positive (*T. britovi*: 1, *Trichinella* spp.: 1), and in 2007, an additional 24 wild boar with no information on their farmed/hunted status were examined. All were negative.
3. In the Netherlands in 2009 and 2007, respectively, an additional 600 and 449 hunted wild boar was examined using a serological method. All were negative.
4. In Sweden, the number of wild boar sampled includes both farmed and hunted. In 2007-2008, data only cover the samples tested at the National Veterinary Institute (SVA).
5. In Switzerland, in 2008, 1,458 samples from hunted wild boar were tested based on serological tests, three were positive (*Trichinella* spp). In 2007, data include a small number of foxes, lynxes and badgers.

Figure TR5. Findings of* Trichinella *in hunted wild boar, 2007-2009 (pooled data)

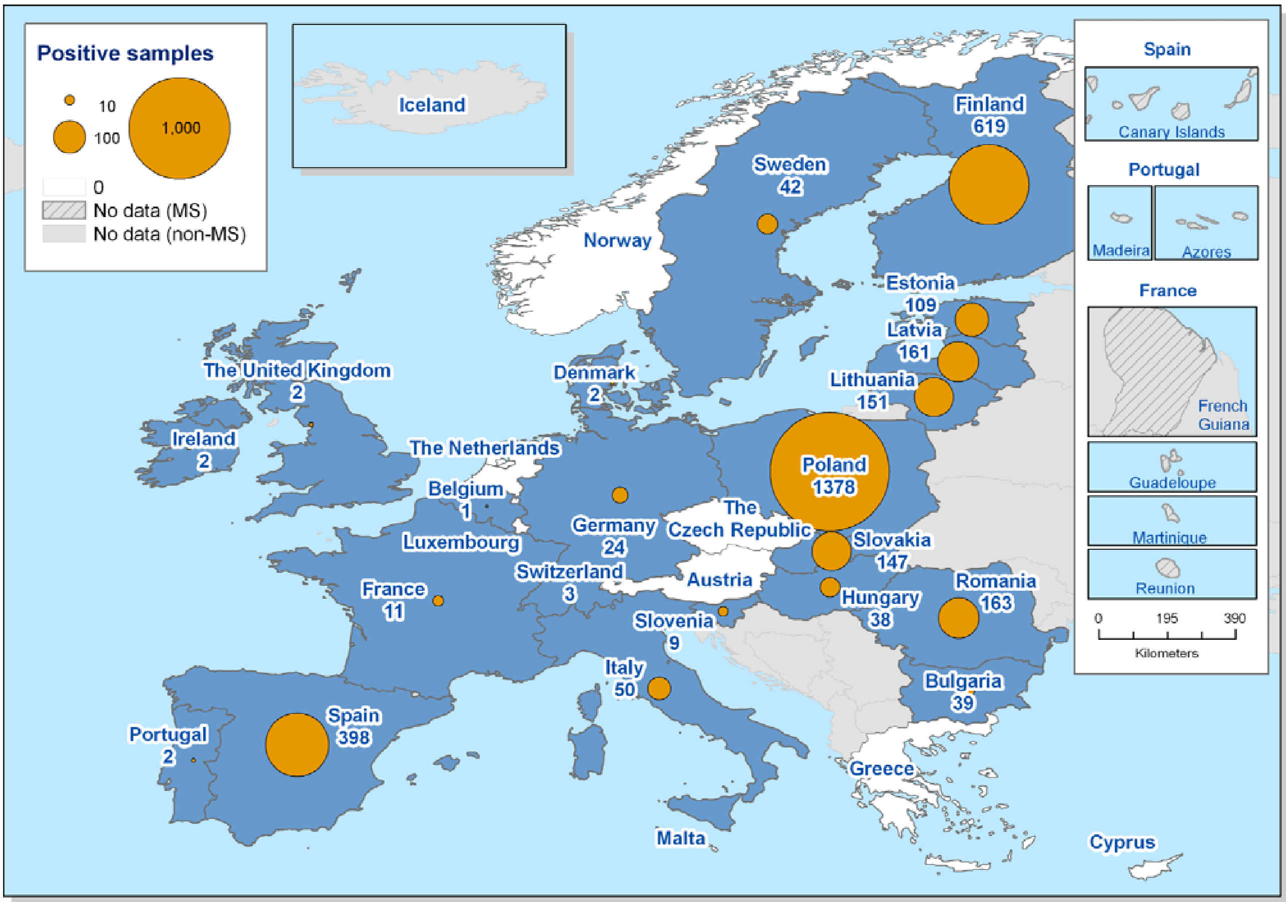
Table TR6. Findings of* Trichinella *in wildlife other than wild boar, 2007-2009 (pooled data)

Country	Foxes		Bears		Raccoon dogs		Other wildlife[1]	
	N	Pos	N	Pos	N	Pos	N	Pos
Austria	-	-	-	-	-	-	10	0
Belgium	265	0	-	-	-	-	35	0
Bulgaria	94	3	2	0	-	-	-	-
Cyprus	6	0	-	-	-	-	20	0
Denmark	261	0	-	-	28	0	329	2
Estonia	-	-	146	20	-	-	45	27
Finland	909	173	170	10	686	196	617	238
France	479	10	-	-	-	-	143	0
Germany	12,028	3	1	0	-	-	-	-
Hungary	2,347	42	-	-	-	-	97	1
Ireland	888	5	-	-	-	-	445	0
Italy	1,825	3	-	-	-	-	3,527	4
Latvia	66	47	-	-	61	45	9	6
Lithuania	24	3	-	-	-	-	-	-
Luxembourg	67	0	-	-	-	-	-	-
Netherlands	22	0	-	-	-	-	338	7
Poland	4	0	-	-	-	-	17	0
Portugal	13	2	-	-	-	-	18	0
Romania	-	-	342	51	-	-	-	-
Slovakia	794	136	59	0	2	0	14	0
Slovenia	1,288	7	147	0	-	-	-	-
Spain	22	1	-	-	-	-	216,967	8
Sweden	832	3	526	1	58	0	656	33
United Kingdom	1,864	2	-	-	-	-	114	0
EU Total	**22,979**	**430 (1.9 %)**	**1,393**	**82 (5.9 %)**	**835**	**241 (28.9 %)**	**223,367**	**326 (0.1 %)**
Norway	-	-	1	0	1	0	1	0

1."Other wildlife" includes badgers, beavers, birds, deer, hedgehogs, lynxes, marine mammals, martens, minks, moose, mouflons, otters, polecats, rats, rodents, seals, squirrels, stray dogs, wolverines, wolves, wild unspecified ruminants and unspecified wildlife.

Note: In 2009, Switzerland reported three findings of *T. britovi* in lynxes, no information on the total number of animals tested was provided.

Figure TR6. Findings of* Trichinella *in wildlife, 2007-2009 (pooled data)



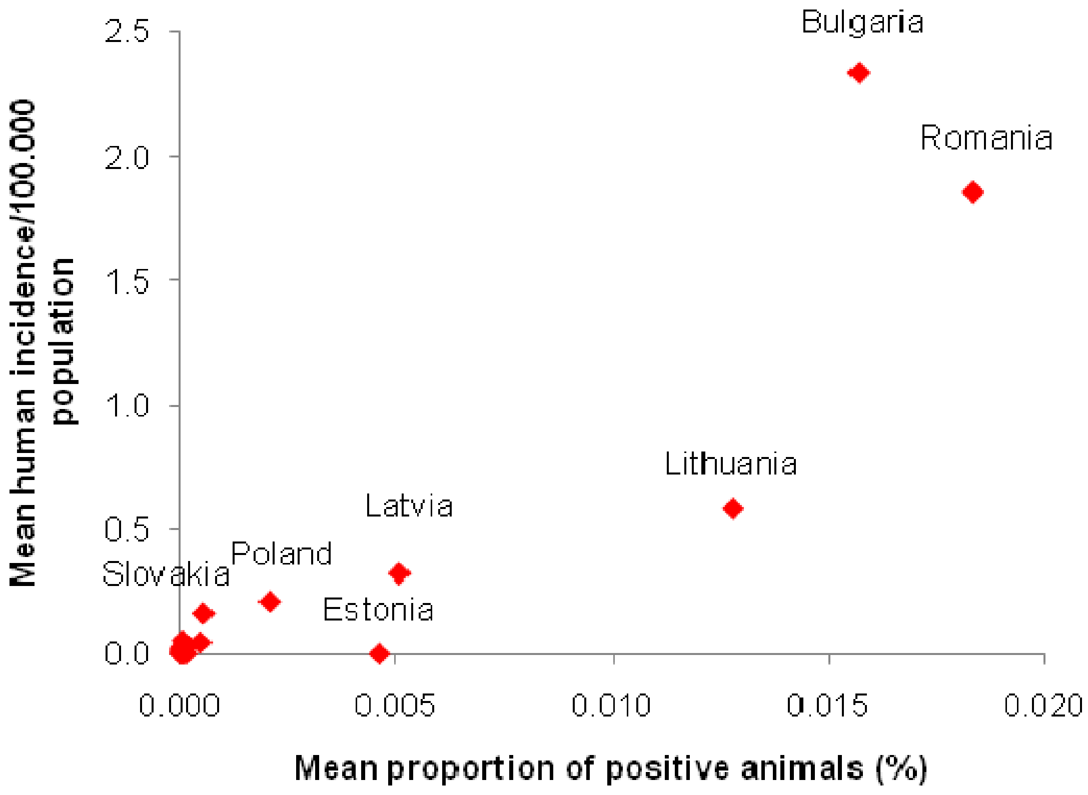
Note: Data included in the figure are based on clinical investigations, surveys or monitoring programmes. Data based on serology are not included.

All reported data from the following species are included: wildlife includes badgers, bears, beavers, birds, deer, foxes, hedgehogs, lynxes, marine mammals, martens, minks, moose, mouflons, otters, polecats, raccoon dogs, rats, rodents, seals, squirrels, stray dogs, wild boar - non-farmed, wolverines, wolves, wild unspecified ruminants and unspecified wildlife.

3.9.3 Overview of *Trichinella* from farm-to-fork

During the last three years, almost 600 million pigs and more than 1.5 million wild boar (farmed and hunted) have been tested in the EU for *Trichinella* during meat inspection in order to protect public health. All MSs and one non-MS provided data from humans as well as animals and one non-MS reported only data on animals. The human population is mainly exposed to *Trichinella* through the consumption of uninspected pig meat or farmed and hunted wild boar meat. Fortunately, the EU mean proportion of *Trichinella* positive pigs and wild boar was extremely low, 0.0007 %, however there were differences between MSs. The mean human incidence was 0.15 per 100,000 population. *Trichinella* was reported more often from farmed wild boar (0.05 %) and particularly hunted wild boar (0.14 %) targeted for human consumption compared to pigs (0.0004 %). The correlation between the human notification rate and proportion of positive pigs and wild boar (farmed and hunted) in the MSs is presented in Figure TR7 as a mean of the pooled results for 2007 to 2009. The majority of MSs reported no or very few cases of *Trichinella* in humans or pigs and wild boar. However, for MSs reporting findings of *Trichinella* in humans and animals there is a positive significant correlation (Spearman[40] rank correlation coefficient of 0.58, *P*-value < 0.01) between the level of infection in pigs and wild boar and the number of human cases. Romania and Bulgaria are the MSs having the highest mean human notification rate as well as the highest mean proportion of positive samples in animals followed closely by Lithuania.

Figure TR7. Correlation between mean human notification rate/100.000 population and mean proportion of positive pigs and wild boar, 2007-2009 (pooled data)



Note: 20 MSs with positive human cases and/or animal cases included (Austria, Belgium, Bulgaria, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden).

40 The Spearman rank correlation coefficient is a non-parametric rank correlation statistical procedure that can be used with few data pairs (20, i.e. the pairwise results from MSs having both measures).

3.9.4 Discussion

In EU, cases of confirmed human trichinellosis increased by 12 % in 2009 (748 cases) compared to 2008 (670 cases). The majority of these occurred in four MSs, Bulgaria, Lithuania, Poland and Romania. Thirteen MSs reported no cases of trichinellosis and eight MSs reported less than 10 cases.

The relatively high number of cases limited to a few Eastern European MSs is likely to reflect the higher prevalence of *Trichinella* in pig and wild boar populations found in these MSs. The significant correlation for the years 2007 to 2009 between the human notification rate and the proportion of positive pigs and wild boar supports this notion. The human cases in these MSs may also be linked to the cultural habit of raising pigs in backyards and to hunt wild boar for human consumption as well as to consume pig and wild boar meat products that are raw or not thoroughly cooked. In addition, meat intended for private consumption may not be inspected for *Trichinella*, resulting in a higher risk for infection in private households. This was noted by Romania where 30 household outbreaks in 2009 were caused by the consumption of pig and wild boar meat not inspected for *Trichinella* (see the food-borne outbreaks chapter).

Trichinella is not a common zoonotic agent in farm animals in EU. Typically, only a few positive pigs or farmed wild boar are reported by a limited number of MSs each year, indicating that the health risks posed to humans from meat of farm animals is generally low. The *Trichinella* findings are most often reported in pigs not raised under a controlled environment, or from backyard pigs. These categories of pigs are more likely to be slaughtered in small slaughterhouses or at the farm where the testing of the carcasses for *Trichinella* maybe more difficult due to the lack of available laboratory facilities, or may not be carried out at all. Therefore, these types of pig form the main risks to public health.

Trichinella is quite often reported from wildlife animal species in EU and particularly some Eastern MSs reported the parasite frequently in wildlife. This shows that the parasite is circulating in the wild animal populations. In hunted wild boar, *Trichinella* findings were reported three times as often as in farmed wild boar and these animals form a particular risk to humans. Hunted wild boar rarely enter the commercial food market, thus, the risk is most relevant for the domestic use of meat by the hunters' households. In 2009, Lithuania, Poland and Romania reported a total of seven *Trichinella* outbreaks due to hunted wild boar with a total of 158 human cases.

Fox meat is usually not consumed by humans; however, this animal species can be considered as an indicator of the occurrence of *Trichinella* in the wildlife population and most MSs reported data from foxes. During the three-year period, a total of 1.9 % of the foxes tested positive. Only five MSs reported data on raccoon dogs, but it was the animal species with the highest proportion of positive findings, reported by Finland and Latvia.

In 2009, a scientific report was submitted to EFSA concerning the development of harmonised schemes for the monitoring and reporting of *Trichinella* in animals in EU[41].This report was an outcome of a grant project co-funded by EFSA and was prepared by a consortium of MS institutes lead by FERA[42]. The report concluded that *Trichinella* in EU is mainly circulating among wildlife, and most humans become infected when consuming undercooked meat from farm animals or game not tested at slaughter, as pigs slaughtered for private domestic consumption are not required by EU legislation to undergo meat inspection. The report suggested using more resources on prevention of infection in these high risk groups instead of spending the resources on large scale production systems with negligible risk to humans.

41 Scientific report submitted to EFSA. Development of harmonised schemes for the monitoring and reporting of *Trichinella* in animals and foodstuffs in the European Union. Question No EFSA-Q-2009-01072.

42 The Food and Environment Research Agency, the United Kingdom.

3. INFORMATION ON SPECIFIC ZOONOSES

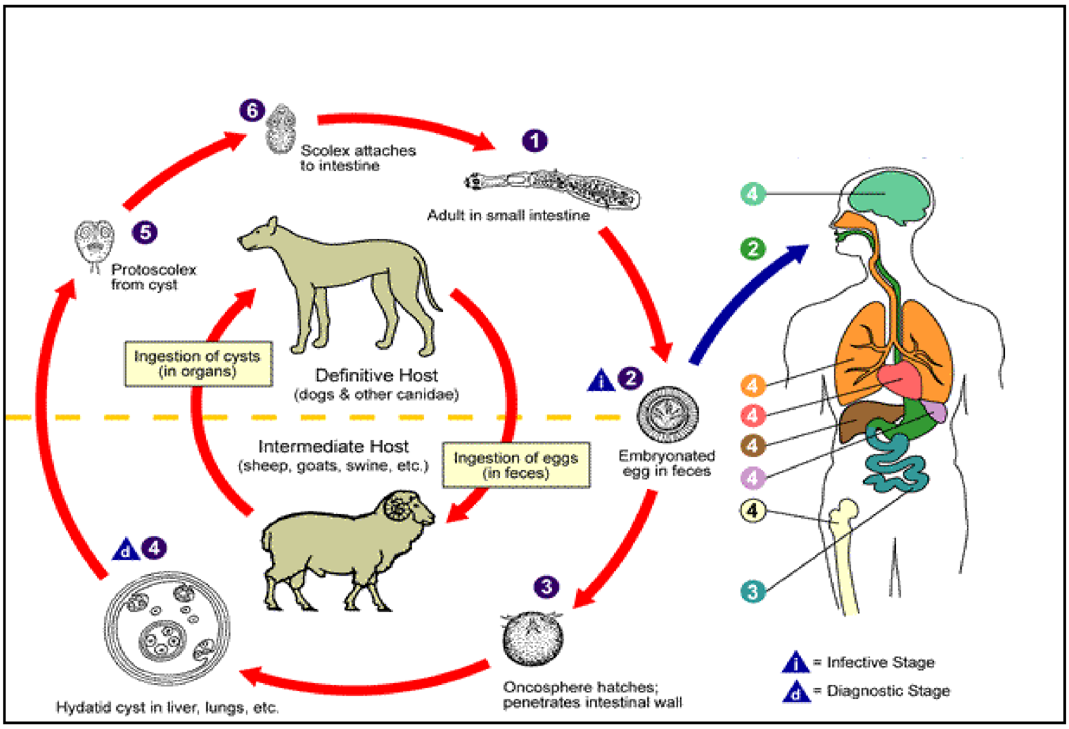
3.10 *Echinococcus*

Human echinococcosis (also known as hydatid disease) is caused by the larval stages of the small tapeworm of the genus *Echinococcus*. In Europe, this disease is caused by two of the six recognised species, namely *E. granulosus* and *E. multilocularis.* The disease caused by the two species is also known as 'cystic echinococcosis (CE)' and 'alveolar echinococcosis (AE)', respectively.

The adult stage of the tapeworm *E. granulosus* lives in the small intestines of dogs and, rarely, of other canids e.g. wolves and jackals, which are the definitive hosts. The adult parasite releases eggs that are passed in the faeces. Sheep, goats, pigs, cattle and reindeer are the intermediate hosts in which ingested eggs hatch and release the larval stage (oncosphere) of the parasite. The larvae may enter the bloodstream and migrate into various organs, especially the liver and lungs, where they develop into hydatid cysts. The definitive hosts become infected by ingestion of the cyst-containing organs of the infected intermediate hosts.

Humans are a dead-end host and may become infected through accidental ingestion of the eggs, shed in the faeces of infected dogs or other canids. In humans, the eggs also hatch in the digestive tract releasing oncospheres which may enter the bloodstream and migrate to the liver, lungs and other tissues to develop into hydatid cysts. These cysts may develop unnoticed over many years, and may ultimately rupture (Figure EH1). Clinical symptoms and signs of the disease (CE) depend on the location of the cysts and are often similar to those induced by slow growing tumours.

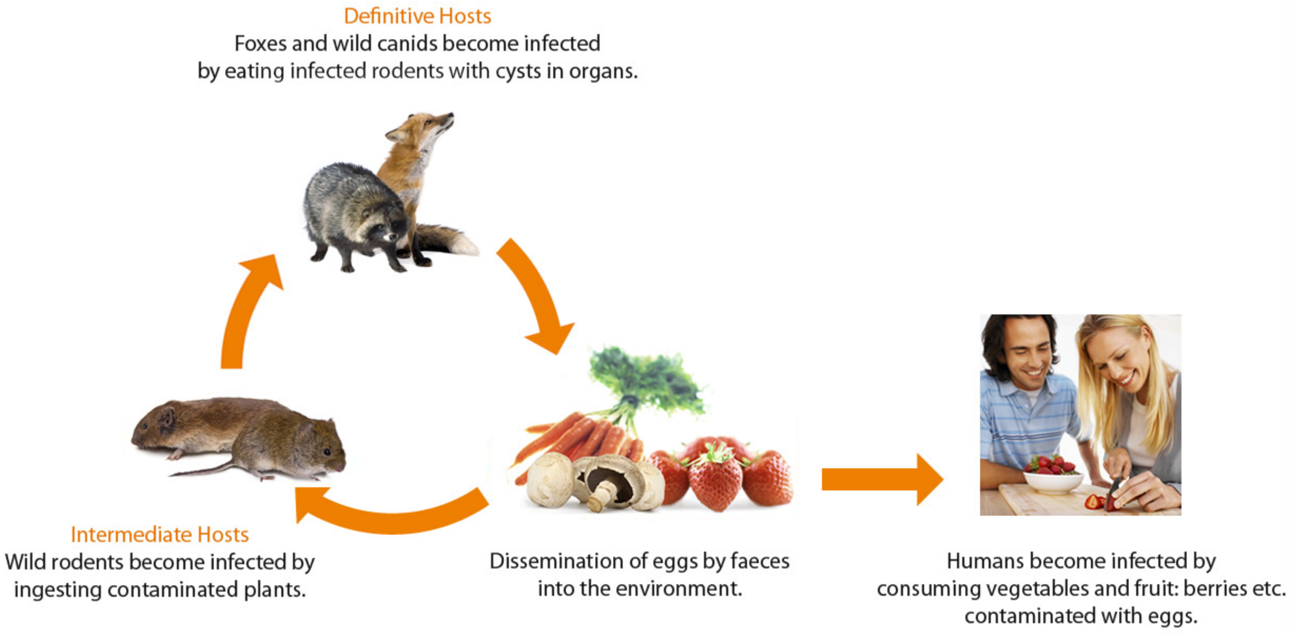
***Figure EH1. Lifecycle of* E. granulosus**



Source: http://www.dpd.cdc.gov/dpdx

E. multilocularis has a similar life cycle as *E. granulosus* (Figure EH2). The definitive hosts are foxes, raccoon dogs and to a lesser extent dogs, cats, coyotes and wolves. Small rodents and voles are the intermediate hosts. The larvae form of the parasite remains indefinitely in the proliferative stage in the liver, thus invading the surrounding tissues. In accidental cases, humans may acquire *E. multilocularis* infection by ingesting eggs shed by the definitive host via e.g. contaminated vegetables, berries or hands, or when touching animals with infective eggs in the fur, such as dogs. *E. multilocularis*is the causative agent of the highly pathogenic alveolar echinococcosis in man. Although a rare human disease, alveolar echinococcosis is a chronic disease with infiltrative growth of considerable public health importance since it is fatal in up to 100 % of untreated patients.

***Figure EH2. Lifecycle of* E. multilocularis**



An overview of the data reported in 2009 is presented in the following tables and figures. Since the EUSR 2009 is focusing on zoonotic parasites, this chapter is more extensive than usual. Additional information on data provided by MSs on *Echinococcus* spp. in 2009 is presented in Level 3 tables.

Table EH1. Overview of countries reporting data on* Echinococcus *spp., 2009

Data	Total number of MS reporting	Countries
Human	25	**All MSs** except DK, IT **Non-MSs:** NO
Animal	25	**All MSs** except IE, MT **Non-MSs:** CH, NO

Note: In the animal chapters, only countries reporting 25 samples or more have been included for analysis

3.10.1 *Echinococcosis* in humans

The number of reported human cases of echinococcosis (including both cystic and alveolar echinococcosis), is presented in Table EH2. In 2009, a total of 790 confirmed cases of echinococcosis was reported in EU, an 11.3 % decrease compared with 2008 (891 cases). Bulgaria, Germany Spain and Romania accounted for 70.5 % of confirmed cases reported in EU in 2009. The highest notification rate was reported by Bulgaria and Lithuania with respectively 4.25 and 1.07 reported confirmed cases per 100,000 population. The number of imported cases is shown within brackets in Table EH2 for some countries. It is often difficult to ascertain the geographical location of where an infection was acquired since it can take many years for the disease to manifest.

The highest notification rate was observed in 45-64 year olds (0.25 per 100,000 population), followed by those over 65 years (Figure EH1). Three cases in 0-4 year old children were reported from Bulgaria in 2009.

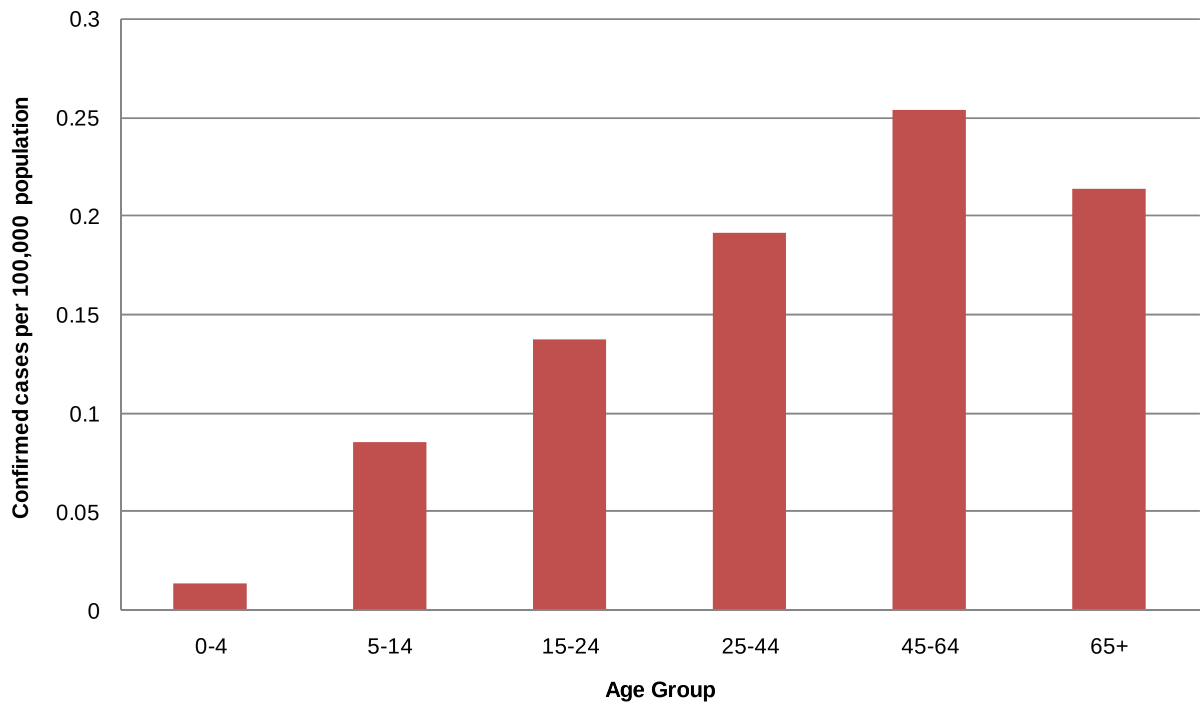
Echinococcus species was known for 358 of the confirmed cases in 2009, which correspond to 45.3 % of the total number of cases. This is significantly less than in 2008, when the species was known for 77 % of the confirmed cases. Out of the speciated cases in 2009, *E. granulosus* represented 275 cases (76.8 % of cases with known species) while *E. multilocularis* represented 83 cases (23.2 %) (Table EH3). The severe alveolar form of echinococcosis increased remarkably in France from five cases in 2008 to 26 cases reported in 2009.

Table EH2. Reported cases of echinococcosis in humans, 2005-2009, and notification rates in 2009

Country	Report Type[1]	2009			2008	2007	2006	2005
		Cases	Confirmed Cases (Imported)	Confirmed cases/ 100,000	Confirmed Cases			
Austria 3	C	21	20 (2)	0.24	6	17	26	9
Belgium	A	14	14	0.13	0	1	1	0
Bulgaria	A	323	323	4.25	386	461	543	-
Cyprus	C	1	1	0.13	1	4	6	1
Czech Republic	C	1	1	0	2	-	2	2
Denmark	–[2]	-	-	-	-	-	-	-
Estonia	U	0	0	0	1	2	0	0
Finland	C	1	1 (1)	0.02	1	1	0	-
France	C	28	28	0.04	7	-	15	17
Germany	C	106	106 (42)	0.13	102	89	124	109
Greece	C	22	22	0.20	28	10	5	10
Hungary	C	8	8	0.08	7	8	6	5
Ireland	C	1	1	0.02	2	0	0	0
Italy	–[2]	-	-	-	-	-	0	-
Latvia	C	15	15	0.66	21	12	22	5
Lithuania	A	36	36	1.07	32	12	15	15
Luxembourg	U	0	0	0	0	-		0
Malta	U	0	0	0	0	0	0	0
Netherlands	A	25	25	0.15	12	6	31	-
Poland	C	25	25	0.07	28	40	65	34
Portugal	C	4	4	0.04	4	10	9	9
Romania	C	42	42	0.20	119	-	-	-
Slovakia	C	4	4	0.07	5	4	6	2
Slovenia	C	9	9	0.44	7	1	3	0
Spain	C	86	86	0.19	98	125	98	78
Sweden	C	12	12 (12)	0.13	13	24	7	4
United Kingdom	C	7	7	0.01	9	7	13	14
EU Totals		**791**	**790 (57)**	**0.18**	**891**	**834**	**997**	**314**
Iceland	–[2]	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	0	0	-	-
Norway	C	0	0	0	2	0	0	1

1. A: aggregated data report; C: case-based report; –: No report; U: unspecified.
2. No surveillance system exists.
3. New electronic reporting system in place since 2009.

Figure EH3. Age-specific notification rates of echinococcosis in humans, 2009



Source: Austria, Bulgaria, Cyprus, Czech Republic, Finland, France, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom (N=774).

Table EH3. Species distribution of reported confirmed echinococcosis cases in humans, 2009

Country	*E. granulosus*	*E. multilocularis*	*Species unknown*	Total
Austria	17	3	0	20
Belgium	0	14	0	14
Bulgaria	0	0	323	323
Cyprus	0	0	1	1
Czech Republic	0	0	1	1
Finland	1	0	0	1
France	0	26	2	28
Germany	66	24	16	106
Greece	0	0	22	22
Hungary	1	0	7	8
Ireland	1	0	0	1
Latvia	12	0	3	15
Lithuania	26	10	0	36
Netherlands	25	0	0	25
Poland	4	4	17	25
Portugal	0	0	4	4
Romania	25	2	15	42
Slovakia	2	0	2	4
Slovenia	2	0	7	9
Spain	86	0	0	86
Sweden	7	0	5	12
United Kingdom	0	0	7	7
EU total	**275**	**83**	**432**	**790**

Figure EH4. Distribution of* Echinococcus *spp.,* E. multilocularis *and* E. granulosus *in humans, 2007-2009

3.10.2 *Echinococcus* in animals

During the years 2007 to 2009, 22 MSs and one non-MS have provided information on *Echinococcus* infections in farm animals. All these countries reported large numbers of animals inspected at slaughter, except France who does not have these results registered centrally. Bulgaria and Romania reported the highest prevalence, whereas the Nordic countries, Belgium and Cyprus had not reported any positive findings (Figure EH5).

In 2009, 18 MSs reported data on *Echinococcus* in farm animals mainly from meat inspection at slaughterhouses (Table EH4 and Figure EH5). Most MSs reported no or very few findings of *Echinococcus*, while Bulgaria reported 10.5 % of goats positive, Italy reported 11.3 % of sheep positive and Romania reported 26.1 % of cattle positive for the parasite. Bulgaria reported relatively common findings proportions of positive samples for cattle and sheep as well, 5.1 % and 7.0 % positive, respectively. Bulgaria, Germany, Italy and Slovenia reported data from farm animals at *Echinococcus* species level. In Bulgaria, Italy and Slovenia the reported findings were for *E. granulosus*.

During 2007 to 2009, 13 MSs and two non-MSs reported data on *Echinococcus* in foxes and nine MSs and one non-MS reported positive findings (Table EH5). The Czech Republic, France and Germany reported more than 85 % of all data from foxes and more than 95 % of the positive samples during the three years. Seven MSs and one non-MS have reported data on *Echinococcus* in foxes for a minimum four years, from 2005 to 2009 (Figure EH7). In this period, the Nordic countries, Finland, Norway and Sweden reported no positive findings in foxes. The proportion of positive foxes increased during 2005-2009 in the Czech Republic, while findings from France, Germany, Luxembourg, the Netherlands and Switzerland fluctuated. In 2007 and 2008, Switzerland reported relatively high proportions of positive samples (26.2 % and 19.3 %, respectively); however, in 2009 no data were provided.

In total, ten MSs and one non-MS reported data on *Echinococcus* in foxes in 2009 (Table EH5). The Czech Republic, Hungary, Luxembourg and Sweden reported data from the monitoring of hunted foxes, whereas Finland and France reported data from surveillance programmes, and in Norway and Sweden data were from a national screening programme. *E. multilocularis* is frequently reported from foxes in EU; in 2009, six MSs reported positive findings in foxes and most findings were reported as *E. multilocularis*; only Germany reported some positive samples without species information. The Czech Republic, Luxembourg, Germany, France, Hungary and Poland reported 33.6 %, 17.4 %, 14.0 %, 11.2 %, 10.7 % and 4.0 % of samples from foxes positive with *E. multilocularis*, respectively (Table EH5). The distribution of *E. multilocularis* in foxes in 2007-2009 is presented in Figure EH6.

Six MSs and one non-MS reported positive findings of *Echinococcus* in wildlife other than foxes during 2007 to 2009 (Table EH6). *E. multilocularis* was reported in muskrats from France and Germany and in mice from Switzerland. *E. granulosus* was reported in wolves, reindeer and other ruminants by Finland, in other ruminants by France, and in wild boar and unspecified wildlife by Italy. Furthermore, *Echinococcus* spp. was reported in deer by Spain and the United Kingdom, in wild boar by Italy and Spain and in unspecified wildlife by Italy.

Monitoring of *Echinococcus* spp. in stray dogs in Romania
In 2007, Romania introduced a monitoring programme for *Echinococcus* in stray dogs. In the period 2007 to 2008, 16,784 dogs were tested and 28 samples were positive for *Echinococcus* spp. During 2009, the prevalence of *Echinococcus* spp. in stray dogs was slightly higher than in previous years; 2,352 dogs were tested with 49 positive (2.1 % vs. 0.2 %).

Some countries provided information on the *Echinococcus* findings in pet animal species. Five MSs and one non-MS reported positive findings of *Echinococcus* spp. in dogs from 2007 to 2009 (Table EH7). France, Germany, the Netherlands and Romania reported positive findings of *E. multilocularis* in dogs; France and Germany with a very low occurrence, whereas the Netherlands only analysed one sample. Romania reported results from over 4,000 dogs with a high occurrence of 45.4 % positive. Most of these findings were due to *E. granulosus* (93.8 %), followed by *E. multilocularis* (3.3 %) and *Echinococcus* spp. (2.9 %). Switzerland also reported a high occurrence of *Echinococcus* in dogs (25.0 %) and *E. multilocularis* was detected in 52.9 % of positive findings. Finland, Italy, Norway, Portugal and Slovakia reported no positive samples from dogs. However, all these countries analysed very few samples, except Slovakia that tested more than 4,000 dogs.

Germany, Slovakia and Switzerland were the only countries to report data from cats from 2007 to 2009 and all samples were negative (Table EH7).

During 2007-2009 *E. granulosus* was reported in animals by nine MSs and *E. multilocularis* by 10 MSs and one non-MS. France, Germany, Italy, the Netherlands and Romania were the only MSs to report both species, however seven MSs reported *Echinococcus* spp. only without species information and five MSs and one non-MSs reported some of their findings as *Echinococcus* spp. The Nordic countries (Denmark, Norway and Sweden), Belgium and Cyprus did not report any findings of *Echinococcus* in animals in the framework of annual zoonoses reporting.

For additional information on *Echinococcus* in animals, please see Level 3 tables.

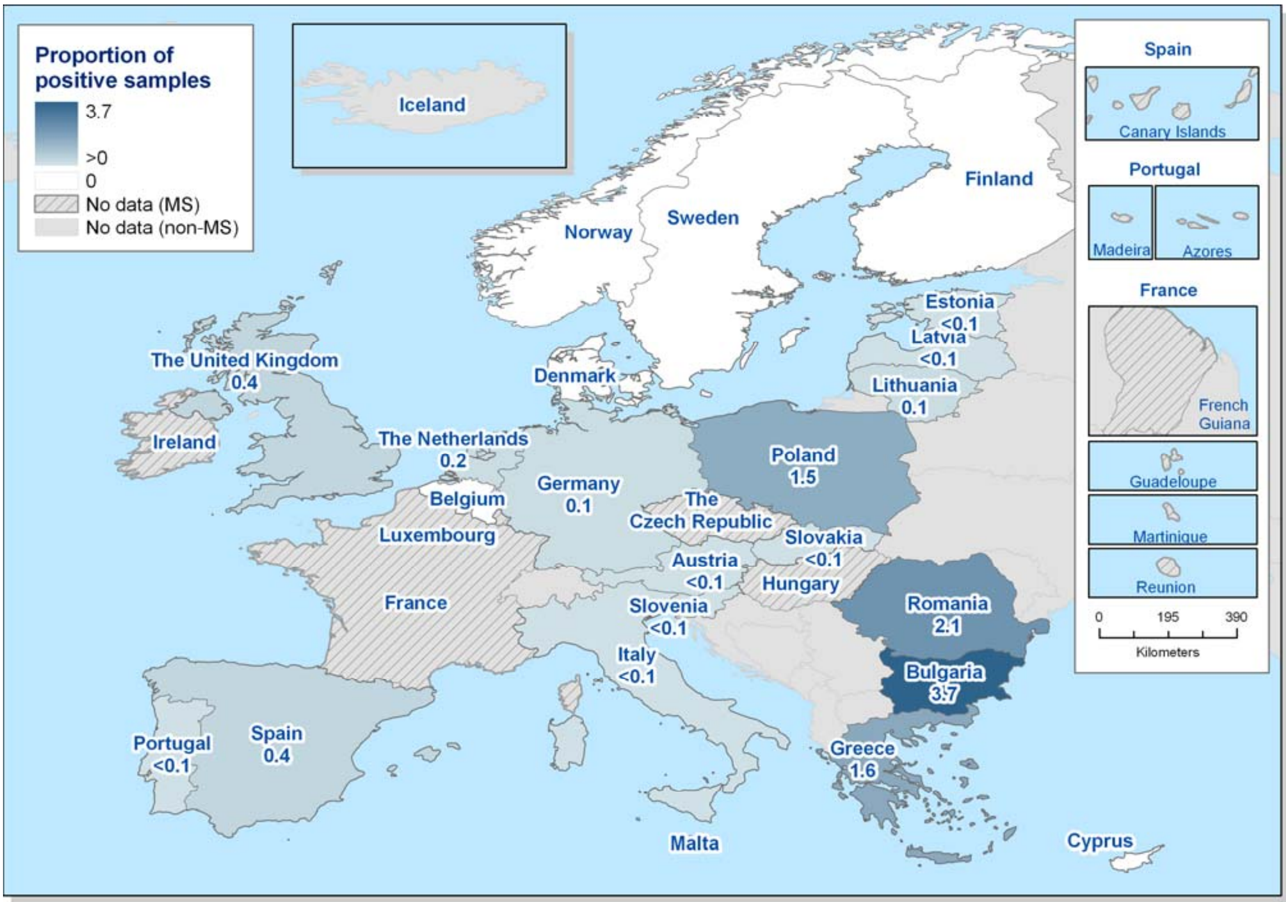
Table EH4.* Echinococcus *in farm animals, inspected at slaughter, 2009

Country	Species[1]	Cattle		Pigs		Goats		Sheep		Solipeds	
		N	% pos	N	% pos	N	% pos	N	% pos	N	% pos
Austria	*E.* spp.	619,617	<0.1	5,537,389	0	4,967	0	121,547	<0.1	-	-
Belgium	*E.* spp.	799,256	0	-	-	-	-	-	-	-	-
Bulgaria	*E. g.*	38,300	5.1	531,631	0.1	4,149	10.5	581,285	7.0	6,647	0
Cyprus	*E.* spp.	17,308	0	-	-	126,608	0	136,705	0	-	-
Denmark	*E.* spp.	507,200	0	18,972,880	0	-	-	-	-	-	-
Estonia	*E.* spp.	46,934	0	405,456	0	-	-	5,846	0	-	-
Finland	*E.* spp.	268,056	0	-	-	-	-	25,687	0	-	-
Germany	*E. g.*	-	-	-	-	-	-	265	0.8	-	-
Greece	*E.* spp.	161,069	1.0	826,783	<0.1	654,468	0.5	2,126,481	1.8	-	-
Italy[2,3]	*E.* spp.	1,730,438	0.2	6,093,180	<0.1	27,055	2.5	306,048	11.3	21,313	<0.1
	E. g.	-	0.1	-	<0.1	-	0.1	-	<0.1	-	-
Latvia[4]	*E.* spp.	99,903	0	323,588	0	-	-	-	-	400	0
Lithuania	*E.* spp.	84,985	<0.1	167,266	0.2	-	-	247	0	-	-
Poland	*E.* spp.	-	-	17,799,372	0.5	-	-	-	-	-	-
Romania	*E.* spp.	131,013	26.1	3,023,757	0.7	1,910	0.3	318,102	3.4	-	-
Slovenia	*E. g.*	123,760	<0.1	295,960	<0.1	450	0	9,759	0	1,426	0
Spain[5]	*E.* spp.	2,271,834	0.6	39,959,670	<0.1	-	-	-	-	30,918	0.1
Sweden	*E.* spp.	426,504	0	2,942,912	0	773	0	252,873	0	3,807	0
United Kingdor	*E.* spp.	341,057	0.4	-	-	-	-	-	-	-	-
Total (18 MSs)		**7,667,234**	**0.8**	**96,879,844**	**0.1**	**820,380**	**0.5**	**3,884,845**	**3.2**	**64,511**	**<0.1**
Norway	*E.* spp.	313,300	0	1,522,300	0	23,300	0	1,165,300	0	1,600	0

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

1. *E.* spp. = *Echinococcus* spp., *E.g.* = *Echinococcus granulosus.*
2. In Italy, some samples were tested for *Echinococcus* spp. and others specifically for *E. granulosus*. The total number of samples is only stated once in Table EH4.
3. In Italy, an additional 848,702 sheep and goats were tested and 10,096 were positive (8,547 with *E. granulosus* and 1,549 with *Echinococcus* spp.).
4. In Latvia, an additional 9,329 sheep and goats were tested, 0 were positive.
5. In Spain, an additional 12,791,855 sheep and goats were tested and 86,786 were positive (*Echinococcus* spp.).

Figure EH5. Findings of* Echinococcus *in farm animals, 2007-2009 (pooled data)



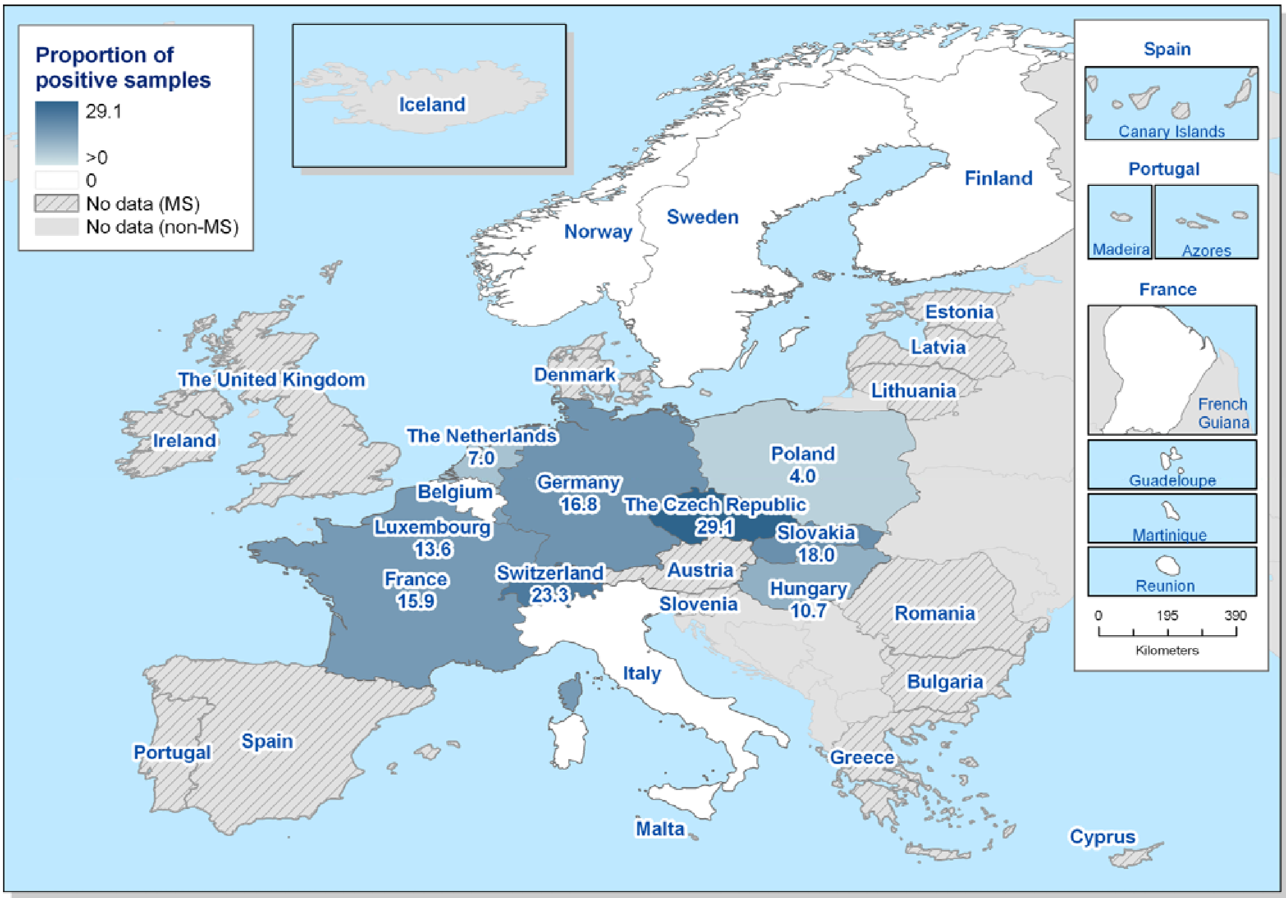
Note: Data from cattle, goats, pigs, sheep and solipeds are included. Samples sizes of less than 25 are included. Data do not include clinical investigations or suspect sampling.

Table EH5.* Echinococcus multilocularis *in foxes, 2007-2009

Country	2009			2008			2007		
	N	Pos	% pos	N	Pos	% pos	N	Pos	% pos
Belgium	-	-	-	117	0	0	-	-	-
Czech Republic[1]	1,554	522	33.6	1,333	426	32.0	1,250	255	20.4
Finland	189	0	0	411	0	0	264	0	0
France[2]	925	104	11.2	1,344	258	19.2	941	148	15.7
Germany[3]	5,463	916	16.8	5,927	1,217	20.5	4,385	510	11.6
Hungary	840	90	10.7	-	-	-	-	-	-
Italy	-	-	-	2	0	0	-	-	-
Luxembourg	23	4	17.4	20	2	10.0	23	3	13.0
Netherlands	41	0	0	-	-	-	116	11	9.5
Poland	250	10	4.0	-	-	-	-	-	-
Slovakia	1	0	0	-	-	-	570	103	18.1
Spain[4]	-	-	-	5	2	40.0	-	-	-
Sweden	305	0	0	244	0	0	245	0	0
Total (10 MSs in 2009)	**9,591**	**1,646**	**17.2**	**9,403**	**1,905**	**20.3**	**7,794**	**1,030**	**13.2**
Norway	396	0	0	427	0	0	483	0	0
Switzerland	-	-	-	1,044	202	19.3	1,376	361	26.2

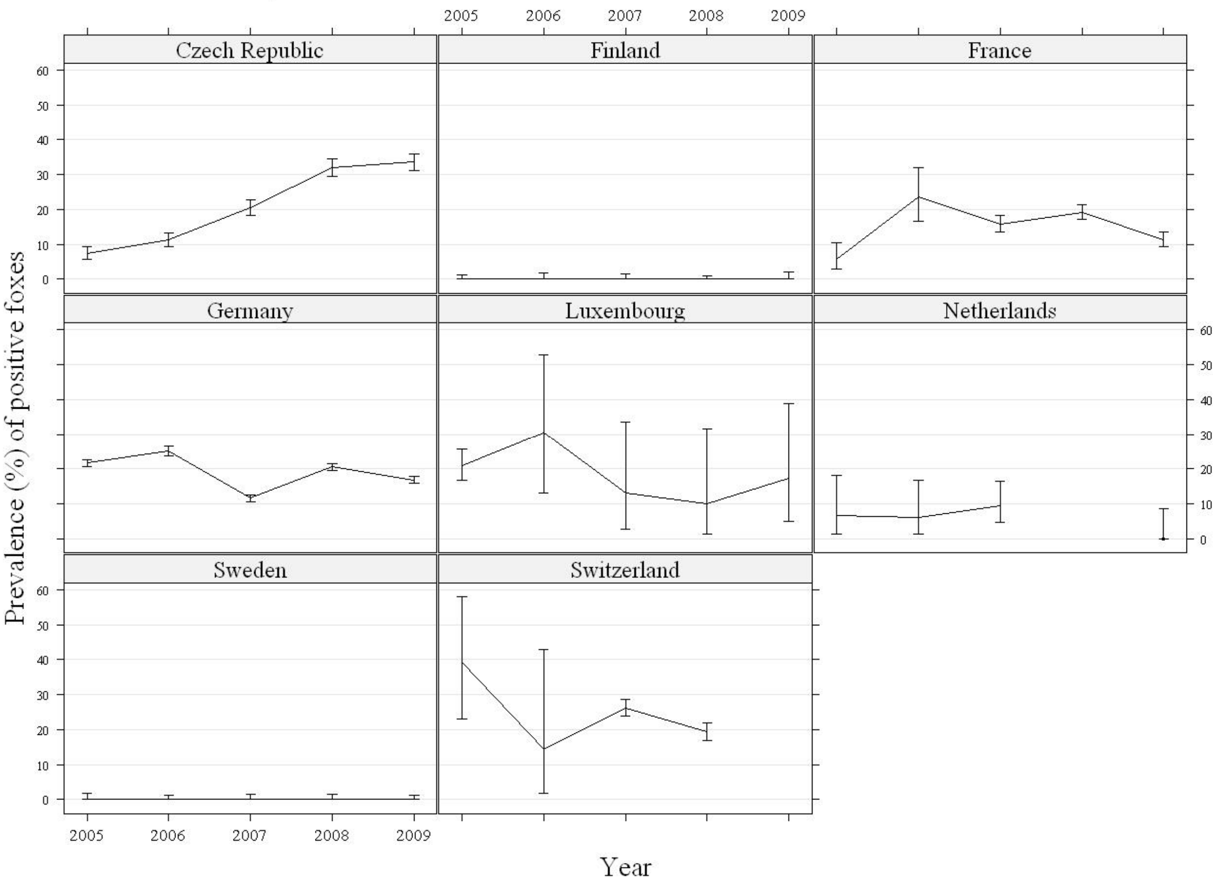
1. In Czech Republic 2008, all the 426 positive samples were reported as *Echinococcus* spp.
2. In France, the result for foxes cannot be interpreted as national prevalence since results are based on surveys carried out in a selection of French departments, mainly in the east of France.
3. In Germany 2009, 153 of the 916 positive samples were reported as *Echinococcus* spp.; in 2008, 122 of the 1,217 positive samples were reported as *Echinococcus* spp.; the rest were *E. multilocularis.*
4. In Spain 2008, positive samples were reported as *Echinococcus* spp.

***Figure EH6. Findings of* Echinococcus multilocularis *in foxes, 2007-2009 (pooled data)*[1]**



1. In the Czech Republic in 2008, positive samples were reported as *Echinococcus* spp. In Germany in 2009, 153 of the 916 positive samples were reported as *Echinococcus* spp. and in 2008, 122 of the 1,217 positive samples were reported as *Echinococcus* spp.

***Figure EH7. Findings of* Echinococcus multilocularis[1] *in foxes in MSs providing data for at least four years, 2005-2009*[2]**



1. In 2005-2009, MSs reported *E. multilocularis* findings in foxes, except for a few MSs; in the Czech Republic in 2008 and in Switzerland in 2005 and 2006, positive samples were reported as *Echinococcus* spp. and in Germany in 2006, 2008 and 2009, 37 of the 906 positive samples, 122 of the 1,217 positive samples and 153 of the 916 positive samples were reported as *Echinococcus* spp., respectively. In 2005, France reported positive samples as *E. granulosus*.
2. Only MSs with data from at least four years are included. No data were reported by the Netherlands in 2008, therefore no line was drawn from 2007 to 2009 in the trend figure for this MS. In 2009, the Netherlands reported no positive foxes; the vertical drawn in 2009 indicates the 95 % confidence interval.

Table EH6. **Echinococcus** *in wildflife other than fox, 2007-2009 (pooled data)*

Country	Deer		Reindeer		Other ruminants[1]		Wild boars		Other/unspecified wildlife[2]	
	N	Pos[3]	N	Pos[4]	N	Pos[4]	N	Pos[5]	N	Pos[6]
Bulgaria	-	-	312	0	-	-	-	-	-	-
Estonia	-	-	5,334	0	-	-	-	-	-	-
Finland	-	-	237,097	6	1,301	8	-	-	5,705	3
France	1	0	-	-	1	1	1	0	11	1
Germany	-	-	-	-	-	-	-	-	1,320	35
Greece	-	-	-	-	-	-	300	0	-	-
Italy	1,918	0	-	-	-	-	22,927	53	13,065	93
Poland	-	-	-	-	-	-	11,476	0	-	-
Romania	-	-	-	-	-	-	415	0	-	-
Slovenia	165	0	-	-	2	0	31	0	15	0
Spain	310,886	159	-	-	-	-	211,203	264	-	-
Sweden	-	-	54,432	0	-	-	-	-	1	0
United Kingdom	83,538	1	-	-	-	-	-	-	-	-
Total (13 MSs)	**396,508**	**160**	**297,175**	**6**	**1,304**	**9**	**246,353**	**317**	**20,117**	**132**
Norway	-	-	46,800	0	-	-	-	-	-	0
Switzerland	-	-	-	-	-	-	-	-	1,027	166

1. Data include alpine chamois, bison and moose.
2. Data include bears, hares, lynx, martens, mice, muskrats, raccoon dogs, voles, wolves and other unspecified wild animals.
3. In deer, all positive samples were reported as *Echinococcus* spp.
4. In reindeer and 'other ruminants', all positive samples were *E. granulosus.*
5. In wild boar, 47 of the positive samples from Italy were reported as *E. granulosus*, the remaining samples from both Italy and Spain were reported as *Echinococcus* spp.
6. In other/unspecified wildlife, three positive samples from wolves from Finland were *E. granulosus*, 36 positive samples from muskrats from France and Germany were *E. multilocularis*, 25 and 68 positive samples from unspecified wildlife from Italy were reported as *E. granulosus* and *Echinococcus* spp., respectively, and 166 positive samples from mice from Switzerland were *E. multilocularis*.

Table EH7. **Echinococcus** *in pets, 2007-2009 (pooled data)*

Country	Species[1]	Cats		Dogs	
		N	Pos	N	Pos
Bulgaria	*Echinococcus* spp.	-	-	486	6
Finland		-	-	1	0
France	*E. multilocularis*	-	-	1,294	2
Germany	*E. multilocularis*	196	0	597	3
Italy		-	-	5	0
Netherlands	*E. multilocularis*	-	-	1	1
Portugal		-	-	6	0
Romania	*Echinococcus* spp. (53) *E. granulosus* (1,718) E. multilocularis (61)	-	-	4,035	1,832
Slovakia		1,124	0	4,084	0
Total (9 MSs)		**1,320**	**0**	**10,509**	**844 (17.5 %)**
Norway		-	-	1	0
Switzerland	*E. multilocularis* (9), *Echinococcus* spp. (8)	4	0	68	17

1. Numbers in brackets indicate number of positive samples.

3.10.3 Discussion

Human echinococcosis is a relatively rare chronic zoonotic disease in EU.

In 2009, notified confirmed cases of human echinococcosis decreased by 11 % (790 cases) compared with 2008 (891 cases). Notified cases in EU are limited to a small number of countries. In 2009, four (Bulgaria, Germany, Spain and Romania) out of the 27 MSs accounted for 70.5 % of the total reported number of human echinococcosis cases. Also, due to the chronic nature of the disease, it is more prevalent in people aged 45 and over. However, in countries where the disease is endemic in animals, individuals at a young age may also develop the disease as was noted in Bulgaria where three cases were diagnosed in children aged 0-4 years.

In 2009, as in the previous years, most MSs reported no findings or very low levels of *Echinococcus* in farm animals and pets. However, in Romania, Bulgaria and Italy the parasite was more frequently recorded in farm animal species. Romania reported an increasing proportion of positive cattle from 2007 to 2009 and in 2009 26 % of inspected cattle was positive with *Echinococcus*. Bulgaria reported an increase in positive sheep while Italy had increasing proportions of both goats and sheep.

Surveillance of *E. multilocularis* in foxes is important in order to access the migration pattern of this parasite in Europe. Several MSs have had monitoring/surveillance programmes running for some years and the distribution pattern among countries has remained the same during the last three years; fortunately, countries with no positive findings continue to be free from *E. multilocularis.* Only the Czech Republic reported a clear increase in positive foxes during recent years.

In wildlife species other than foxes, MSs frequently reporting *E. multilocularis* in foxes also report findings in other wildlife. However, the majority of samples was negative for *Echinococcus* in other wildlife than foxes.

During the past five years, the quality of reported data of *Echinococcus* has clearly improved; more information is provided about the sampling context and more data are reported at species level. The latter is very important since *E. granulosus* and *E. multilocularis* have very different epidemiologies and pose different kinds of health risks to humans. Still, a more in-depth analysis could be carried out if more information about the *Echinococcus* species in humans and animals were reported at species level.

A scientific report was submitted to EFSA in 2010 concerning the development of harmonised schemes for the monitoring and reporting of *Echinococcus* in animals and foodstuffs in EU[43]. This report is an outcome of a grant project co-funded by EFSA and it is prepared by a consortium of MS institutes lead by FERA[44]. For *E. granulosus*, the report recommends MSs to focus monitoring on intermediate hosts (cattle, pigs, sheep and goats) at slaughterhouse level and to develop more sensitive diagnostic methods that might be used on live animals. For *E. multilocularis*, monitoring should focus on the definitive host (fox or raccoon dog) in order to identify geographical risk areas.

43 Scientific report submitted to EFSA. Development of harmonised schemes for the monitoring and reporting of *Echinococcus* in animals and foodstuffs in the European Union. Question No EFSA-Q-2009-01071.

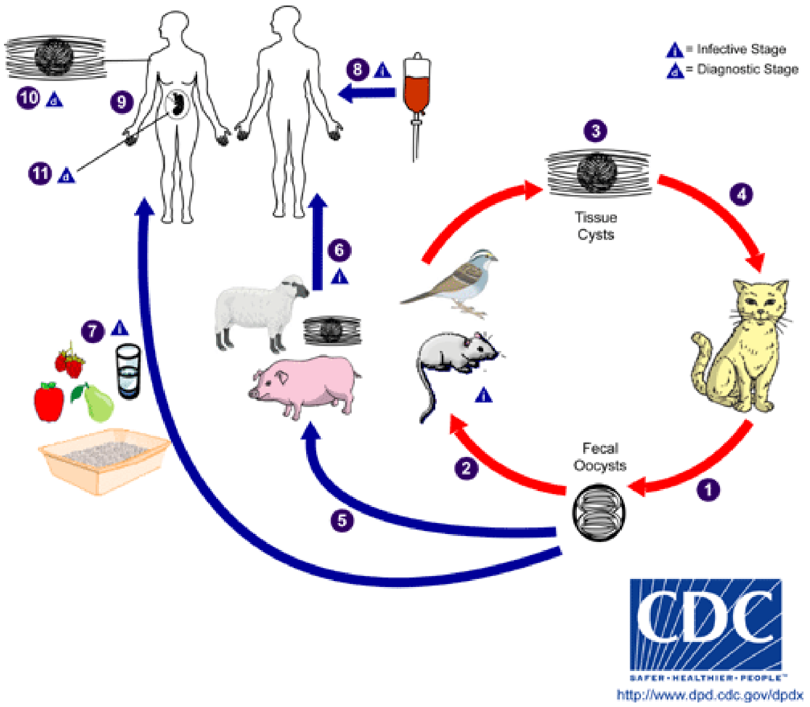
44 The Food and Environment Research Agency, the United Kingdom.

3. INFORMATION ON SPECIFIC ZOONOSES

3.11 *Toxoplasma*

Toxoplasma infection is common in animals and humans. The causative agent is an obligate intracellular protozoan parasite, *Toxoplasma gondii*. Nearly all warm-blooded animals can act as intermediate hosts, and seemingly all animals may be carriers of tissue cysts of this parasite (Figure TO1). However, the parasite only matures in domestic and wild cats, which are the definite hosts.

***Figure TO1. Lifecycle of* Toxoplasma gondii**



Source: http://www.dpd.cdc.gov/dpdx/HTML/Toxoplasmosis.htm

The infection may be acquired by humans through the consumption of undercooked meat containing intermediate cysts or food/water contaminated with oocysts from cat faeces or from handling contaminated soil or cat litter trays. Most human infections are asymptomatic or cause mild flu-like symptoms resulting in long-lasting immunity. Lymphadenitis accompanied with fever and headache is the most frequent clinical sign of infection in humans. About 50 % to 80 % of the European population are estimated to be infected. Occasionally parasites may cause a serious foetal infection resulting in abortion or congenital lesions in child's brains, eyes or other organs, particularly if the mother acquires her first infection during the first trimester of pregnancy.

In animals, *Toxoplasma* is an important cause of abortion in sheep and goats, but may be controlled by proper management practices and vaccination. In previous years, detection of this parasite was most frequently reported in cats, dogs, sheep and pigs.

Table TO1 presents the countries reporting data on *Toxoplasma* in 2009.

Table TO1. Overview of countries reporting data on* Toxoplasma*, 2009

Data	Total no of MSs reporting	Countries
Human	17	**MSs**: AT, BG, CY, CZ, EE, ES, FI, HU, IE, LT, LU, LV, MT, RO, SK, SI, UK
Animal	18	**MSs**: AT, BG, DE, EE, ES, FI, FR, GR, HU, IE, IT, LV, NL, PL, PT, RO, SK, UK **Non-MSs**: CH, NO

3.11.1 Toxoplasmosis in humans

In total, 1,262 human toxoplasmosis cases were reported from 17 EU MSs in 2009 (Table TO2). Out of these, 1,259 were confirmed. The overall notification rate was 0.65 per 100,000 population in reporting countries, with the highest rates in Lithuania, Slovakia and Hungary.

Table TO2. Reported toxoplasmosis cases in humans and notification rates for 2009, TESSy data for 2006-2009

Country	Report Type[1]	2009			2008	2007	2006
		Cases	Confirmed Cases	Confirmed cases/ 100,000	Confirmed Cases		
Austria [3]	C	1	1	0.01	1	1	-
Belgium	-	-	-	-	-	-	-
Bulgaria	A	17	17	0.22	64	113	3016
Cyprus	U	0	0	0	0	0	0
Czech Republic	C	2	2	0.02	2	1	328
Denmark	-	-	-	-	-	-	-
Estonia	C	4	4	0.30	1	1	3
Finland	C	26	26	0.49	46	36	0
France	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-
Hungary	C	204	204	2.03	84	69	98
Ireland	C	37	37	0.83	49	49	42
Italy	-	-	-	-	-	-	-
Latvia	C	6	6	0.27	6	9	4
Lithuania	A	210	209	6.24	117	67	0
Luxembourg	U	0	0	0	1	0	0
Malta	U	0	0	0	0	0	0
Netherlands	-	-	-	-	-	-	-
Poland	-	-	-	-	183	423	438
Portugal	-	-	-	-	-	-	-
Romania	C	51	49	0.23	327	326	-
Slovakia	C	181	181	3.34	175	253	303
Slovenia	U	16	16	0.79	21	20	22
Spain[2]	C	1	1	0.01	1	0	41
Sweden	-	-	-	-	0	0	0
United Kingdom	C	506	506	0.83	133	149	127
EU Total		**1,262**	**1,259**	**0.65**	**1,211**	**1,517**	**4,422**
Iceland	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-
Norway	-	-	-	-	-	-	-

1. A: aggregated data report; C: case-based report; –: No report; U: unspecified.
2. Sistema de Informacion Microbiologica (SIM), notification rates calculated on estimated coverage, 25 %.
3. New electronic reporting system in place since 2009.

In many countries, there is no surveillance system for toxoplasmosis or rather no routine screening that could identify cases. In 2009, most cases were reported among women aged 24-44 years old, most likely as a result of toxoplasmosis screening in pregnant women. Only 23 cases were reported in infants (<12 months) and for only two of these, the reported transmission mode was congenital (mother-to-child). As the most severe outcomes are in newborns, the latest EU case definition (Decision 2008/426/EC[45]) requires reporting only of congenital cases while the previous definitions included all cases. Most MSs, however, still have to adapt their reporting to this new definition. Of the fourteen countries that reported cases in 2009, only three (Austria, the Czech Republic and Spain) seemed to have adapted their reporting to the new case definition. In the United Kingdom, the data for 2009 are derived directly from the *Toxoplasma* Reference Unit. Thus, the large apparent increase in the number of cases is due to a change in data collection and does not reflect a true change in disease incidence.

45 Commission Decision 2008/426/EC of 28 April 2008 amending Decision 2002/253/EC laying down case definitions for reporting communicable diseases to the Community network under Decision No 2119/98/EC of the European Parliament and of the Council. OJ L 159, 18.6.2008, p. 46–90.

3.11.2 *Toxoplasma* in animals

In total, 18 MSs and two non-MSs reported information on the occurrence of *Toxoplasma* in animals in 2009. Overall, the number of tested animals reported within MSs for *Toxoplasma* has increased during the last three years (Table TO3). The parasite was reported from cattle, pigs, sheep, goats, cats and dogs.

During the years 2007 to 2009, the highest proportion of *Toxoplasma*-positive samples was reported from sheep and goats. In 2009, 24.4 % of tested animals were positive ranging from 0 % to 58.8 % between MSs. These results represent a decrease compared to previous years (Table TO3). However, the data on sheep might be biased due to sampling based on clinical disease or on suspicion of an infection even though the reason for sampling is not always reported by MSs. In 2009, only the Netherlands, Spain, Switzerland and the United Kingdom reported data originating from clinical sampling of sheep.

In 2009, only 5.3 % of tested cattle and 0.4 % of tested pigs were positive for *Toxoplasma* in the reporting MS group. For cattle, the proportion of positive samples varies between years, but has decreased from the proportion of positive samples of 20.3 % recorded in 2007. This is mainly due to a high number of positive findings reported by the Netherlands in 2007. For pigs, the proportion of positive samples has decreased from 11.7 % in 2007, primarily because Italy reported high levels in 2007.

In 2009, *Toxoplasma* in cats was reported from 10 MSs and Switzerland, and overall at EU level 11.0 % of tested animals were positive. In dogs, *Toxoplasma* was reported by nine MSs and Switzerland, and in total at EU level 15.5 % of animals were positive. Only Slovakia and Switzerland reported data based on clinical sampling for both cats and dogs.

Although more MSs reported data on *Toxoplasma* for 2009, there is still a lack of information on the context of the testing, and therefore the data cannot be regarded as comparable between MSs and reporting years. Thus, no formal analyses for trends over the years were carried out. However, at national level, the Netherlands show a significant decrease in *Toxoplasma* in cattle, sheep and goats over the last three years.

Table TO3. Findings of* Toxoplasma[1] gondii *in animals, 2007-2009

Country	2009		2008		2007	
	N	Pos	N	Pos	N	Pos
Cattle						
Austria	23	0	13	0	-	-
Finland	463	0	85	0	355	0
France	2,349	304	-	-	-	-
Germany	296	0	199	1	660	0
Hungary	1	1	-	-	-	-
Ireland	24	1	37	1	19	3
Italy	163	31	288	83	306	66
Netherlands	2,648	0	3,469	0	1,072	424
Poland	400	0	299	26	-	-
Portugal	22	0	8	3	10	0
Slovakia	22	0	48	5	10	1
Spain	13	1	-	-	-	-
Total (12 MSs in 2009)	**6,424**	**338 (5.3 %)**	**4,446**	**119 (2.7 %)**	**2,432**	**494 (20.3 %)**
Switzerland	4	0	1	0	-	-
Pigs						
Austria	5	1	25	1	-	-
Finland	1,144	0	393	0	750	0
Germany	705	0	479	0	-	-
Ireland	9	0	8	1	-	-
Italy	-	-	14	0	722	172
Latvia	5	0	-	-	4	0
Poland	550	8	326	59	-	-
United Kingdom	10	1	-	-	-	-
Total (7 MSs in 2009)	**2,428**	**10 (0.4 %)**	**1,245**	**61 (4.9 %)**	**1,476**	**172 (11.7 %)**
Switzerland	-	-	1	0	-	-

Table continue overleaf

Table TO3 (Contd.). Findings of* Toxoplasma[1] gondii *in animals, 2007-2009

Country	2009		2008		2007	
	N	Pos	N	Pos	N	Pos
Sheep and goats						
Austria	118	53	39	12	-	-
Finland	92	0	23	0	87	0
France	-	-	-	-	834	150
Germany[2]	338	23	207	8	480	0
Greece	257	105	544	308	602	251
Hungary	-	-	5	0	8	0
Ireland	712	63	531	82	444	72
Italy	654	304	1,030	442	3,211	1,037
Latvia	11	4	-	-	-	-
Lithuania	-	-	6	0	-	-
Netherlands	987	75	2,174	336	-	-
Poland	-	-	166	60	-	-
Portugal	21	7	53	23	100	36
Romania	9	3	-	-	-	-
Slovakia	17	10	18	8	55	31
Sweden	-	-	-	-	-	11
Spain	260	61	19	4	75	16
United Kingdom	741	323	-	201	-	381
Total (13 MSs in 2009)	**4,217**	**1,031 (24.4 %)**	**4,815**	**1,484 (30.8 %)**	**5,896**	**1,985 (33.7 %)**
Norway	31	9	2,314	442	82	46
Switzerland	15	2	11	1	-	-
Cats						
Austria	4	1	-	-	-	-
Bulgaria	11	0	-	-	-	-
Estonia	8	0	6	0	3	0
Finland	312	0	282	8	301	11
Germany	898	6	599	9	649	5
Hungary	-	-	3	0	14	0
Ireland	-	-	4	0	2	0
Italy	287	106	93	14	225	69
Latvia	68	12	121	17	76	7
Poland	-	-	111	45	94	0
Portugal	219	60	16	3	6	2
Romania	28	6	-	-	-	-
Slovakia	139	27	172	34	219	47
Sweden	-	-	-	-	-	15
Total (10 MSs in 2009)	**1,974**	**218 (11.0 %)**	**1,407**	**130 (9.2 %)**	**1,589**	**156 (9.8 %)**
Switzerland	477	6	427	3	-	-

Table TO3 (Contd.). Findings of Toxoplasma[1] gondii *in animals, 2007-2009*

Country	2009		2008		2007	
	N	Pos	N	Pos	N	Pos
Dogs						
Austria	1	0	-	-	-	-
Estonia	-	-	-	-	2	1
Finland	726	0	496	1	550	0
Germany	279	0	258	0	210	0
Hungary	-	-	5	0	2	0
Ireland	2	0	5	0	3	0
Italy	549	234	199	71	344	125
Latvia	48	4	54	19	78	7
Poland	-	-	1	0	-	-
Portugal	1	0	-	-	-	-
Romania	13	10	-	-	-	-
Slovakia	95	18	123	48	160	81
Sweden	-	-	-	-	-	1
Total (9 MSs in 2009)	**1,714**	**266 (15.5 %)**	**1,141**	**139 (12.2 %)**	**1,349**	**215 (15.9 %)**
Switzerland	3	1	1	0	-	-

1. Positive samples are *T. gondii*, except positive samples from Germany (2009, 2008), Switzerland (2009, 2008) and Spain (2007), which are *Toxoplasma* spp. In Italy in 2008, positive samples are reported as a mix of *Toxoplasma* spp. and *T. gondii*.

2. Germany has found *Toxoplasma* only in sheep.

3.11.3 Discussion

The surveillance of human toxoplasmosis varies significantly between countries, most likely because the majority of cases are asymptomatic. A comparison of the data is therefore difficult to make. In order to harmonise the reporting in EU and to focus on the severe cases, the new EU case definition requires only the reporting of congenital cases, which could have a fatal outcome. Most MSs, however, still have to implement this new case definition.

Increasing numbers of MSs have provided data on *Toxoplasma* in animals, which may indicate recognition of the important public health burden of this parasite. Almost all reporting MSs detected some positive findings from animals.

The highest proportion of positive samples was found from sheep and goats, where 24.4 % of tested animals were positive for *Toxoplasma* in 2009. These two animal species can develop clinical disease caused by *Toxoplasma.* Therefore, sheep and goats are often tested due to clinical suspicion and, thus, it may be more likely to find positive animals from sheep and goats than from other animal species. *Toxoplasma* was also reported by MSs from cattle, pigs, dogs and cats.

In a scientific opinion[46] of the panel on Biological Hazards on the surveillance and monitoring of *Toxoplasma* in humans, food and animals it was concluded that despite the fact that *Toxoplasma* has the highest incidence among the parasitic diseases in EU, no representative data from humans, food or animals are available. However, it was suggested that harmonised analytical methods to detect the parasite be developed before comparable monitoring be introduced in EU. When standardised methods are available, *Toxoplasma* monitoring should start on the pre-harvest sector in sheep, goats, pigs and game animal species.

46 EFSA (European Food Safety Authority), 2007. Scientific opinion of the Panel on Biological Hazards (BIOHAZ) on surveillance and monitoring of *Toxoplasma* in humans, food and animal. The EFSA Journal, 583, 1-64.

3. INFORMATION ON SPECIFIC ZOONOSES

3.12. Q fever

Q fever, or Query fever, is a zoonotic disease caused by the bacterium *Coxiella burnetii.* Cattle, sheep and goats are the primary domestic animal reservoirs, and the bacteria are excreted in milk, urine, faeces and in high numbers in the amniotic fluids and the placenta at birth. Clinical disease in these animals is rare, although abortion in goats and sheep as well as metritis and infertility in cattle have been associated with *C. burnetii* infections.

The bacteria can survive for long periods in the environment. Humans are most often infected when inhaling airborne dust contaminated by dried placental material, birth fluids or faeces. Only a few organisms may suffice to cause infection. There are epidemiological indications that consumption of milk and/or milk products containing *C. burnetii* has been associated with sero-conversion in humans. However, there is no conclusive evidence that the consumption of milk and milk products containing *C. burnetii* has resulted in clinical Q fever cases in humans.

Only 50 % of people infected with *C. burnetii* show clinical signs. Clinical signs and symptoms of acute Q fever may include fever, severe headache, muscle pain, discomfort, sore throat, chills, sweats, non-productive cough, nausea, vomiting, diarrhoea, abdominal pain and chest pain. The fever usually lasts for one to two weeks and may result in a life-long immunisation. Acute Q fever is fatal in approximately 2 % of cases. Chronic Q fever is uncommon, but may develop in persons with a previous history of acute Q fever. A serious complication of chronic Q fever is inflammation of the heart valves, which may be fatal in up to 65 % of cases.

Table QF1. Overview of countries reporting data on Q fever, 2009

Data	Total no of MSs reporting	Countries
Human	23	**All MSs** except: AT, DK, FR, IT **Non-MSs**: IS, NO
Animal	17	**MSs**: AT, BE, BG, DE, DK, ES, FI, GR, HU, IT, NL, PL, RO, SK, SI, SE, UK **Non-MSs**: CH, NO

Note: The overview table includes all data reported by MSs. However, in the animal chapter only countries reporting 25 samples or more have been included for analyses.

3.12.1 Q fever in humans

In 2009, a total of 2,686 cases of Q fever in humans were reported in EU of which 1,987 were reported as confirmed cases (Table QF2). EU notification rate was 0.51 per 100,000 population. There was a 24.7 % increase in the number of reported confirmed cases compared to 2008 (1,594 cases). The Netherlands accounted for as much as 81.7 % of reported cases. This is due to an ongoing outbreak occurring in the Netherlands since 2007.

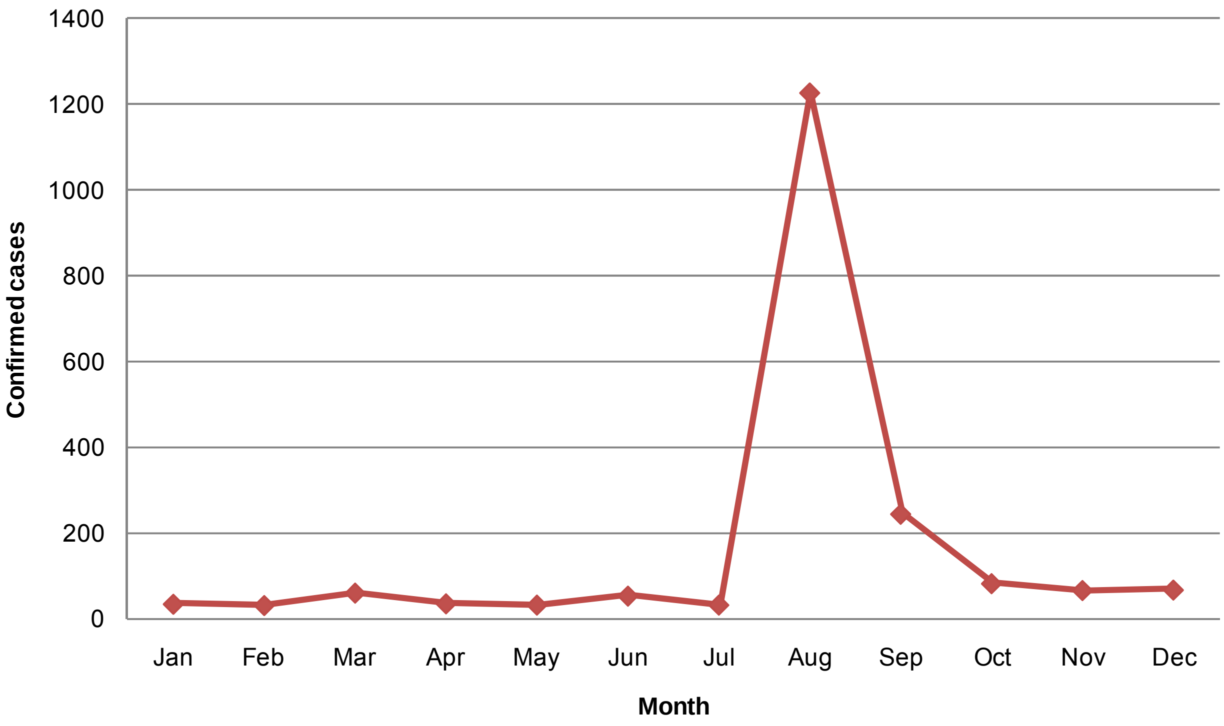
Table QF2. Reported confirmed Q fever cases in humans, 2007-2009 (TESSy) and notification rates in 2009

Country	Report Type[1]	2009			2008	2007
		Cases	Confirmed Cases	Confirmed Cases/ 100,000	Confirmed Cases	
Austria	-[2]	-	-	-	-	-
Belgium	A	33	33	0.31	0	0
Bulgaria	A	24	22	0.29	17	33
Cyprus	C	3	2	0.25	0	8
Czech Republic	U	0	0	0	-	-
Denmark	-[2]	-	-	-	-	-
Estonia	U	0	0	0	0	0
Finland	C	1	1	0.02	2	2
France	-	-	-	-	-	-
Germany	C	190	190	0.23	370	83
Greece	C	3	3	0	3	0
Hungary	C	19	19	0.2	0	0
Ireland	C	17	17	0.4	10	4
Italy	-	-	-	-	-	-
Latvia	U	0	0	0	0	0
Lithuania	U	0	0	0	0	0
Luxembourg	U	0	0	0	-	-
Malta	U	0	0	0	0	0
Netherlands	C	2,317	1,623	9.84	1,011	132
Poland	C	3	3	0.01	0	0
Portugal	C	14	14	0.13	12	8
Romania	C	4	2	0.01	3	0
Slovakia	U	0	0	0	0	1
Slovenia	U	0	0	0	0	93
Spain[3]	C	34	34	0.30	119	159
Sweden	C	5	5	0.05	7	0
United Kingdom	C	19	19	0.03	40	62
EU total		**2,686**	**1,987**	**0.51**	**1,594**	**585**
Iceland	U	0	0	0	0	0
Liechtenstein	-	-	-	-	0	0
Norway	U	0	0	0	0	0

1. A: aggregated data report; C: case-based report; −: No report; U: unspecified.
2. No surveillance system exists.
3. Surveillance system covers only 25 % of the total population.

As in 2008, the highest notification rate of human Q fever was in the 45 to 64 year old age group followed by 25 to 44 year olds and over 65 year olds. One confirmed case, in a baby girl less than a year old, occurred in the Netherlands. The seasonal pattern observed for Q fever showed a sharp peak in reported cases in August. This was, however, solely attributed to the large number of cases reported from the Netherlands in this month. Three confirmed cases were reported to have died of Q fever: two males from Germany, a 63 and a 69 year old; and one 68 year old female from the Netherlands.

Figure QF1. Seasonal distribution of reported confirmed human cases of Q fever in reporting MSs, 2009



Source: Belgium, Cyprus, Finland, Germany, Greece, Hungary, Ireland, Netherlands, Poland, Portugal, Spain, Sweden (N=1,963).

In the Netherlands, a Q fever outbreak in humans first emerged in May 2007 and is now the largest EU outbreak of Q fever ever recorded. In total, 168 human cases were confirmed in 2007; 1,000 in 2008; 2,357 in 2009; and 237 in the first 10 weeks of 2010. The hospitalisation rate was 50 % in 2007; 20.9 % in 2008; and 19.7 % in 2009. Since 1984, there has been a very large expansion in dairy goat production, to over 150,000 tonnes of milk annually. Q fever was first diagnosed as a cause of abortion on a dairy goat farm in 2005. There is consensus among public health and veterinary professionals that most human Q fever cases are linked to abortion waves on large dairy goat farms, and to a much lesser extent on dairy sheep farms. A large multidisciplinary research programme has commenced, to generate an improved understanding of *C. burnetii* infection and Q fever, and to inform improved control options. A broad range of control options have been implemented, including compulsory notification of abortion episodes in small ruminants, blood and bulk milk testing, vaccination, stringent hygiene measures (other animal reservoirs control, manure handling, storage and transport, risk material handling), large-scale culling of pregnant goats. Reasons for the emergence of the outbreak are unclear, but may be related to the increase in the number of goats and goat farms; to changes in the intensity of goat production in highly populated areas; to dry weather conditions and strong winds during and after the lambing/kidding season; and to changes in the virulence of *C. burnetii*. Research has been initiated to investigate each of these hypotheses[47].

47 EFSA Panel on Animal Health and Welfare (AHAW), 2010. Scientific Opinion on Q fever. EFSA Journal, 8(5):1595, 114 pp.

3.12.2 *Coxiella burnetii* in animals

In 2009, 17 MSs and two non-MSs provided information regarding Q fever (*C. burnetii)* in animals (Table QF3 and QF4). The majority of sampling was carried out due to clinical suspicion, e.g. after abortions and was examined using serological tests. When including MSs also reporting less than 25 samples, a total of 20 MSs and two non-MSs reported the use of serological testing (ELISA, CFT or IFA), 17 MSs and one non-MS additionally used isolation and direct identification methods (RT-PCR, FISH and IHC), and seven MSs reported no information on diagnostic methods (Appendix Table QF1). The number of MSs reported an increase in Q fever once again compared to 2008, and all the reporting MSs found at least some positive animals. Most of the samples originated from cattle but the highest proportion of positive samples came from goats (animal-based data) and sheep flocks (herd-based data) (Tables QF3 and QF4 and Figure QF2). As monitoring and reporting schemes can differ considering the country or the period of time, results shall be interpreted cautiously.

The distribution of *C. burnetii* in farm animals (cattle, sheep and goats) in 2007 to 2009 shows that all reporting MSs have had positive findings in at least one animal species in the three-year period (Figure QF3).

The proportion of positive animal samples for cattle was 7.4 % in 2007, 9.9 % in 2008 and 9.0 % in 2009 (Table QF3). In 2009, Denmark and Spain reported the highest proportion of positive bovine animals, 54.5 % and 30.3 %, respectively. However, both MSs reported data from animals tested due to suspicion of infection. Belgium, Bulgaria, Germany, the United Kingdom and Switzerland all tested high numbers of individual animals for *C. burnetii*. For the United Kingdom, it was the first year that data was provided on the number of cattle tested following clinical suspicion of infection with *C. burnetii* and only a very small proportion (0.1 %) of bovine animals were positive. Only minor increases in the proportion of positive animals were observed for MSs providing data from more than one year. Particularly, Germany has been testing substantial numbers of bovine animals during the last three years and the proportion of positive animals has stayed at the same level: 10.6-10.7 %. Poland reported a large decrease in bovine animals tested positive from 40.1 % in 2008 to 5.4 % in 2009.

Belgium, Finland, Italy, Romania and Sweden provided information at herd level for cattle in 2009; of these, only Italy and Sweden reported data on herd level in earlier years (Table QF3). Belgium, Finland and Italy tested substantial numbers of cattle herds each. Belgium recorded the highest portion of positive herds (70.9 %), whereas in Finland and Italy the proportions of positive samples were very low (0.3 % and 0.4 %, respectively). For Finland, 2009 was the first year that data was provided on *C. burnetii*.

In 2009, a slight increase in the proportion of positive sheep was observed compared to 2008, mainly because of a large increase in the number of animals tested in Germany (Table QF4). Also, Bulgaria and the United Kingdom reported data on substantial numbers of sheep. For the United Kingdom, 2009 was the first year that data were provided on the number of sheep tested following clinical suspicion of infection with *C. burnetii* and no positive animals were found among the 1,709 tested animals. However, a survey of seroprevalence of *C. burnetii* in sheep and goats in Great Britain was also carried out in 2008, the results of which indicated a flock level prevalence for *C. burnetii* of 9.7 %. In Greece, the proportion of positive animals decreased from 26.7 % in 2008 to 13.6 % in 2009. Spain reported the highest proportion of positive sheep (62.6 %). However, this MS reported data from animals tested due to suspicion of infection, and then a higher rate of positive animals is expected in such suspected sampling. Italy provided data on flock level in 2009, and they reported 19.8 % of flocks positive.

In goats, the proportion of positive animals increased from 9.7 % in 2007 to 15.7 % in 2008 to 23.5 % in 2009. The increase between 2008 and 2009 is due to Germany who reported most of the animal level data in 2009 and found 34.8 % of the samples positive. The Netherlands tested 1,281 holdings of goats for *C. burnetii* in 2009 and found 5.2 % of them positive.

Only a few MSs do not have their sampling based solely on suspicion; Slovenia indicated systematic monitoring of Q fever in bovine animals and small ruminants by testing blood samples taken for *Brucella* spp. testing. Slovenia reported test results from sheep and goats together, and 53 of 4,817 animals (1.1 %) were found seropositive. Finland, Sweden, the United Kingdom and Norway carried out surveys using objective sampling. In addition, in 2009, Germany, Italy, Portugal, Slovakia and Switzerland analysed samples from alpacas, alpine chamois, buffalo, dogs, pigs, solipeds, water buffalo, wild animals, wild boar, zoo animals and other animals. In Germany, eight samples from 177 pigs and two samples from 386 wild boar tested positive for Q fever; from Italy 20 samples from 89 water buffalo herds were positive and from Switzerland two samples from 212 pigs tested positive.

For additional information on data, please refer to Level 3 tables.

In the Netherlands, despite massive infection control measures to restrain the 2008 Q fever outbreak in dairy goats and sheep, in 2009 2,317 Q fever cases in humans were notified. From the end of 2009 until June 2010, 87 dairy goat and two dairy sheep farms were declared infected and some 50,000 pregnant animals were culled. All remaining uninfected reproduction animals were to be vaccinated until the end of June 2010.

Table QF3. **Coxiella burnetii** *(Q fever) in cattle, 2007-2009*

Country	Sampling unit[1]	2009		2008		2007	
		N	% pos	N	% pos	N	% pos
Cattle							
Austria	Animal	929	3.4	1,147	1.1	1,070	1.5
Belgium	Animal	1,676	12.8	314	8.0	220	33.2
	Herd	1,407	70.9	-	-	-	-
Bulgaria	Animal	3,353	4.8	249	10.8	3,366	10.9
Denmark	Animal	268	54.5	-	-	-	-
	Herd	-	-	836	46.4	812	54.7
Finland	Animal	25	0	-	-	-	-
	Herd	1,882	0.3	-	-	-	-
Germany	Animal	11,771	10.6	11,866	10.7	6,936	10.7
Hungary	Animal	453	7.5	-	-	536	7.5
Italy	Animal	-	-	1,743	18.4	464	24.6
	Herd	5,534	0.4	34	8.8	-	-
Netherlands	Animal	-	-	1,201	0.4	1,062	0.1
Poland	Animal	369	5.4	1,130	40.1	91	2.2
Portugal	Animal	-	-	-	-	147	4.1
Romania	Holding	57	52.6	-	-	-	-
Slovakia	Animal	664	0.9	5,786	4.9	7,587	3.0
Slovenia	Animal	415	4.1	1,305	4.5	-	-
Spain	Animal	198	30.3	-	-	-	-
Sweden	Herd[2]	537	7.6	1,000	8.5	-	-
	Herd[3]	41	73.2	-	-	-	-
United Kingdom	Animal	1,373	0.1	-	-	-	-
Total cattle (15 MSs in 2009)	**Animal**	**21,494**	**9.0**	**24,741**	**9.9**	**21,479**	**7.4**
	Herd[4]	**9,458**	**11.9**	**1,870**	**25.5**	**812**	**54.7**
Norway	Animal	68	0	-	-	-	-
Norway	Herd	-	-	525	0	-	-
Switzerland[5]	Animal	3,294	2.5	2,660	2.4	-	-

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

1. For animal-based data in 2007, the sampling stage was not indicated; in 2008, samples from Austria, Belgium, Greece, Italy, Netherlands and Slovenia were collected at farm; in 2009, samples from Austria, Denmark, Greece, Slovenia and United Kingdom were collected at farm.

   For herd-based data in 2007, Denmark was the only country to report on the sampling stage (at farm); in 2008, samples from Denmark, Norway, Sweden and United Kingdom (flock and herd) were collected at farm; in 2009, samples from Netherlands and Sweden were collected at farm.
2. National survey using the ELISA method.
3. Survey using selective sampling and PCR methods on herds previously antibody-positive in bulk milk in 2008.
4. The summarised number of herds includes both herds and holdings.
5. In Switzerland, positive samples were reported as *Coxiella* spp.

Table QF4. **Coxiella burnetii *(Q fever) in sheep and goats, 2007-2009***

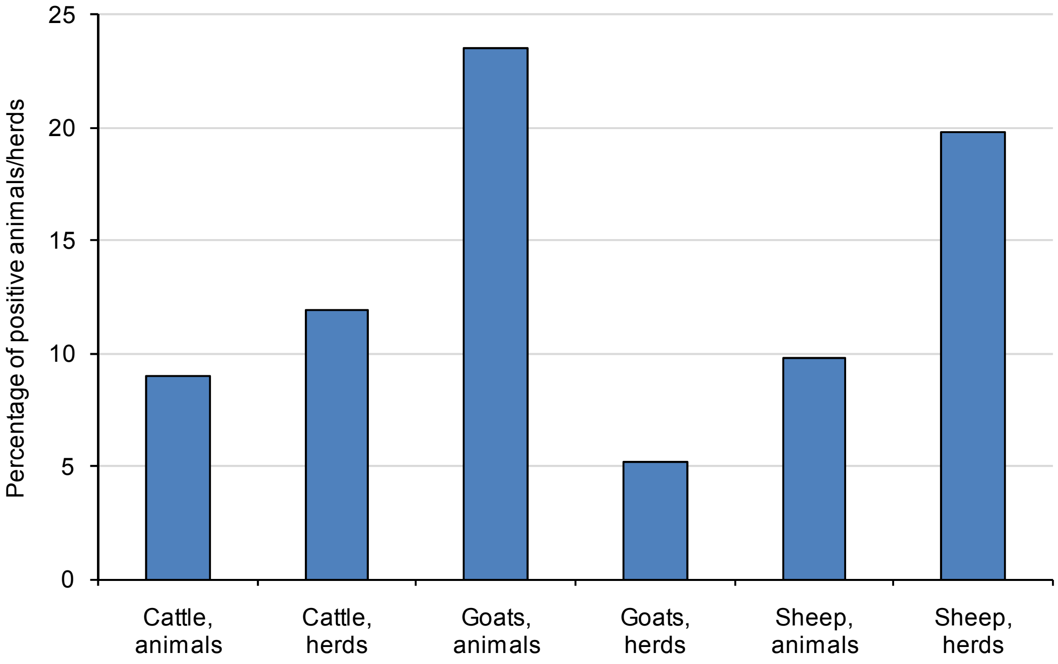
Country	Sampling unit[1]	2009		2008		2007	
		N	% pos	N	% pos	N	% pos
Sheep							
Austria	Animal	35	0	27	0	-	-
Bulgaria	Animal	1,709	6.8	820	5.0	3,410	11.2
France	Animal	-	-	-	-	330	40.3
Germany	Animal	9,605	11.4	1,880	10.3	527	5.9
Greece	Animal	59	13.6	30	26.7	202	20.3
Hungary	Animal	42	7.1	-	-	27	7.4
Italy	Animal	-	-	25	16.0	903	16.6
	Flock	253	19.8	-	-	-	-
Netherlands	Animal	-	-	129	10.1	144	0
Portugal	Animal	-	-	727	8.8	75	0
Slovakia	Animal	58	0	1,476	0	3,758	0.1
Spain	Animal	131	62.6	-	-	-	-
United Kingdom	Animal	1,709	0	-	-	-	-
	Flock	-	-	383	9.7	-	-
Total sheep (9 MSs in 2009)	**Animal[2]**	**13,348**	**9.8**	**5,114**	**6.3**	**9,376**	**7.9**
	Flock	**253**	**19.8**	**383**	**9.7**	**-**	**-**
Norway	Animal	627	0	-	-	-	-
Switzerland	Animal	166	0	141	1.4	-	-
Goats							
Austria	Animal	93	2.2	109	10.1	-	-
Bulgaria	Animal	774	7.5	25	12.0	-	-
France	Animal	-	-	-	-	110	30.0
Germany	Animal	1,453	34.8	499	15.6	190	10.5
Greece	Animal	-	-	-	-	114	14.9
Hungary	Animal	-	-	-	-	76	0
Italy	Animal	-	-	-	-	141	9.2
	Flock	43	7.0	-	-	-	-
	Herd	-	-	-	-	101	10.9
Netherlands	Animal	-	-	160	31.9	74	9.5
	Holding	1,281	5.2	-	-	-	-
Slovakia	Animal	69	0	130	1.5	227	0
Spain	Animal	27	7.4	-	-	-	-
United Kingdom	Herd	-	-	142	2.8	-	-
Total goats (7 MSs in 2009)	**Animal[2]**	**2,416**	**23.5**	**923**	**15.7**	**932**	**9.7**
	Herd[3]	**1,324**	**5.2**	**142**	**2.8**	**101**	**10.9**
Norway	Herd	349	0	-	-	-	-
Switzerland[4]	Animal	127	3.1	139	6.5	-	-

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

1. For animal-based data in 2007, the sampling stage was not indicated; in 2008, samples from Austria, Belgium, Greece, Italy, Netherlands and Slovenia were collected at farm; in 2009, samples from Austria, Denmark, Greece, Slovenia, Sweden and United Kingdom were collected at farm.

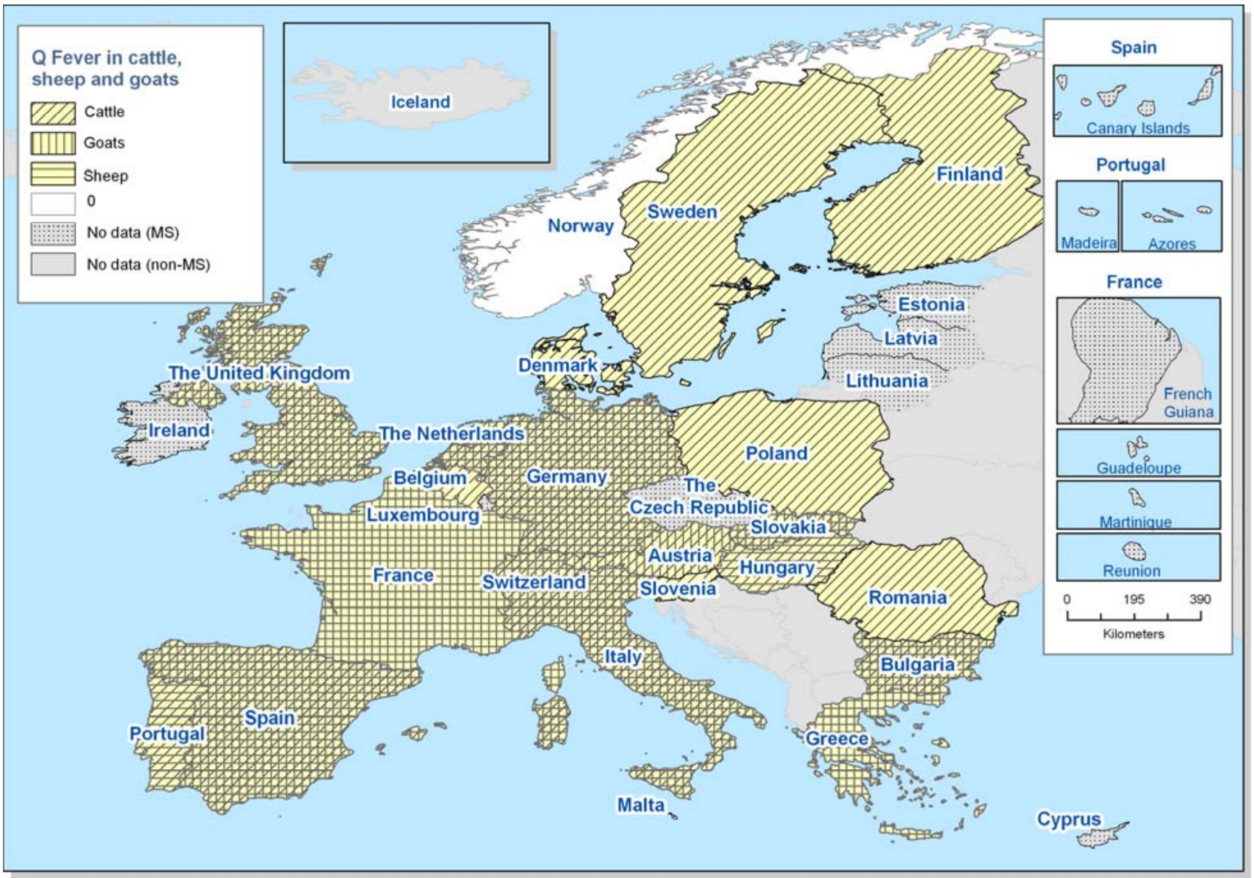
   For herd-based data in 2007, Denmark was the only country to report on sampling stage (at farm); in 2008, samples from Denmark, Norway, Sweden and United Kingdom (flock and herd) were collected at farm; in 2009, Netherlands (holding) was the only country to report on the sampling stage (farm).
2. In 2009, Italy and Slovenia tested an additional 1,858 and 4,669 sheep and goats, 0 and 155 were positive for *C. burnetii*, respectively.
3. The summarised number of herds includes both flocks, herds and holdings.
4. In Switzerland, positive samples were reported as *Coxiella* spp.

Figure QF2.* *Occurrence of* Coxiella burnetii *(Q fever) in the reporting MS group in cattle, sheep and goats, 2009



Note: Data is only included for sample size ≥25.

Figure QF3.* *Distribution of* Coxiella burnetii *(Q fever) in cattle, sheep and goats, 2007-2009



3.12.3 Discussion

In 2009, together 15 MSs reported *Coxiella burnetii* (Q fever) cases in humans. The number of cases had been increasing from 2007 and the Netherlands accounted for the majority of cases in these years, due to a large Q fever outbreak. These recent developments lead the EC to ask EFSA for scientific advice on the significance of the occurrence of Q fever in MSs. EFSA's scientific panel on Animal Health and Welfare (AHAW) issued an opinion on Q fever on 27 April 2010. According to the opinion, *C. burnetii* infection is present in humans in most, if not all, MSs. Q fever is a zoonotic disease with a limited public health impact in the EU, however, in certain epidemiological circumstances and for particular risk group, the public health impact can be significant. This is demonstrated by the outbreak in the Netherlands.

In 2009, an increased number of MSs reported data on Q fever in animals, indicating a growing interest in the disease. All reporting MSs detected *C. burnetii* from at least one of the domestic ruminant species, cattle, sheep or goats. The reported proportion of positive units varied between MSs. These findings are in line with AHAW's opinion, which states that infection with *C. burnetii* is endemic in domestic ruminants (cattle, sheep and goats) in most, if not all, MSs. Although infection in domestic ruminants is common, the disease is rare. The overall impact of *C. burnetii* infection on the health of domestic ruminants in MSs is limited.

The opinion further concludes that it seems likely that *C. burnetii* infection can be maintained in domestic ruminants in a wide range of husbandry systems. The common risk factors associated with transmission of infection from domestic ruminants to humans in different MSs include an association between human infection and small ruminants (sheep and goats); an indication of proximity between animals and human populations; particularly in association with parturition in animals (and to abortions, in the case of goats); and specific climatic conditions, in particular dry, windy weather. In humans, the risk of exposure to *C. burnetii* is increased, either following close contact with animals infected with *C. burnetii,* or following community-based exposure (caused by an elevation of *C. burnetii* in the wider environment following release and dissemination from infected animal hosts).

A scientific report was submitted to EFSA in 2010 concerning the development of harmonised schemes for the monitoring and reporting of Q-fever in animals in the EU[48]. This report is an outcome of a grant project co-funded by EFSA and is prepared by a consortium of MS institutes lead by ANSES[49]. The report recommended MSs to focus monitoring on clinically infected herds of cattle, sheep and goats, using a combination of PCR methods for direct detection of *C. burnetii*, and ELISA tests for serological testing. The report also suggests definitions when a herd is considered to be clinically infected. The report states that most MSs have no regulations on Q fever in ruminants, and central recording and reporting of results could be improved.

48 Scientific report submitted to EFSA. Development of harmonised schemes for the monitoring and reporting of Q-fever in animals in the European Union. Question No EFSA-Q-2009-00511.

49 Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (ANSES), France.

3. INFORMATION ON SPECIFIC ZOONOSES

3.13 Other zoonoses

Table OZ1 presents countries reporting data on the other zoonoses not covered by the specific chapters of this report. For this section, only data on *Francisella* and *Cysticerci* were submitted in 2009.

Table OZ1. Overview of countries reporting data on other zoonoses, 2009

Data	Total no of MSs reporting	Countries
Human	23	**All MSs** except: AT, DK, FR, IT **Non-MSs:** IS, NO
Animal	17	**MSs:** AT, BE, BG, DE, DK, ES, FI, GR, HU, IT, NL, PL, RO, SK, SI, SE, UK **Non-MSs:** CH, NO

3.13.1 *Francisella*

Tularemia (rabbit fever) is a zoonotic disease caused by *Francisella tularensis*, a gram negative coccobacillus geographically widely distributed. *F. tularensis* has been isolated from more than 200 animal species including vertebrates and invertebrates. The bacterium is able to survive for long periods of time in diverse environments such as water, mud and decomposing carcasses. There are several subspecies of *F. tularensis*, but the subspecies *holarctica* is most common in Europe.

The main transmission route for humans is via arthropod or insect bites. Therefore, tularemia is a disease associated primarily with rural environments where people may be in contact with infected vectors. In addition, transmission may also occur through the skin after direct contact with infected animals or through ingestion of contaminated food or water and inhalation of aerosolised soil dust containing bacteria.

Tularemia in humans has an incubation period that typically varies between three to five days. Although there are five different clinical forms of tularemia (ulceroglandular, oculoglandular, oropharyngeal, gastrointestinal and pneumonic), the ulceroglandular form accounts for 80 % of human cases.

Ulceroglandular tularaemia is characterised as fever, an ulcer appearing at the bite site, painful and swollen lymph nodes and chills. Tularemia may lead to severe complications such as septicaemia, meningitis, pericarditis and renal and hepatic failure. Long-term immunity is developed after recovery and re-infection is extremely rare.

The ecology of *F. tularensis* is complex. The role of the different animal species as reservoirs is poorly understood. However, wild animals such as hares, rabbits, voles, muskrats and ticks are considered important reservoirs for *F. tularensis*. Animals may develop clinical infections that include a wide range of symptoms. Tularemia in wild hares, rabbits and rodents is often fatal.

Humans

Human cases with *Francisella* are more common in the northern parts of Europe. In 2009, no tularaemia food-borne outbreaks were reported within EU.

Animals

Sweden analysed 25 hares, three squirrels and one beaver which were found negative for *F. tularensis* (rabbit fever).

3.13.2 *Cysticerci*

Animals

In 2009, two MSs, Estonia and Sweden provided information on *Cysticerci* in pigs and cattle tested at slaughterhouse. Estonia reported 24 (0.006 %) of 405,456 pigs positive for *Cysticerci tenuicollis*, and no positive findings in 46,934 cattle, 5,846 sheep and 3,568 wild boar. *Cysticercus tenuicollis* is not a zoonotic infection. Sweden reported 4 (0.001 %) of 426,504 cattle positive to *Cysticercus* spp. and no positive findings in 2,969,690 pigs.

A scientific report was submitted to EFSA concerning the development of harmonised schemes for the monitoring and reporting of *Cysticercus* in animals and foodstuffs in EU[50]. This report is an outcome of a grant project co-funded by EFSA and it is prepared by a consortium of MS institutes lead by FERA. The proposal focuses primarily on the monitoring of cattle for *T. saginata,* pigs for *T. solium* and in addition considers monitoring *T. multiceps* in certain areas of EU. Monitoring should continue to be based on visual meat inspection according to current European legislation; however, central recording and reporting of results could be improved. The development and validation of a serodiagnostic test for bovine cysticercosis for use as a routine surveillance tool is recommended.

Based on information submitted by 22 MSs, the scientific report concludes, that porcine cysticercosis still persists in some east European MSs (Austria, Estonia, Lithuania, Poland and Romania), but seems to be eradicated in north, west and south Europe. For bovine cysticercosis, very incomplete information was reported. However, from all 17 MSs where information was available, a rare occurrence of bovine cysticercosis was recorded, covering MSs from all regions of EU. Data reported showed that there was an obvious disparity in the number of cases detected in the different MSs.

50 Scientific Report submitted to EFSA. Development of harmonised schemes for the monitoring and reporting of *Cysticercus* in animals and foodstuffs in the European Union. Question No EFSA-Q-2009-01073.

4. FOOD-BORNE OUTBREAKS

4.1 General overview

The reporting of investigated food-borne outbreaks has been mandatory for EU MSs since 2005. Starting from 2007, harmonised specifications on the reporting of these outbreaks at EU level have been applied[51]. However, the food-borne outbreak investigation and reporting systems at national level are not harmonised within EU MSs. Therefore, the differences in the numbers and types of reported outbreaks, as well as causative agents, may not necessarily reflect levels of food safety between MSs, but may rather be indicative of the differences in the efficiency and sensitivity of the national systems for identifying and investigating food-borne outbreaks.

Data from 2009 provide information on the total number of reported food-borne outbreaks caused by different causative agents, including food-borne outbreaks where the causative agent was unknown. For verified outbreaks, where laboratory detection of the causative agent in the food vehicle or analytical epidemiological evidence disclosed a link between human cases, data were reported on the type of evidence supporting the outbreak, food vehicles, and detailed information covering the type of outbreak, number of human cases, hospitalisations and deaths, setting, and contributing factors. For the outbreaks where this link is supported by weaker evidence (possible outbreaks), only the causative agent, number of human cases, hospitalisations and deaths were reported.

In this general overview, all reported food-borne outbreaks, including outbreaks caused by drinking water, are included in the tables and figures. In subsequent sections, outbreaks are presented in more detail, categorised by the causative agent. However, all verified waterborne outbreaks are addressed separately in section 4.10.

In 2009, 24 MSs and two non-MSs provided data on food-borne outbreaks. An overview of countries reporting data on food-borne outbreaks is provided in Table OUT1. No outbreak data were received from Bulgaria, Cyprus and Luxembourg.

Table OUT1. Overview of countries reporting data on food-borne outbreaks, 2009

Data	Total no of MSs reporting	Countries
Salmonella	24	**All MSs** except BG, CY, LU **Non-MSs**: CH, NO
Campylobacter	16	**MSs**: AT, BE, CZ, DE, DK, EE, ES, FR, IE, IT, LT, MT, NL, PL, SE, UK **Non-MSs**: CH, NO
Pathogenic *E.coli*	12	**MSs**: AT, BE, DE, ES, FR, IE, IT, LT, MT, PL, RO, UK **Non-MS**: NO
Other bacterial agents	13	**MSs**: AT, BE, CZ, DE, DK, ES, FR, LT, LV, PL, PT, SE, UK **Non-MS**: NO
Bacterial toxins	21	**MSs**: BE, DE, DK, ES, FI, FR, GR, HU, IE, IT, LT, LV, MT, NL, PL, PT, RO, SE, SI, SK, UK **Non-MSs**: CH, NO
Viruses	20	**MSs**: AT, BE, CZ, DE, DK, ES, FI, FR, GR, HU, IE, IT, LT, LV, MT, NL, PL, SE, SK, UK **Non-MSs**: CH, NO
Parasites	7	**MSs**: BE, DE, ES, HU, LT, PL, RO **Non-MS**: NO
Other causative agents	16	**MSs**: AT, BE, DE, DK, EE, ES, FR, GR, HU, IT, LT, LV, PL, SE, SK, UK **Non-MSs**: CH, NO
Unknown	17	**MSs**: BE, CZ, DK, ES, FI, FR, GR, HU, IE, IT, LT, LV, MT, NL, PL, SE, UK **Non-MSs**: CH, NO

51 EFSA (European Food Safety Authority), 2007. Report of the Task Force on Zoonoses Data Collection on harmonising the reporting of food-borne outbreaks through EU reporting system in accordance with Directive 2003/99/EC. The EFSA Journal,123, 1-16.

In 2009, a total of 5,550 food-borne outbreaks, including both possible and verified outbreaks, were reported by the 24 reporting MSs (Table OUT2). This was similar to the number of outbreaks reported in 2008, where 25 MSs reported a total of 5,332 outbreaks. Overall, 48,964 human cases, 4,356 hospitalisations and 46 deaths (case fatalities) were related to the reported outbreaks for 2009 (Table OUT3).

A total of 977 verified outbreaks were reported by MSs, representing 17.6 % of the total number of food-borne outbreaks recorded in 2009. The verified outbreaks reported by MSs involved 14,572 human cases. Of these, 12.6 % were admitted to hospital and 23 people died (0.16 %) (Table OUT3). These numbers were similar to observations in 2008. In the non-MSs, Norway and Switzerland, verified outbreaks affected 143 cases with six hospitalisations and no fatalities.

The average number of outbreaks reported in 2009 was 1.1 outbreaks per 100,000 population (Table OUT2). As in previous years, Malta had a high reporting rate (11.1 outbreaks per 100,000 population) but was exceeded by Latvia in 2009 with a reporting rate of 35.6 outbreaks per 100,000 population.

Within EU, the causative agent was known in 72.9 % of the outbreaks, ranging from 21.5 % to 100 % among MSs. Fifteen MSs reported the causative agent in more than 75.0 % of their outbreaks.

In 2009, France alone accounted for 22.6 % of all reported outbreaks. In France a particular effort is made to validate the causes of food-borne outbreaks, and a real-time processing transmission explains the big number of food-borne outbreaks reported by this MS. Latvia experienced a large increase in the reported outbreaks, with 805 reported outbreaks in 2009, compared to 45 in 2008. In contrast, the number of reported outbreaks decreased in Germany from 1,068 to 602. Together, France, Germany and Latvia accounted for 48.0 % of all outbreaks (Table OUT2). Whereas, France, Latvia, Poland and Spain together accounted for 73.7 % of verified outbreaks.

In 2009, a total of 46 deaths were reported related to food-borne outbreaks (Table OUT3). Out of these death cases, 16 were associated with *Salmonella*, 15 with *Listeria monocytogenes,* three with *Staphylococcus* toxins, two with *Clostridium botulinum* toxins, two with *Clostridium* spp., two with viruses, one with *Campylobacter*, one with *Yersinia* and four deaths with unknown or other causative agents.

Salmonella remained the most frequently detected causative agent in food-borne outbreaks reported in EU (Figures OUT1 and OUT2). In 2009, *Salmonella* was responsible for 31.0 % of all reported outbreaks followed by viruses and bacterial toxins that accounted for 18.8 % and 10.1 % of the outbreaks, respectively. In 27.1 % of all outbreaks, the causative agent was unknown (Table OUT4). These observations are similar to reports from previous years.

There has been a sharp decline in the total number of *Salmonella* outbreaks within EU during the years 2007 to 2009 from 2,253 to 1,722 outbreaks. At the same time, outbreaks caused by bacterial toxins have increased slightly (from 464 outbreaks in 2007 to 558 outbreaks in 2009) (Figure OUT2 and Table OUT4). The increase observed in the number of outbreaks caused by viruses was mainly due to outbreaks reported by Latvia.

Table OUT2. Total number of reported food-borne outbreaks (excluding verified waterborne outbreaks) in EU, 2007-2009

Country	2009				2008				2007[1]			
	N	Reporting rate per 100,000	Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100,000	Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100,000	Possible outbreaks (n)	Verified outbreaks (n)
Austria	351	4.2	340	11	368	4.4	354	14	438	5.3	427	11
Belgium	105	1.0	91	14	104	1.0	89	15	75	0.7	54	21
Czech Republic	25	0.2	23	2	23	0.2	22	1	37	0.4	33	4
Denmark	51	0.9	35	16	82	1.5	66	16	57	1.1	0	57
Estonia	23	1.7	22	1	51	3.8	46	5	28	2.1	26	2
Finland	54	1.0	24	30	41	0.8	33	8	32	0.6	0	32
France	1,256	2.0	898	358	1,081	1.7	808	273	984	1.6	0	984
Germany	602	0.7	567	35	1,068	1.3	1,038	30	1,405	1.7	1,343	62
Greece	53	0.5	53	0	55	0.5	54	1	55	0.5	55	0
Hungary	59	0.6	38	21	114	1.1	79	35	269	2.7	217	52
Ireland	28	0.6	27	1	25	0.6	23	2	20	0.5	15	5
Italy	248	0.4	248	0	245	0.4	245	0	-	-	-	-
Latvia[2]	805	35.6	694	111	45	2.0	35	10	233	10.2	218	15
Lithuania	175	5.2	167	8	228	6.8	216	12	196	5.8	186	10
Luxembourg	-	-	-	-	2	0.4	2	0	-	-	-	-
Malta	46	11.1	46	0	64	15.6	64	0	57	14.0	57	0
Netherlands	247	1.5	214	33	324	2.0	289	35	345	2.1	308	37
Poland	313	0.8	203	110	484	1.3	329	155	562	1.5	407	155
Portugal	11	0.1	0	11	35	0.3	24	11	-	-	-	-
Romania	54	0.3	0	54	46	0.2	9	37	42	0.2	5	37
Slovakia	303	5.6	297	6	75	1.4	66	9	114	2.1	97	17
Slovenia	5	0.2	2	3	17	0.8	16	1	17	0.9	0	17
Spain	416	0.9	275	141	551	1.2	337	214	619	1.4	365	254
Sweden	224	2.4	213	11	154	1.7	148	6	123	1.4	111	12
United Kingdom	96	0.2	96	0	50	0.1	50	0	25	0.0	25	0
EU Total	**5,550**	**1.1**	**4,573**	**977**	**5,332**	**1.1**	**4,442**	**890**	**5,733**	**1.1**	**3,949**	**1,784**
Norway	47	1.0	42	5	63	1.3	59	4	82	1.8	53	29
Switzerland	13	0.2	7	6	10	0.1	5	5	11	0.2	4	7

1. 2007 data have been updated compared to published data, in accordance with information received from a MS.
2. For Latvia, household outbreaks included in 2009 data, but not in previous years.

Table OUT3. Number of human cases in food-borne outbreaks (possible and verified - excluding verified waterborne outbreaks) in EU, 2009

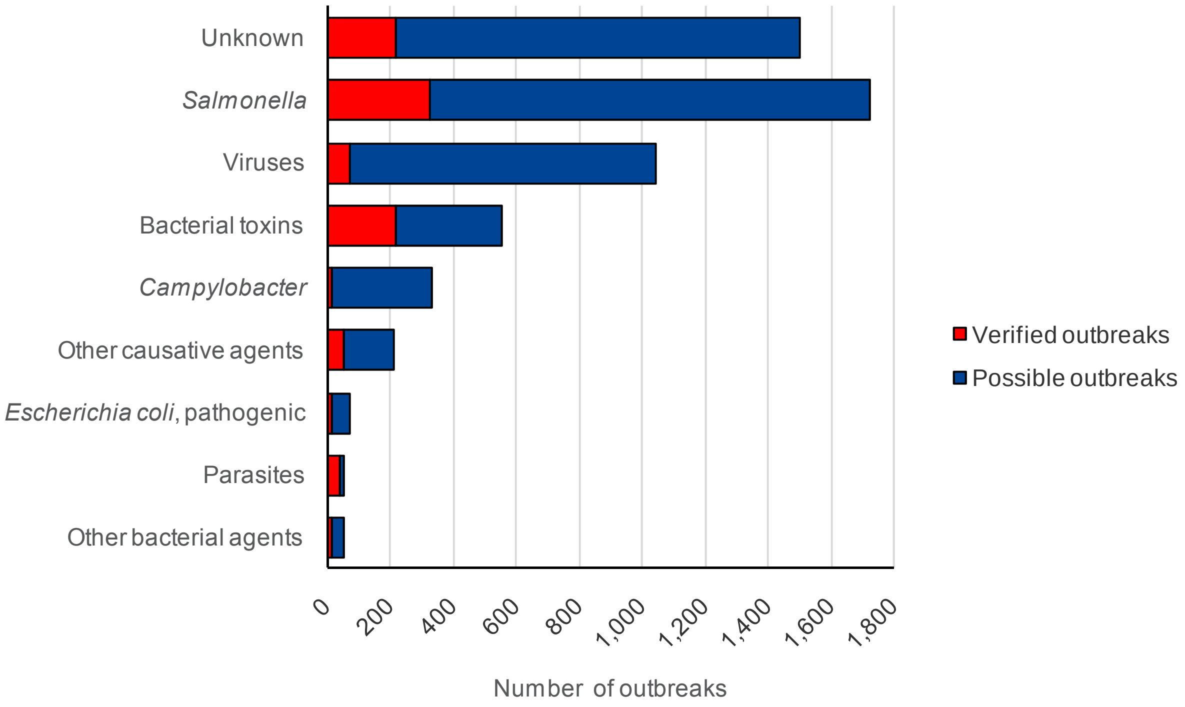
Country	Verified outbreaks				Possible outbreaks			
	N	Human cases			N	Human cases		
		Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Austria	11	422	64	5	340	908	159	1
Belgium	14	238	43	0	91	674	15	1
Czech Republic	2	156	14	4	23	807	28	0
Denmark	16	858	38	2	35	751	11	2
Estonia	1	6	3	0	22	57	23	0
Finland	30	1,403	3	0	24	265	8	0
France	358	4,685	385	3	898	9,480	346	6
Germany	35	583	56	4	567	2,571	437	0
Greece	-	-	-	-	53	500	86	0
Hungary	21	266	53	1	38	848	64	1
Ireland	1	28	0	0	27	151	24	1
Italy	-	-	-	-	248	1,451	-	-
Latvia	111	251	-	0	694	2,034	-	-
Lithuania	8	236	130	0	167	531	405	0
Malta	-	-	-	-	46	215	5	0
Netherlands	33	321	10	2	214	735	11	0
Poland	110	1,521	431	0	203	2,044	350	0
Portugal	11	251	90	1	0	-	-	-
Romania	54	714	379	1	0	-	-	-
Slovakia	6	167	18	0	297	1,083	225	0
Slovenia	3	36	3	0	2	47	18	1
Spain	141	2,112	122	0	275	3,472	175	2
Sweden	11	318	0	0	213	2,336	13	0
United Kingdom	-	-	-	-	96	3,432	111	8
EU Total	**977**	**14,572**	**1,842**	**23**	**4,573**	**34,392**	**2,514**	**23**
Norway	5	65	3	0	42	642	16	0
Switzerland	6	78	3	0	7	202	2	0

Table OUT4. Causative agents in all food-borne outbreaks in EU, 2007-2009

Causative agent	2009				2008				2007 [1]			
	N	%	Outbreaks		N	%	Outbreaks		N	%	Outbreaks	
			Verified outbreaks (n)	Possible outbreaks (n)			Verified outbreaks (n)	Possible outbreaks (n)			Verified outbreaks (n)	Possible outbreaks (n)
Salmonella	1,722	31.0	324	1,398	1,888	35.4	490	1,398	2,253	39.3	517	1,736
Viruses	1,043	18.8	70	973	697	13.1	38	659	675	11.8	104	571
Bacterial toxins	558	10.1	218	340	525	9.8	159	366	464	8.1	411	53
Campylobacter	333	6.0	16	317	488	9.2	21	467	465	8.1	29	436
Other causative agents	214	3.9	55	159	167	3.1	68	99	206	3.6	154	52
Escherichia coli, pathogenic	75	1.4	18	57	75	1.4	10	65	65	1.1	26	39
Parasites	51	0.9	40	11	70	1.3	38	32	58	1.0	35	23
Other bacterial agents	52	0.9	18	34	20	0.4	11	9	41	0.7	14	27
Yersinia	-	-	-	-	22	0.4	2	20	20	0.3	2	20
Unknown	1,502	27.1	218	1,284	1,380	25.9	53	1,327	1,486	25.9	492	992
EU Total	**5,550**	**100**	**977**	**4,573**	**5,332**	**100**	**890**	**4,442**	**5,733**	**100**	**1,784**	**3,949**

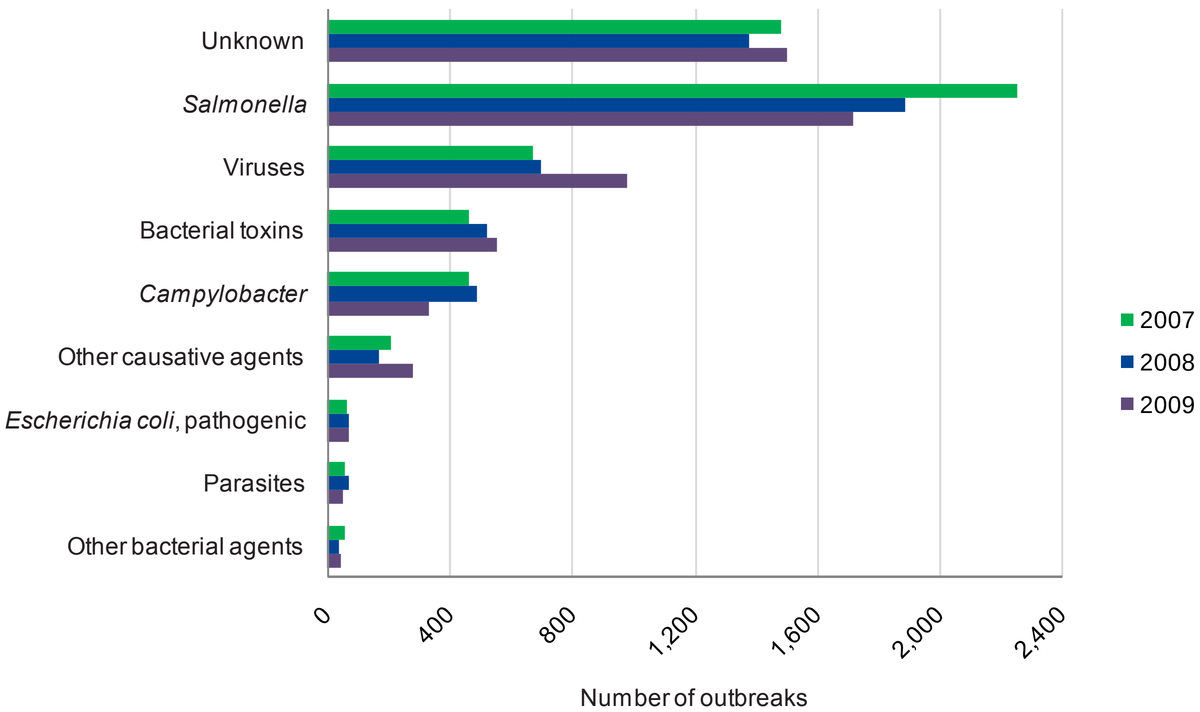
1. 2007 data have been updated compared to published data, in accordance with information received from a MS.

Figure OUT1. Distribution of food-borne outbreaks (possible and verified) per causative agent in EU, 2009



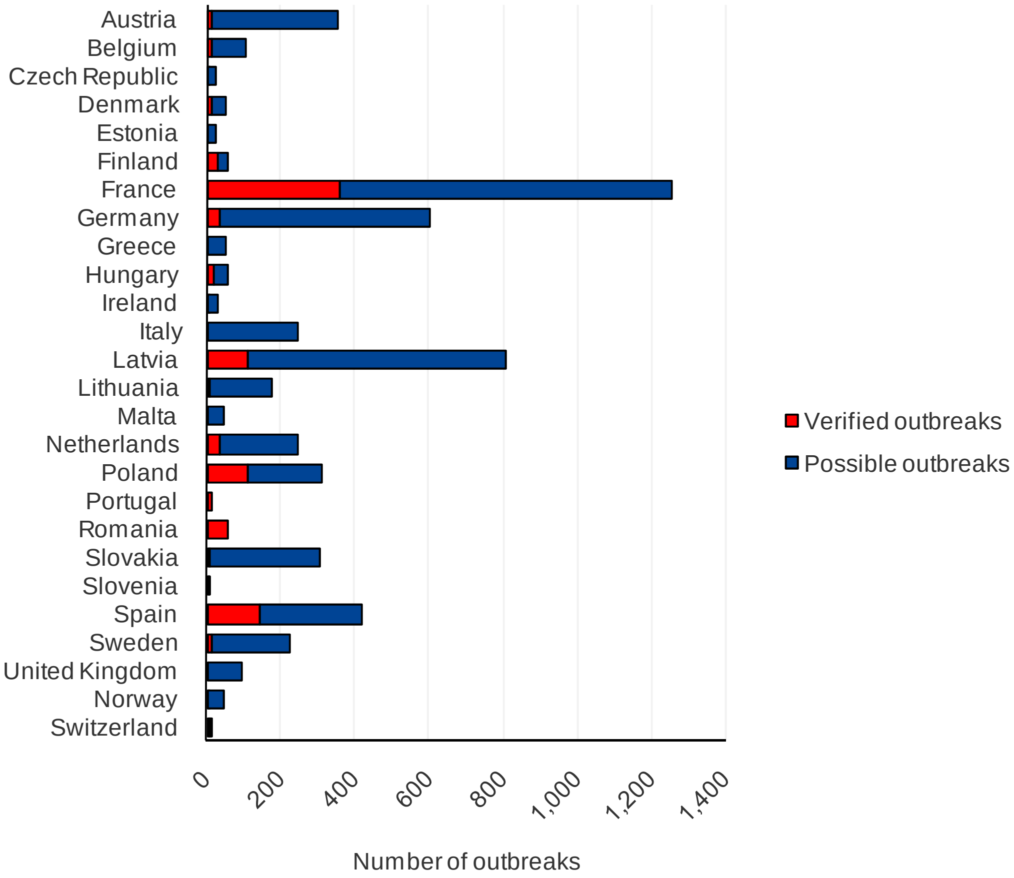
Note: Food-borne viruses include calicivirus, hepatitis A virus and other unspecified food-borne viruses. Bacterial toxins include toxins produced by *Bacillus, Clostridium* and *Staphylococcus.* Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins, wax esters and other unspecified agents. Parasites include primarily *Trichinella,* but also *Anisakis.* Other bacterial agents include *Brucella, Listeria, Shigella, Vibrio* and *Yersinia.*

Figure OUT2. Total number of food-borne outbreaks (possible and verified) in EU, 2007-2009



Note: Food-borne viruses include calicivirus, hepatitis A virus and other unspecified food-borne viruses. Bacterial toxins include toxins produced by *Bacillus, Clostridium* and *Staphylococcus.* Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins, wax esters and other unspecified agents. Parasites include primarily *Trichinella,* but also *Anisakis.* Other bacterial agents include *Brucella, Listeria, Shigella, Vibrio*, and *Yersinia.*

Figure OUT3. Distribution of food-borne outbreaks (possible and verified) in MSs and non-MSs, 2009



The overall proportion of verified outbreaks was 17.6 % in 2009 (Table OUT4). Considering each causative agent, the highest proportion of verified outbreaks was reported for parasites (78.4 %). For the remaining causative agents, the maximum proportion of verified outbreaks was 39.1 % for bacterial toxins (Figure OUT1).

The extent to which MSs are able to classify outbreaks as verified is highly dependent on the MS-specific outbreak investigation and reporting system, and the type of information that is available on each outbreak. This is why there are differences between MSs in the proportion of verified outbreaks (Figure OUT3). Eighteen MSs and two non-MSs reported both verified and possible outbreaks. In contrast, Greece, Italy, Malta, and the United Kingdom reported only possible outbreaks and therefore provided no detailed information on implicated food vehicles, settings or contributing factors. For the United Kingdom, only possible outbreaks were reported for legal reasons.

In verified outbreaks, where the causative agent was known, *Salmonella,* bacterial toxins and viruses were responsible for most human cases, accounting for 62.6 % of the outbreaks and 77.5 % of reported human cases (Table OUT5). Furthermore, these outbreaks accounted for 70.5 % of hospitalisations and 43.5 % of deaths related to verified outbreaks with known causative agent. However, the *Listeria* outbreaks had the highest proportion of hospitalised cases (40 cases, 100 %) as well as the highest proportion of deaths (11 cases, 27.5 %). Also outbreaks caused by parasites had a high proportion of hospitalisations (45.3 %).

Table OUT5. Number of outbreaks and human cases per causative agent in verified food-borne outbreaks in EU, 2009

Causative agent	2009				
	N	%	Human cases		
			Cases	Hospitalised	Deaths
Salmonella	324	33.2	4,500	988	6
Bacterial toxins	218	22.3	3,611	295	4
Viruses	70	7.2	3,189	15	0
Other causative agents	55	5.6	394	93	0
Parasites	40	4.1	572	259	0
Escherichia coli, pathogenic	18	1.8	228	62	0
Campylobacter	16	1.6	102	9	1
Other bacterial agents	18	1.8	248	50	12
Unknown	218	22.3	1,728	71	0
EU Total	**977**	**100**	**14,572**	**1,842**	**23**

Note: Data from 977 outbreaks are included: Austria (11), Belgium (14), Czech Republic (2), Denmark (16), Estonia (1), Finland (30), France (358), Germany (35), Hungary (21), Ireland (1), Latvia (111), Lithuania (8), Netherlands (33), Poland (110), Portugal (11), Romania (54), Slovakia (6), Slovenia (3), Spain (141) and Sweden (11).

Note: Food-borne viruses include calicivirus, hepatitis A virus and other unspecified food-borne viruses. Bacterial toxins include toxins produced by *Bacillus*, *Clostridium* and *Staphylococcus.* Other causative agents include mushroom toxins, marine biotoxins, histamine, mycotoxins, wax esters and other unspecified agents. Parasites include primarily *Trichinella,* but also *Anisakis.* Other bacterial agents include *Brucella, Listeria, Shigella, Vibrio,* and *Yersinia*.

An outbreak is defined as either a household outbreak, where only members of a single household are affected, or as a general outbreak, where members of more than one household are affected. Of the 977 verified outbreaks in 2009, 40.6 % were general outbreaks, 29.3 % were household outbreaks and 30.1 % were unknown. It should be kept in mind that the reporting and investigation systems in some MSs do not include household outbreaks at all.

Types of evidence supporting verified outbreaks are summarised in Table OUT6. More than one type of evidence can be reported for one outbreak. The causative agent was detected from the food vehicle and human cases in 38.7 % and 56.9 % of verified outbreaks, respectively, and the agent was laboratory characterised both from the food vehicle and human cases in 5.7 % of outbreaks. Often more than one type of evidence was included for a specific outbreak. Analytical epidemiological evidence supported the link between human cases and food vehicles in 73.4 % of verified outbreaks, ranging from 0 % to 100 % within reporting MSs.

In 2009, the majority of verified outbreaks were associated with foodstuffs of animal origin (Figure OUT4). Once again the most common single foodstuff category reported as food vehicle was eggs and egg products, responsible for 169 (17.3 %) outbreaks. Mixed or buffet meals accounted for 8.1 % of outbreaks and pig meat and products thereof for 7.8 %. For 216 (22.1 %) outbreaks the food vehicle was unknown.

Fruit and vegetables were implicated in 43 (4.4 %) verified outbreaks; these outbreaks were primarily caused by frozen raspberries contaminated with norovirus. In fact, in 82.6 % of outbreaks caused by fruit and vegetables, the causative agent was norovirus.

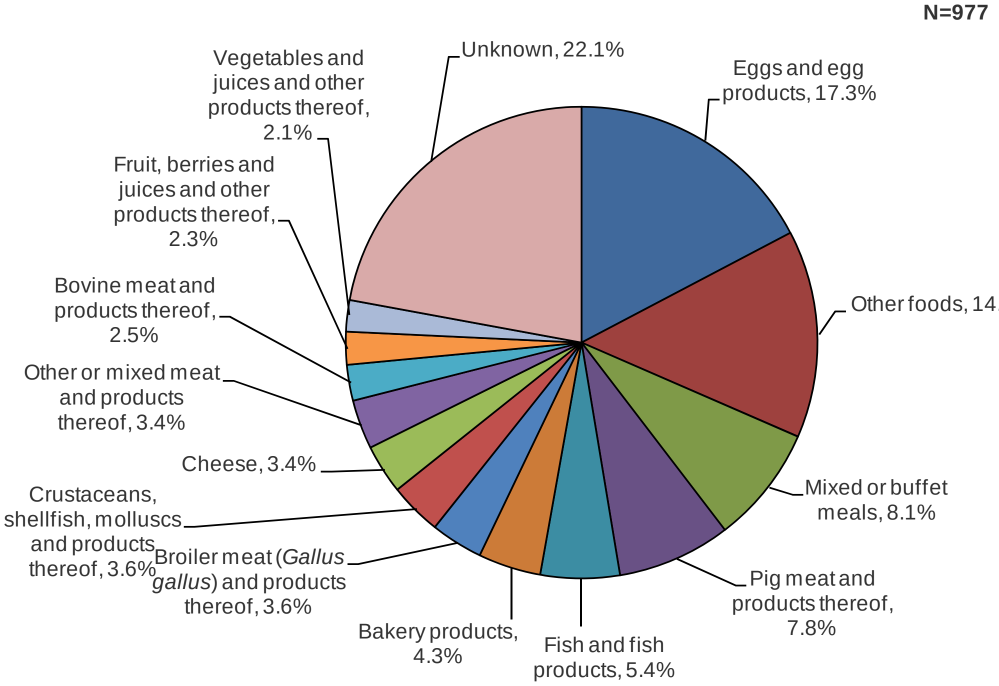
The setting of the outbreak was provided in 85.0 % of verified outbreaks (Figure OUT5). Households were reported as the setting in 36.4 % of outbreaks (18.7 % of cases). Apart from private households, the most common settings in verified outbreaks with large numbers of human cases were restaurants/cafés and similar premises (17.5 % of cases) as well as schools and kindergartens (14.8 % of cases).

Table OUT6. Evidence in verified food-borne outbreaks in EU, 2009

Country	N	Causative agent detected in food vehicle	Laboratory characterisation of isolates [1]	Analytical epidemiological evidence
Austria	11	8	-	3
Belgium	14	12	-	3
Czech Republic	2	2	2	-
Denmark	16	12	7	5
Estonia	1	1	1	1
Finland	30	9	4	28
France	358	108	-	329
Germany	35	32	14	4
Hungary	21	20	20	1
Ireland	1	-	-	1
Latvia	111	-	-	111
Lithuania	8	5	-	3
Netherlands	33	24	-	10
Poland	110	47	-	75
Portugal	11	11	-	-
Romania	54	52	-	3
Slovakia	6	6	6	-
Slovenia	3	3	-	-
Spain	141	20	-	133
Sweden	11	6	2	7
EU Total	**977**	**378**	**56**	**717**
Norway	5	5	-	-
Switzerland	6	5	-	1

1. Causative agents detected in both human cases and food vehicles are further characterised to confirm that the isolates from human cases and food are identical.

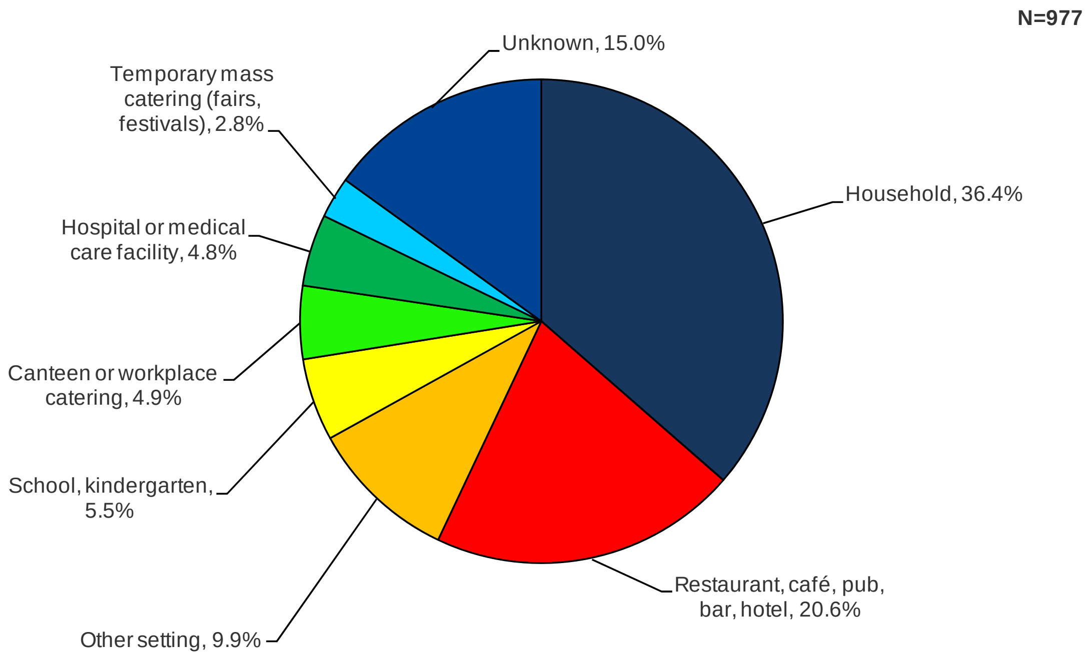
Figure OUT4. Distribution of verified outbreaks by food vehicle in EU, 2009



Note: Data from 977 outbreaks are included: Austria (11), Belgium (14), Czech Republic (2), Denmark (16), Estonia (1), Finland (30), France (358), Germany (35), Hungary (21), Ireland (1), Latvia (111), Lithuania (8), Netherlands (33), Poland (110), Portugal (11), Romania (54), Slovakia (6), Slovenia (3), Spain (141) and Sweden (11).

Other foodstuffs (N=139) include: other or unspecified poultry meat and products thereof (17), dairy products (other than cheeses) (13), cereal products including rice and seeds/pulses (nuts, almonds) (11), turkey meat and products thereof (5), milk (4), herbs and spices (2), sheep meat and products thereof (2), sweets and chocolate (2) and other foods (83).

Figure OUT5. Distribution of verified outbreaks by settings in EU, 2009



Note: Data from 977 outbreaks are included: Austria (11), Belgium (14), Czech Republic (2), Denmark (16), Estonia (1), Finland (30), France (358), Germany (35), Hungary (21), Ireland (1), Latvia (111), Lithuania (8), Netherlands (33), Poland (110), Portugal (11), Romania (54), Slovakia (6), Slovenia (3), Spain (141) and Sweden (11).

Other settings (N=97) include: take-away or fast-food outlet (19), camp, picnic (16), residential institution (nursing home, prison, boarding school) (14), mobile retailer, market/street vendor (3), aircraft, ship, train (1) and other settings (44).

Detailed information on causative agents in selected food vehicles

The following section provides a more detailed view of different food vehicles and shows the distribution of the causative agents related to verified outbreaks caused by meat from pigs and products thereof, eggs and egg products, mixed or buffet meals, fish and fish products, and fruit and vegetables (Figures OUT6-OUT10).

Of 76 outbreaks caused by pig meat and products thereof, 39.5 % were due to *Trichinella.* Romania reported 96.7 % of these outbreaks. *Clostridium* spp. accounted for 22.4 % (from France, Hungary, Portugal and Romania) and *Salmonella* spp. for 15.8 % (Belgium, France, Germany and Hungary) of the outbreaks (Figure OUT6). *S.* Typhimurium was responsible for five out of twelve *Salmonella* outbreaks associated with pig meat. The proportion of human cases in the outbreaks caused by pig meat and products thereof was also mostly because of *Trichinella* spp. (37.8 %).

Egg and egg products were implicated in 123 outbreaks of which 96.7 % were caused by *Salmonella* spp. (Figure OUT7). The majority of outbreaks were associated with *S*. Enteritidis (75.6 %). The majority of egg related *S*. Enteritidis outbreaks were reported by France and Poland (60.4 %). One virus outbreak, involving 9.1 % of the human cases, was attributed to eggs and egg products used in spinach filled pancakes. In this case an infected food-handler was identified as the contributory factor.

Mixed and buffet meals were implicated in 79 outbreaks comprising 10.3 % of the total number of human cases. The causative agents varied including close to equal proportions of *Salmonella* spp., *Bacillus* spp., *Clostridium* spp. and *Staphylococcus* spp. (Figure OUT8).

Fish and fish products were implicated in 53 outbreaks involving 488 human cases (Figure OUT9). The majority of outbreaks was caused by histamine (34 or 64.2 %). The second most frequent agent was *Salmonella* spp. causing only four (7.5 %) outbreaks.

In 2009, fruit and vegetables were implicated in only 43 outbreaks (Figure OUT10); however, the outbreaks involved 12.1 % of the total number of human cases (1,765) of which 83.7 % were caused by norovirus. The implicated food vehicle was predominantly raspberries.

Figure OUT6. Distribution of verified outbreaks caused by pig meat and products thereof by causative agent in EU, 2009

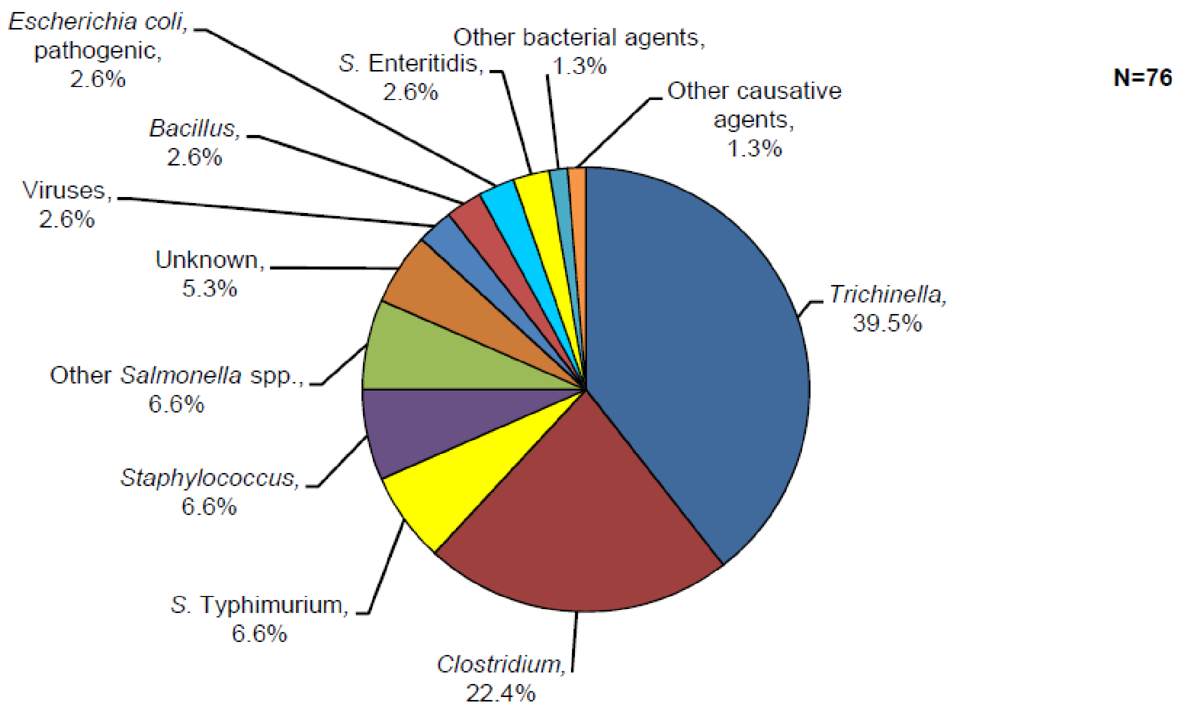


Figure OUT7. Distribution of verified outbreaks caused by eggs and egg products by causative agent in EU, 2009

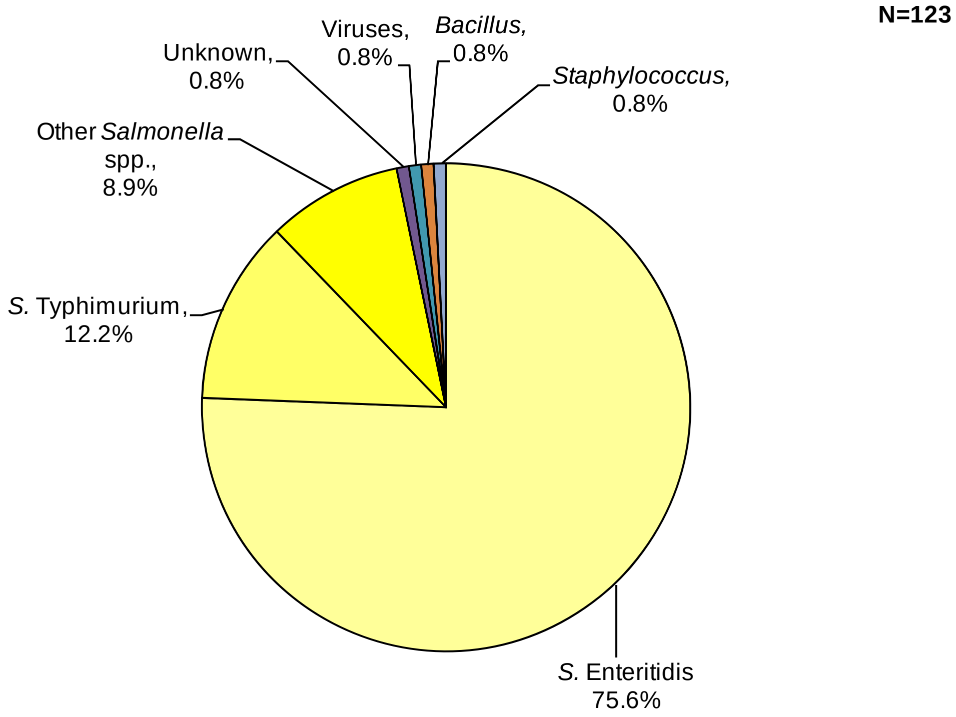


Figure OUT8. Distribution of verified outbreaks caused by mixed or buffet meals by causative agent in EU, 2009

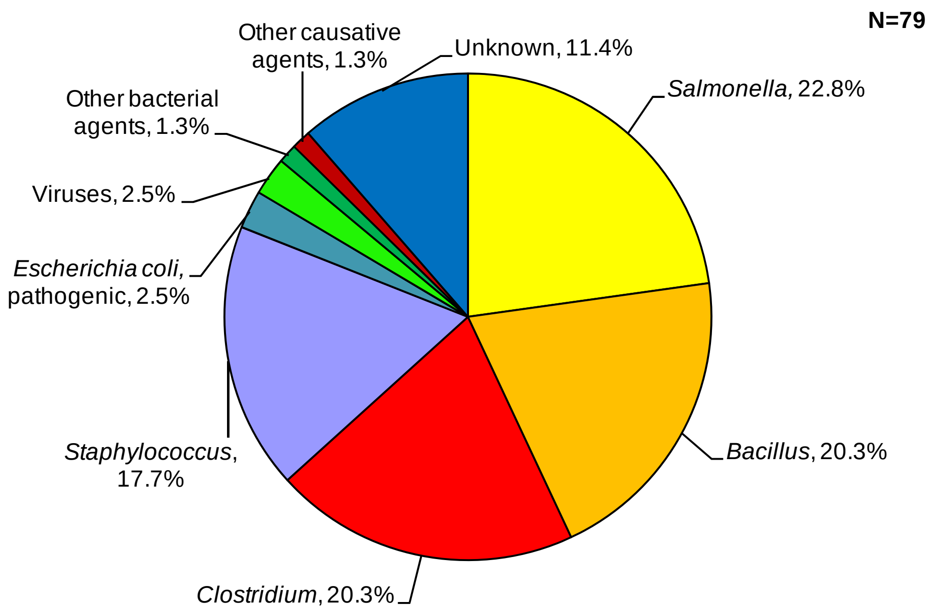


Figure OUT9. Distribution of verified outbreaks caused by fish and fish products by causative agent in EU, 2009

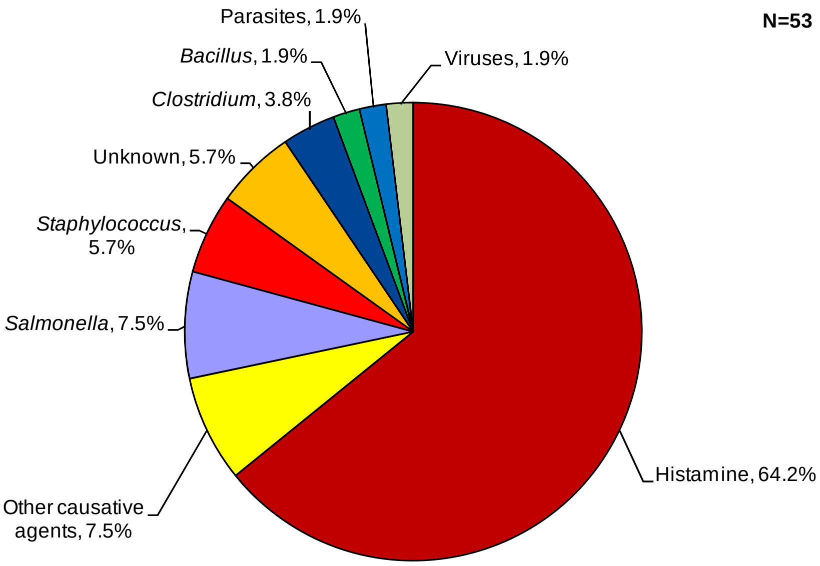
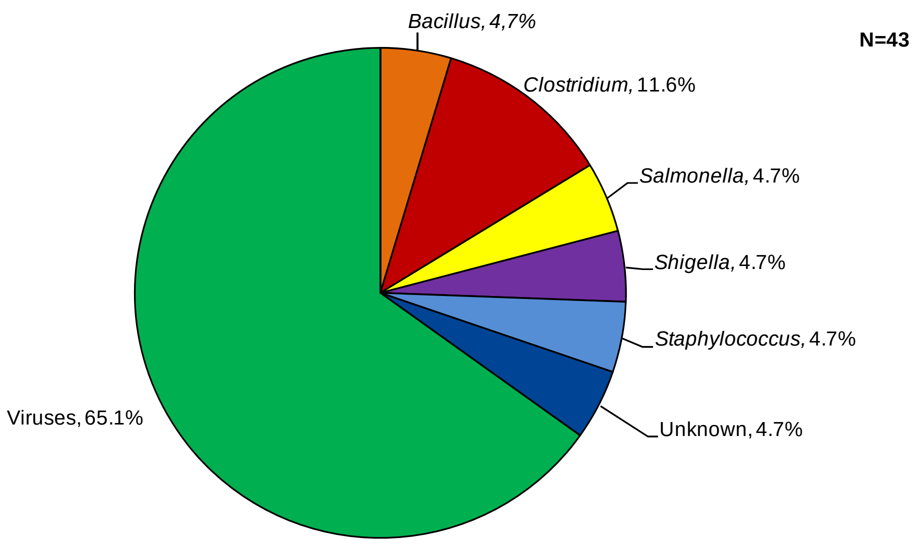


Figure OUT10. Distribution of causative agents in verified outbreaks caused by fruit and vegetables in EU, 2009



4.2 *Salmonella*

In 2009, twenty-four MSs reported a total of 1,722 food-borne outbreaks of human salmonellosis, which constituted 31.0 % of the total number of reported food-borne outbreaks in EU.

The majority of *Salmonella* outbreaks, 82.7 %, were reported by Austria, France, Germany, Italy, Poland, Slovakia and Spain. Within EU, the overall incidence was 0.35 outbreaks per 100,000 population; ranging from 0.01 per 100,000 population in Romania to 5.51 per 100,000 population in Slovakia. Norway and Switzerland reported a total of two *Salmonella* outbreaks (Table OUT7).

The total number of *Salmonella* outbreaks within EU has decreased markedly lasting recent years, and the decrease continued in 2009. From 2007 to 2009 the total of *Salmonella* outbreaks decreased by 23.6 %, from 2,253 outbreaks in 2007 to 1,722 outbreaks in 2009 (Table OUT4). The overall decrease in these outbreaks seems to follow the general decline of notified human salmonellosis cases that has been observed within EU. The majority of *Salmonella* outbreaks are attributed to eggs and egg products and also the number of these outbreaks has decreased. It is assumed that the decrease observed in EU is likely to be the results of the *Salmonella* control programmes that have been implemented in the table egg production laying hens across EU.

In EU, a total of 324 verified *Salmonella* outbreaks was reported by MSs corresponding to 18.8 % of all reported *Salmonella* outbreaks. Compared to 2008, the number of verified outbreaks caused by *Salmonella* spp*.* decreased by 33.9 % in 2009. Verified outbreaks were reported primarily by France, Poland and Spain. In total, 22.0 % of human cases in verified *Salmonella* outbreaks were hospitalised and the case fatality rate among human cases was 0.1 % (six deaths) (Table OUT7). The number of cases caused by *Salmonella* corresponded to 30.9 % of human cases in all verified outbreaks (Table OUT5).

As in previous years, *S.* Enteritidis was the predominant serovar associated with the *Salmonella* outbreaks, accounting for 59.6 % of all verified *Salmonella* outbreaks and 58.2 % of human cases involved in these outbreaks. Furthermore, *S.* Enteritidis accounted for 18.0 % of all human cases, 39.2 % of all hospitalisations and 17.4 % of all deaths connected to verified food-borne outbreaks. In contrast, *S.* Typhimurium was associated with 15.7 % of the verified *Salmonella* outbreaks and 20.2 % of human cases involved in these. Overall, *S.* Typhimurium accounted for 6.2 % of all human cases, 5.9 % of all hospitalisations and 8.7 % of all deaths connected to verified food-borne outbreaks in 2009. For 17.9 % of verified outbreaks caused by *Salmonella,* the serovar was not reported or was unknown. Only 14.3 % of outbreaks due to *S*. Enteritidis and *S*. Typhimurium included information of the isolated phage type (Table OUT8).

Evidence reported for verified *Salmonella* outbreaks was via detection from the food vehicle in 54.3 % of outbreaks, from human cases in 73.5 % of outbreaks and laboratory characterisation both from the food vehicle and human cases in 10.2 % of outbreaks. Analytical epidemiological evidence was presented in 65.4 % of outbreaks (Table OUT9). Often more than one type of evidence was included for a specific outbreak.

Table OUT7. Verified and possible food-borne outbreaks caused by* Salmonella*, 2009

Country	Total outbreaks		Verified outbreaks				Possible outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Austria	208	2.49	8	228	37	0	200	519	117	1
Belgium	5	0.05	1	39	39	0	4	29	2	0
Czech Republic	19	0.18	1	147	5	0	18	432	25	0
Denmark	14	0.25	5	628	3	2	9	94	2	0
Estonia	19	1.42	1	6	3	0	18	48	16	0
Finland	1	0.02	1	28	0	0	0	-	-	-
France	147	0.23	104	843	166	1	43	503	27	0
Germany	343	0.42	20	282	48	1	323	1,338	272	0
Greece	38	0.34	-	-	-	-	38	140	66	0
Hungary	23	0.23	11	146	34	1	12	164	24	1
Ireland	7	0.16	-	-	-	-	7	74	15	1
Italy	111	0.18	-	-	-	-	111	356	-	-
Latvia	48	2.12	-	-	-	-	48	236	-	-
Lithuania	50	1.49	6	122	70	0	44	171	125	0
Malta	14	3.38	-	-	-	-	14	88	-	0
Netherlands	13	0.08	3	36	8	1	10	34	10	0
Poland	161	0.42	95	1,181	361	0	66	399	157	0
Portugal	3	0.03	3	45	35	0	0	-	-	-
Romania	3	0.01	3	130	68	0	0	-	-	-
Slovakia	298	5.51	3	121	18	0	295	848	153	0
Slovenia	4	0.20	3	36	3	0	1	42	17	1
Spain	156	0.34	54	469	90	0	102	772	134	2
Sweden	7	0.08	2	13	0	0	5	53	5	0
United Kingdom	30	0.05	-	-	-	-	30	1,227	73	4
EU Total	**1,722**	**0.35**	**324**	**4,500**	**988**	**6**	**1,398**	**7,567**	**1,240**	**10**
Norway	1	0.02	-	-	-	-	1	5	1	0
Switzerland	1	0.01	-	-	-	-	1	3	1	0

Table OUT8. **Salmonella** *serovars reported for verified food-borne outbreaks in EU, 2009*

Serovar	Phagetypes	Outbreaks		Human cases		
		N	% of EU total	N	Hospitalised	Deaths
S. Enteritidis	PT 21	3	0.9	24	12	0
	PT 4	7	2.2	42	8	0
	PT 8	7	2.2	207	8	2
	Unspecified	164	50.6	2,022	648	1
	PT 13a	2	0.6	118	3	0
	PT 13	2	0.6	46	3	0
	PT 14b	1	0.3	11	0	0
	PT 2	2	0.6	28	12	0
	1	1	0.3	35	5	0
	6a	1	0.3	26	3	0
	PT 23	1	0.3	3	0	0
	PT 6	1	0.3	20	1	0
	RDNC	1	0.3	38	19	1
S. Typhimurium	DT 120	2	0.6	13	5	0
	DT 193	2	0.6	187	25	0
	Unspecified	44	13.6	328	78	2
	DT 135	1	0.3	90	0	0
	U 292	1	0.3	288	-	0
	U 311	1	0.3	2	0	0
S. Ohio		1	0.3	39	39	0
S. Bovismorbificans		2	0.6	34	3	0
S. Bredeney		1	0.3	3	1	0
S. Dublin		1	0.3	3	1	0
S. Hadar		1	0.3	2	0	0
S. Napoli		2	0.6	45	2	0
S. Newport		3	0.9	160	7	0
S. Paratyphi B var java		2	0.6	7	6	0
S. *enterica* subsp. *arizonae*		1	0.3	2	0	0
Salmonella spp., unspecified		58	17.9	445	71	0
S. Infantis		4	1.2	124	5	0
S. Virchow		1	0.3	2	0	0
S. Manhattan		1	0.3	3	1	0
S. group C2		1	0.3	23	4	0
S. group D		1	0.3	80	18	0
EU Total		**324**	**100.0**	**4,500**	**988**	**6**

Table OUT9. Evidence in verified* Salmonella *outbreaks, 2009

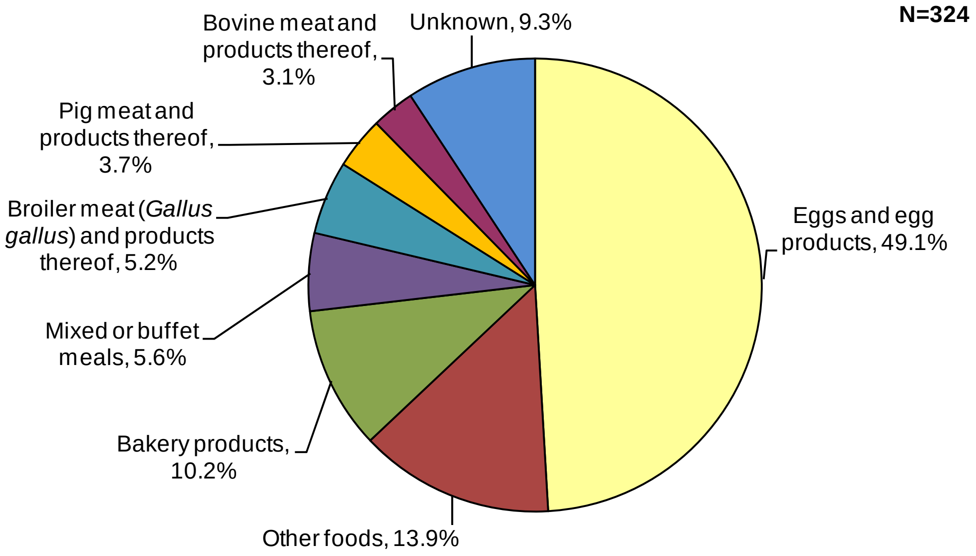
Country	N	Causative agent detected in food vehicle	Laboratory characterisation of isolates [1]	Analytical epidemiological evidence
Austria	8	7	-	1
Belgium	1	1	-	1
Czech Republic	1	1	1	-
Denmark	5	3	3	3
Estonia	1	1	1	1
Finland	1	1	1	1
France	104	70	-	83
Germany	20	19	12	2
Hungary	11	10	10	1
Lithuania	6	3	-	3
Netherlands	3	1	-	2
Poland	95	37	-	62
Portugal	3	3	-	-
Romania	3	3	-	-
Slovakia	3	3	3	-
Slovenia	3	3	-	-
Spain	54	8	-	51
Sweden	2	2	2	1
EU Total	**324**	**176**	**33**	**212**

1. *Salmonella* spp. was detected in both human cases and implicated food vehicles. Laboratory characterisation for all isolates may include serotyping according to the White-Kaufmann-Le Minor scheme, antimicrobial resistance pattern and genotyping (PFGE). Laboratory characterisation of *S*. Typhimurium isolates may include phage typing, and for common phage types (e.g. DT 104), molecular typing (plasmid profiling) and genotyping (MLVA). Laboratory characterisation of *S*. Enteritidis isolates may include phage typing, and for common phage types (e.g. PT4), molecular typing (ribotyping speciation) and genotyping (e.g. MLVA, AFLP, MLST).

Detailed information from verified outbreaks

Figure OUT11 shows the distribution of the most common food vehicles implicated in the verified *Salmonella* outbreaks in 2009. As in previous years, eggs and egg products were the food vehicles most frequently associated with these, causing 49.1 % of all verified *Salmonella* outbreaks (Figure OUT11) and 58.5 % of verified *S.* Enteritidis outbreaks (Figure OUT13). The proportion of outbreaks caused by eggs and egg products was higher compared to both 2007 and 2008.

Figure OUT11. Distribution of food vehicles in verified outbreaks caused by* Salmonella *in EU, 2009

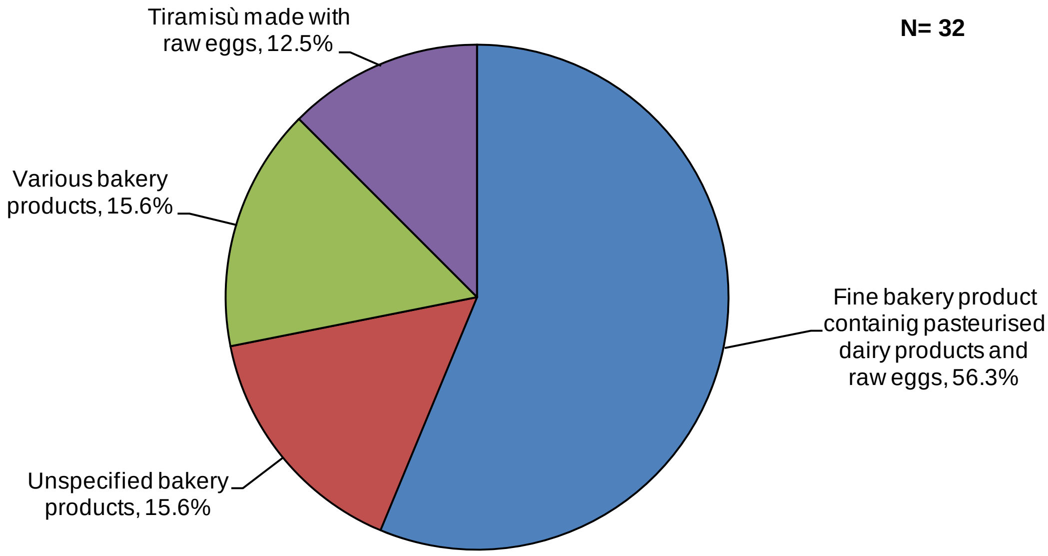


Note: Data from 324 outbreaks are included: Austria (8), Belgium (1), Czech Republic (1), Denmark (5), Estonia (1), Finland (1), France (104), Germany (20), Hungary (11), Lithuania (6), Netherlands (3), Poland (95), Portugal (3), Romania (3), Slovakia (3), Slovenia (3), Spain (54) and Sweden (2).

Other foodstuffs (N=45) include: other or mixed meat and products thereof (7), dairy products (other than cheeses) (4), fish and fish products (4), cheese (3), crustaceans, shellfish, molluscs and products thereof (2), sweets and chocolate (2), turkey meat and products thereof (2), vegetables and juices and other products thereof (2), cereal products including rice and seeds/pulses (nuts, almonds) (1), milk (1), other or unspecified poultry meat and products thereof (1), and other foods (16).

Inadequately heat-treated bakery products using raw eggs were the second most frequently known source of *Salmonella* infections (10.2 % of verified outbreaks) (Figure OUT11). In 32 of 42 verified outbreaks attributed to bakery products (including Tiramisù) (Figure OUT4), *S*. Enteritidis was identified as the causative agent. In 68.8 % of these outbreaks the foodstuff contained raw egg (Figure OUT12).

Figure OUT12. Distribution of outbreaks caused by* Salmonella *Enteritidis in bakery products in EU, 2009



Broiler meat and products thereof was the fourth most important food vehicle category in *Salmonella* outbreaks. The overall proportion of outbreaks caused by broiler meat and products thereof has been quite stable over the past reporting years.

The highest number of outbreaks (58.5 %) and human cases (42.2 %) in verified outbreaks caused by *S*. Enteritidis, were attributed to egg and egg products, followed by bakery products using raw eggs (11.4 % of the outbreaks and 11.4 % human cases in verified *S.* Enteritidis outbreaks, respectively), and mixed or buffet meals (4.7 %) and broiler meat and products thereof (4.7 %) (Figure OUT13).

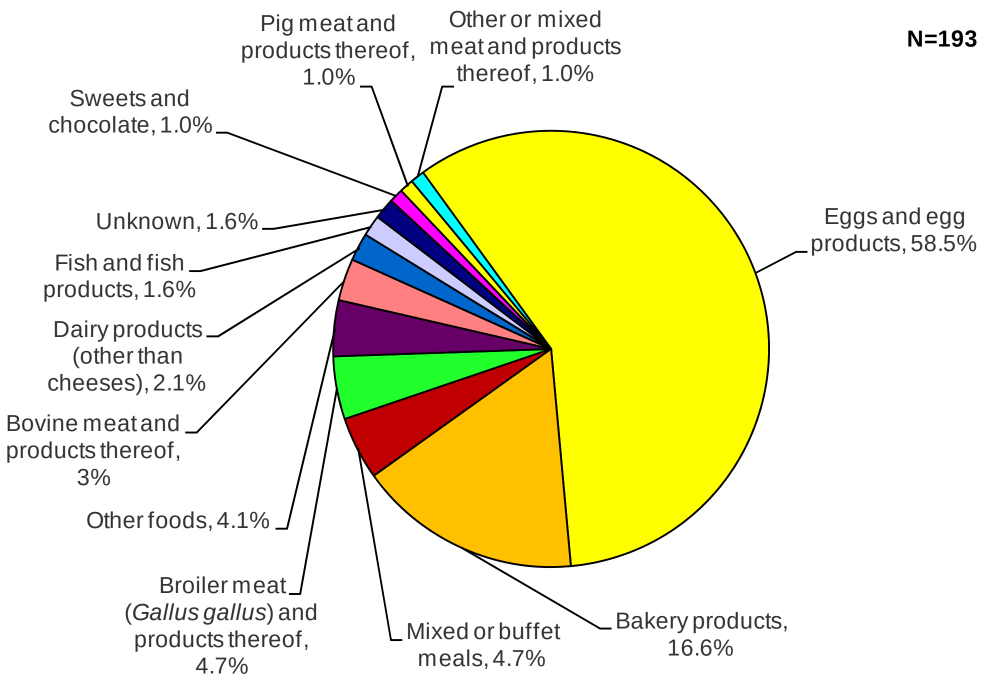
A relatively large proportion of the reported *S.* Typhimurium outbreaks (31.4 %) were related to eggs and egg products. Other important sources were pig and bovine meat and products thereof (9.8 % and 7.8 % respectively) (Figure OUT14). However, 66.9 % of human *S.* Typhimurium cases were caused by unknown sources, mainly due to three large unsolved outbreaks from Austria (one outbreak, 183 cases) and Denmark (two outbreaks, 378 cases).

An outbreak of *S.* Typhimurium U292 involving 288 human cases was reported by Denmark and was the tail of the massive outbreak that started in 2008 and continued through most of 2009. In total, the outbreak affected 1,452 cases in 2008-2009 causing 11 deaths.

An outbreak of *S*. Ohio reported by Belgium involved 39 human cases of which 100 % were hospitalised. The contributory factor in this outbreak was cross-contamination from the carcass splitter at a domestic pig slaughterhouse.

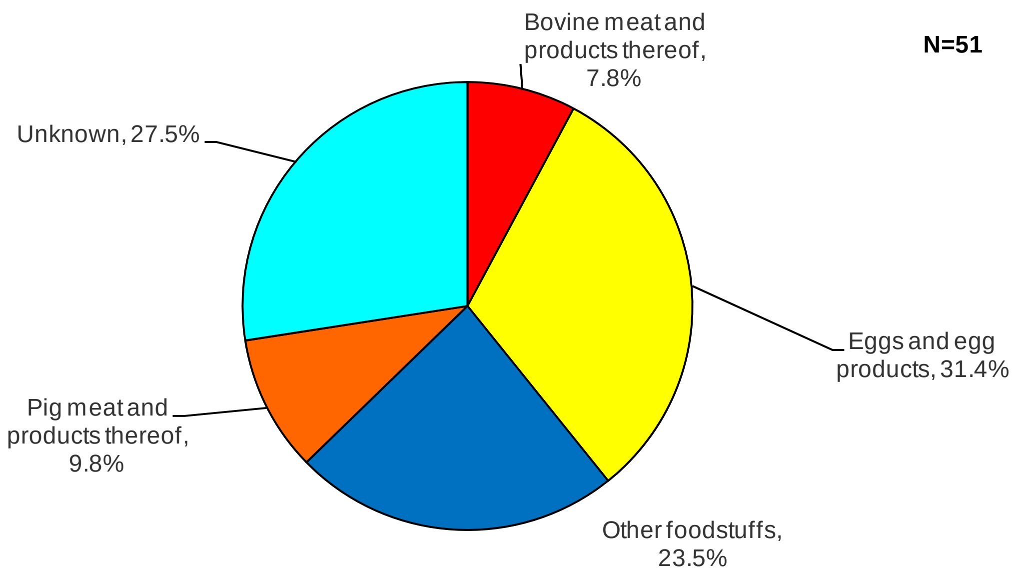
Information about the origin of the foodstuff was only reported in 53.7 % of all verified *Salmonella* outbreaks. The food vehicle was domestically produced in all outbreaks with a food vehicle of known origin, except for three outbreaks (1.1 %), where the food vehicle came from another MS.

Figure OUT13. Distribution of food vehicles in verified outbreaks caused by* Salmonella *Enteritidis in EU, 2009



Note: Data from 193 outbreaks are included: Austria (6), Czech Republic (1), Denmark (3), France (27), Germany (14), Hungary (8), Lithuania (6), Netherlands (1), Poland (92), Portugal (2), Romania (2), Slovakia (3), Slovenia (3) and Spain (25).

Figure OUT14. Distribution of food vehicles in verified outbreaks caused by* Salmonella *Typhimurium in EU, 2009

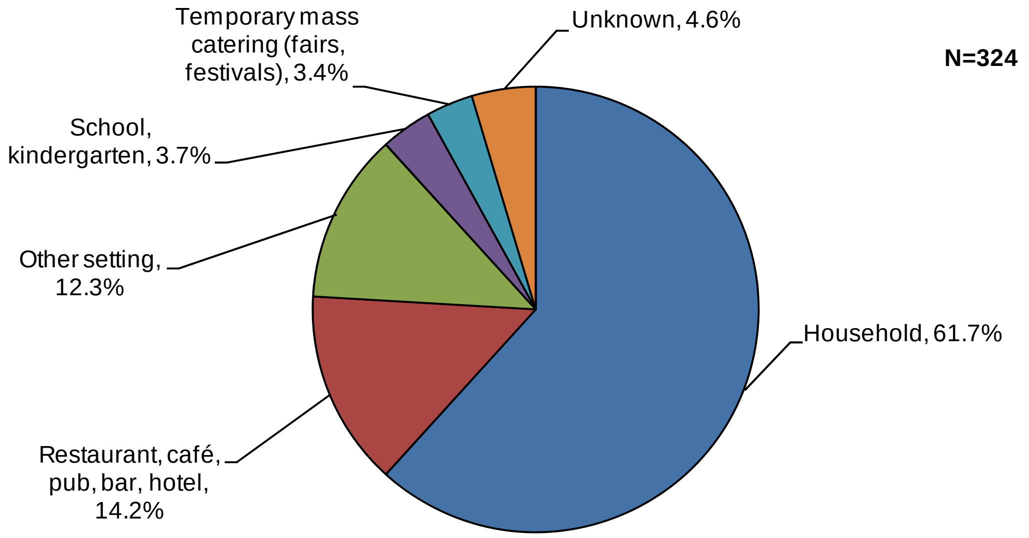


Note: Data from 51 outbreaks are included: Austria (2), Denmark (2), France (36), Germany (3), Hungary (1), Netherlands (1), Poland (1), Portugal (1) and Spain (4).

Other foodstuffs (N=58) include: other or mixed meat and products thereof (16), mixed or buffet meals (15), cheese (10), broiler meat (*Gallus gallus*) and products thereof (4), turkey meat and products thereof (4), and other foods (9).

Households were the most important settings reported in verified *Salmonella* outbreaks (Figure OUT15), followed by eating out at restaurants, cafés, pubs, bars and hotels. These two categories comprised 75.9 % of outbreaks and 46.6 % of human cases.

Figure OUT15. Distribution of settings in verified outbreaks caused by* Salmonella *in EU, 2009



Note: Data from 324 outbreaks are included: Austria (8), Belgium (1), Czech Republic (1), Denmark (5), Estonia (1), Finland (1), France (104), Germany (20), Hungary (11), Lithuania (6), Netherlands (3), Poland (95), Portugal (3), Romania (3), Slovakia (3), Slovenia (3), Spain (54) and Sweden (2).

Other settings (N=40) include: canteen or workplace catering (6), take-away or fast-food outlet (6), hospital or medical care facility (4), residential institution (nursing home, prison, boarding school) (4), mobile retailer, market/street vendor (3), camp, picnic (1), and other settings (16).

4.3 *Campylobacter*

In 2009, 16 MSs reported a total of 333 food-borne *Campylobacter* outbreaks (Table OUT10). In total, this represented 6.0 % of the reported food-borne outbreaks. Only 16 (4.8 %) outbreaks were however classified as verified. Austria and Germany reported 74.8 % of the total number of *Campylobacter* outbreaks. The overall reporting rate in EU was 0.07 per 100,000 population, which was lower compared to 2007 and 2008 (0.11 and 0.10, respectively). The highest reporting rate was from Austria (1.44 per 100,000). The verified outbreaks were reported primarily by France.

Table OUT10. Verified and possible food-borne outbreaks caused by* Campylobacter*, 2009

Country	Total outbreaks		Verified outbreaks				Possible outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Austria	120	1.44	-	-	-	-	120	255	31	0
Belgium	4	0.04	-	-	-	-	4	8	-	-
Czech Republic	1	0.01	-	-	-	-	1	6	0	0
Denmark	3	0.05	-	-	-	-	3	8	0	0
Estonia	3	0.22	-	-	-	-	3	6	4	0
France	18	0.03	15	92	8	0	3	18	4	0
Germany	129	0.16	-	-	-	-	129	378	21	0
Ireland	5	0.11	-	-	-	-	5	19	1	0
Italy	3	<0.01	-	-	-	-	3	7	-	-
Lithuania	2	0.06	-	-	-	-	2	8	8	0
Malta	5	1.21	-	-	-	-	5	13	5	0
Netherlands	12	0.07	1	10	1	1	11	24	1	0
Poland	3	0.01	-	-	-	-	3	6	1	0
Spain	7	0.02	-	-	-	-	7	183	6	0
Sweden	4	0.04	-	-	-	-	4	59	2	0
United Kingdom	14	0.02	-	-	-	-	14	321	4	0
EU Total	**333**	**0.07**	**16**	**102**	**9**	**1**	**317**	**1,319**	**88**	**0**
Norway	4	0.08	-	-	-	-	4	26	0	0
Switzerland	2	0.03	-	-	-	-	2	7	1	0

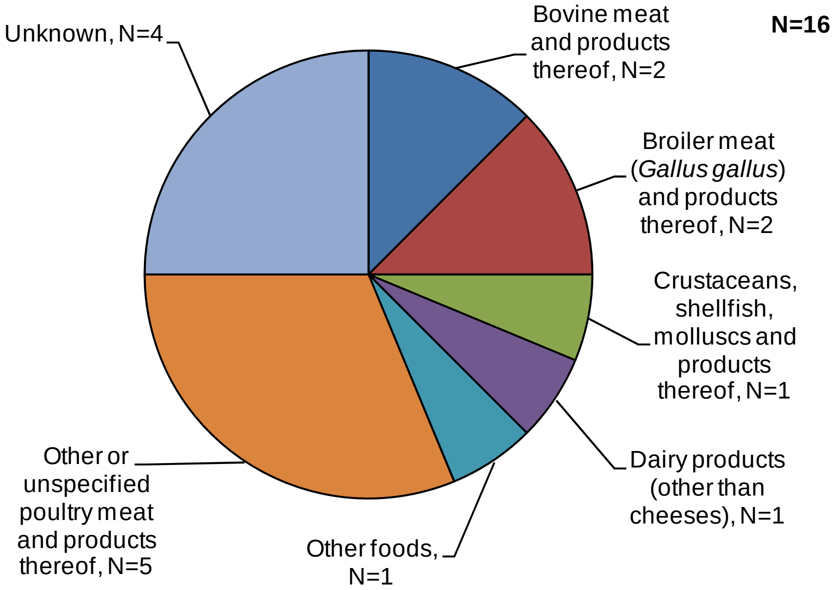
Detailed information from verified outbreaks

Verified food-borne outbreaks due to *Campylobacter* are not commonly recorded in EU. Of the 16 verified *Campylobacter* outbreaks, 10 were categorised as general outbreaks and six as household outbreaks.

Information on the implicated food vehicles was reported for 12 verified *Campylobacter* outbreaks; no specific food category stood out as the apparent source of outbreaks (Figure OUT16). However, it is interesting that compared to previous years, there were two outbreaks caused by bovine meat (from the Netherlands and France).

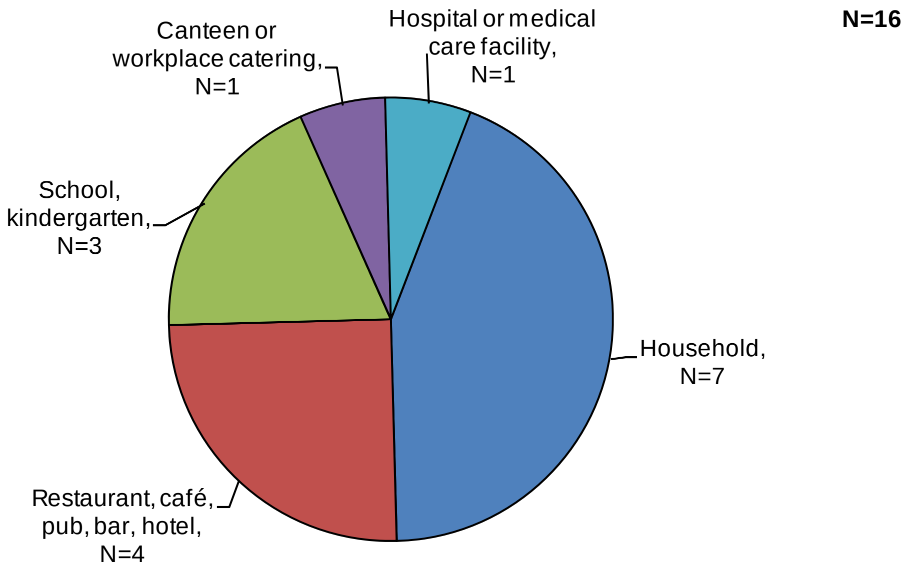
In 2009, households (seven outbreaks), restaurants, cafés, pubs, bars or hotels (four outbreaks) and schools and kindergartens (three outbreaks) were reported as the most frequent setting for *Campylobacter* outbreaks (Figure OUT17). As a single setting, schools and kindergartens comprised the largest proportion of human cases (37.3 %).

Figure OUT16. Distribution of food vehicles in verified* Campylobacter *outbreaks in EU, 2009



Note: Data from 16 outbreaks are included: France (15) and Netherlands (1).

Figure OUT17. Distribution of settings in verified* Campylobacter *outbreaks in EU, 2009



Note: Data from 16 outbreaks are included: France (15) and Netherlands (1).

4.4 Verotoxigenic *Escherichia coli* and other food-borne pathogenic *Escherichia coli*

Twelve MSs reported a total of 75 food-borne outbreaks caused by human pathogenic *E. coli.* This represented 1.4 % of the total number of reported food-borne outbreaks in EU, and was similar to information reported in 2008. France, Germany and Ireland accounted for 57.3 % of pathogenic *E. coli* outbreaks*.* The overall reporting rate in EU was 0.02 per 100,000 population, which is the same reporting rate as in 2007 and 2008 (Table OUT11).

Only 18 (24.0 %) reported *E. coli* outbreaks were verified and these were reported by France and Romania. As much as 27.2 % of cases in these 18 verified outbreaks were hospitalised, however there was a remarkable difference in the percentage of hospitalisations between the two MSs. In France 3.8 % cases were hospitalised while 58.8 % of the Romanian cases were hospitalised. No case fatalities were reported in 2009 (Table OUT11).

Table OUT11. Verified and possible food-borne outbreaks (excl. verified waterborne outbreaks) caused by pathogenic* Escherichia coli*, 2009

Country	Total outbreaks		Verified outbreaks				Possible outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Austria	8	0.10	-	-	-	-	8	18	6	0
Belgium	1	0.01	-	-	-	-	1	4	4	0
France	16	0.02	11	131	5	0	5	54	1	0
Germany	16	0.02	-	-	-	-	16	47	1	0
Ireland	11	0.25	-	-	-	-	11	23	7	0
Italy	1	<0.01	-	-	-	-	1	11	-	-
Lithuania	1	0.03	-	-	-	-	1	3	0	0
Malta	1	0.24	-	-	-	-	1	4	0	0
Poland	5	0.01	-	-	-	-	5	125	2	0
Romania	7	0.03	7	97	57	0	0	-	-	-
Spain	1	<0.01	-	-	-	-	1	2	0	0
United Kingdom	7	0.01	-	-	-	-	7	76	12	0
EU Total	**75**	**0.02**	**18**	**228**	**62**	**0**	**57**	**367**	**33**	**0**
Norway	5	0.10	-	-	-	-	5	31	13	0

Detailed information from verified outbreaks

Of the 18 verified pathogenic *E. coli* outbreaks, ten were reported as general outbreaks, seven as household outbreaks and for one outbreak the type was unknown. General outbreaks involved 187 human cases of which 41 (21.9 %) required hospitalisation. The seven household outbreaks involved 29 human cases and 21 (72.4 %) of these cases required hospitalisation.

Detailed information on the food vehicle was provided for 15 outbreaks. Approximately half of the verified outbreaks (eight outbreaks) implicated some type of meat as the food vehicle. Bovine meat and products thereof were reported as the source in three outbreaks involving 13 cases and four of the hospitalisations. In four outbreaks cheeses were identified as the food vehicle. The remaining three outbreaks with detailed information on food vehicle, implicated dairy products other than cheese (one outbreak) and mixed meals (two outbreaks) as the source of outbreaks. It is interesting that all cases involved in household outbreaks caused by cheese and dairy products reported by Romania, required hospitalisation.

The largest verified outbreak was reported by Romania. The setting was a camp picnic and the outbreak involved 72 human cases of which 32 were hospitalised. The food vehicle was other or mixed red meat and products thereof and no specific contributory factor was reported.

The origin of the food vehicle was provided for seven verified outbreaks; six of these were caused by domestically produced foodstuffs and one by foodstuffs imported from another MS. Contributory factors were reported for 11 outbreaks and four of these involved infected food-handlers, while several other factors contributed to the other outbreaks, such as storage time/temperature abuse, inadequate heat treatment and cross-contamination.

4.5 Other bacterial agents

In the following section, outbreaks caused by *Brucella, Listeria, Shigella, Yersinia* and *Vibrio* are described. In previous Community Summary Reports, outbreaks caused by *Yersinia* were described in a separate section, but due to the low number of outbreaks reported for 2009, they have been included in 'Other bacterial agents'.

Regarding the possible food-borne outbreaks, causative agent specific information was available on *Listeria* and *Yersinia* outbreaks and in addition from some MSs on *Shigella, Leptospira* and *Brucella* outbreaks. This data is presented in Table OUT12. The rest of the outbreaks caused by other bacterial agents are reported under "other agents" because it was not specified whether the agent was a bacterial or chemical one. This data is shown in Table OUT22.

When combining the information from both possible and verified outbreaks in 2009, there was in total 7 food-borne outbreaks caused by *Listeria* reported in EU with 15 recorded deaths and 17 food-borne outbreaks caused by *Yersinia* with one death case recorded.

Three MSs reported in total 4 possible outbreaks caused by *Listeria* in 2009 and in addition Norway recorded one *Listeria* outbreak. These outbreaks included 26 persons in EU and caused 4 deaths. Seven MSs reported together 15 possible *Yersinia* outbreaks that affected 50 persons. Germany, Greece, Ireland and Latvia recorded in total 11 possible outbreaks caused by *Shigella*, Greece and Spain two possible outbreaks due to *Brucella*, Latvia one possible outbreak caused by *Leptospira,* and Spain a possible outbreak caused by *Vibrio*.

Table OUT12. Possible food-borne outbreaks caused by other bacterial agents, 2009

Country	Possible outbreaks				
	Agent	N	Human cases		
			Cases	Hospitalised	Deaths
Austria	*Yersinia*	3	6	0	0
Belgium	*Listeria*	2	4	2	1
Denmark	*Listeria*	1	8	8	2
France	*Yersinia*	1	18	-	0
Germany	*Yersinia*	1	2	0	0
Germany	*Shigella*	3	7	0	0
Greece	*Shigella*	3	12	11	0
Greece	*Brucella*	1	2	0	0
Ireland	*Shigella*	2	9	1	0
Latvia	*Yersinia*	3	6	-	0
Latvia	*Shigella*	3	7	-	0
Latvia	*Leptospira*	1	2	-	0
Lithuania	*Yersinia*	2	8	4	0
Poland	*Yersinia*	4	8	3	0
Spain	*Brucella*	1	3	0	0
Spain	*Vibrio*	1	5	0	0
Sweden	*Yersinia*	1	2	0	0
United Kingdom	*Listeria*	1	14	4	1
EU Total		**34**	**123**	**33**	**4**
Norway	*Listeria*	1	2	2	0

In 2009, 18 verified food-borne outbreaks caused by other bacterial agents were recorded in EU (Table OUT13). As in 2008, *Shigella* was the pathogen most frequently reported in the other bacterial agent category, representing 38.9 % of verified outbreaks. The largest of these, caused by *Shigella sonnei,* was reported by Belgium and involved 58 cases of which only one required hospitalisation. Relatively large outbreaks caused by *Listeria* and *Yersinia* were also reported by MSs.

Table OUT13. Verified food-borne outbreaks caused by other bacterial agents, 2009

Agent	Country	Verified outbreaks			
		N	Human cases		
			Cases	Hospitalised	Deaths
Bacterial agent not specified	Spain	1	3	3	0
	EU Total	**1**	**3**	**3**	**0**
Brucella spp., unspecified	Spain	1	9	0	0
	EU Total	**1**	**9**	**0**	**0**
Listeria monocytogenes	Austria	1	25	25	5
	Czech Republic	1	9	9	4
	Germany	1	6	6	2
	EU Total	**3**	**40**	**40**	**11**
Shigella dysenteriae	Sweden	1	35	0	0
	EU Total	**1**	**35**	**0**	**0**
Shigella flexneri	France	1	10	0	0
	EU Total	**1**	**10**	**0**	**0**
Shigella sonnei	Belgium	1	58	1	0
	Denmark	1	10	0	0
	France	1	5	3	0
	EU Total	**3**	**73**	**4**	**0**
	Norway	1	23	3	0
Shigella spp., unspecified	France	2	10	1	0
	EU Total	**2**	**10**	**1**	**0**
Vibrio parahaemolyticus	France	2	6	1	0
	Spain	1	8	0	0
	EU Total	**3**	**14**	**1**	**0**
Vibrio spp., unspecified	Spain	1	3	0	0
	EU Total	**1**	**3**	**0**	**0**
Yersinia enterocolitica	Denmark	1	30	0	0
	Portugal	1	21	1	1
	EU Total	**2**	**51**	**1**	**1**

Detailed information from verified outbreaks

Information on the type of outbreak was available for 17 of the 18 verified outbreaks. Five outbreaks, one caused by *Brucella,* two by *Vibrio parahaemolyticus,* one by *Vibrio* spp. and one by *Yersinia enterocolitica,* involving 44 human cases were reported as household outbreaks, while all remaining outbreaks (12) were general outbreaks.

Information on the implicated food vehicle was provided for 11 verified outbreaks. While the outbreaks caused by *L. monocytogenes* were caused by cheese (two outbreaks) and pig meat (one outbreak), the *Shigella sonnei, Shigella flexneri* and *Shigella dysenteriae* outbreaks were attributed to sugar peas (three outbreaks, including a Norwegian outbreak), and other food vehicles such as broiler meat, and mixed or buffet meals.

A multinational outbreak caused by two different clones of *Listeria monocytogenes* serotype 1/2a, involving cases in Austria, Germany and the Czech Republic was reported. The outbreak was caused by consumption of 'Quargel', a curd cheese produced by an Austrian manufacturer.
The first part of the outbreak, caused by *Listeria monocytogenes* serotype 1/2a (clone 1), accounted for 14 outbreak cases: 12 in Austria and two in Germany (including five case fatalities) with the onset of disease from June 2009 to January 2010. The outbreak later further linked to another 13 cases in Austria (including two case fatalities), six in Germany (one fatal) and one case in the Czech Republic with the onset of disease from December 2009 to February 2010.
On 23 January 2010, the cheese was voluntarily withdrawn from the market.

Reference: Fretz R, Pichler J, Sagel U, Much P, Ruppitsch W, Pietzka AT, Stöger A, Huhulescu S, Heuberger S, Appl G, Werber D, Stark K, Prager R, Flieger A, Karpíšková R, Pfaff G, Allerberger F. Update: Multinational listeriosis outbreak due to 'Quargel', a sour milk curd cheese, caused by two different *L. monocytogenes* serotype 1/2a strains, 2009-2010 (Euro Surveill. 2010;15(16):pii=19543).

The setting was specified for all but two verified outbreaks. The largest outbreak caused by *Shigella sonnei,* involving 58 cases, took place in a canteen or working place catering. Household was reported as the setting for four outbreaks and three outbreaks reported restaurants/pubs or bars as setting.

For six of the verified outbreaks the place of origin of the implicated food vehicle was reported; the products in two *Listeria* outbreaks and one *Yersinia* outbreak were of domestic origin, two *Shigella* outbreaks originated from products from outside EU and one *Listeria* outbreak originated from products in intra-EU trade.

The *Shigella sonnei* outbreaks reported by Denmark and Norway, as well as the *Shigella dysenteriae* outbreak reported by Sweden, were all caused by sugar peas/sugar snaps that were imported from outside EU and consumed raw.

4.6 Bacterial toxins

Bacterial toxins can cause damage to humans by destroying cells or disrupting normal cellular metabolism. Both Gram negative and Gram positive bacteria produce highly potent toxins. Most bacterial toxins can be destroyed by heating. However, exceptions include certain heat-resistant staphylococcal enterotoxins. Further, the emetic toxin of *Bacillus cereus* has high heat tolerance and cannot be destroyed by normal heat treatment. *Clostridium botulinum* toxin is the cause of a rare but potentially deadly intoxication and occurs when the anaerobic bacterium grows in foods and produces botulinum toxin, a powerful paralytic toxin. *Clostridium perfringens* bacteria multiply especially in food prepared from meat and its toxins cause abdominal cramps and diarrhoea. *Bacillus cereus* may produce emetic and diarrhoeagenic toxins. Depending on the type of toxin, *Bacillus cereus* may cause severe nausea, vomiting and watery diarrhoea. *Staphylococcus aureus* produces toxins that cause intense vomiting and diarrhoea in humans.

Outbreaks caused by bacterial toxins in 2009

In total, 558 outbreaks, constituting 10.1 % of all reported food-borne outbreaks in 2009, were caused by bacterial toxins. Only 39.1 % of these outbreaks were verified. In total, 8.2 % of human cases in verified outbreaks required hospitalisation (Table OUT5). The highest proportion of hospitalised cases were observed in outbreaks caused by *Clostridium botulinum,* where 34 of 36 cases from 12 verified outbreaks required hospitalisation. In contrast, 8.2 % and 16.9 % of cases implicated in verified outbreaks caused by *Bacillus* and staphylococcal toxins required hospitalisation, respectively. As in 2008, outbreaks caused by bacterial toxins accounted for approximately 15 % of the total number of human cases reported in EU.

Eleven MSs reported a total of 124 food-borne outbreaks caused by *Bacillus* spp., which represents 2.2 % of all food-borne outbreaks reported by MSs in 2009. Of these, 59 (47.6 %) were verified (Table OUT14). In addition to these, three outbreaks were reported by a non-MS. While the number of cases involved in the verified *Bacillus* outbreaks was lower than in 2008 (1,132 cases), the number of hospitalisations was considerably higher in 2009 (8.2 % compared to 3.6 % in 2008). In 2009, the total number of reported outbreaks caused by *Bacillus* spp. toxins within EU remained at the same level as in 2008.

Fourteen MSs reported 141 food-borne outbreaks caused by *Clostridium* spp. This represents 2.5 % of all food-borne outbreaks reported in 2009 (Table OUT15); 71 of these outbreaks (50.4 %) were verified. A total of four case fatalities were reported, two from two verified outbreaks caused by *Clostridium botulinum* toxins and two from one possible outbreak. Almost half of the verified outbreaks, encompassing 52.9 % of human cases, were reported by France. Twelve of the verified outbreaks, all of them household outbreaks, were caused by *Clostridium botulinum* toxins (Table OUT16). Almost all human cases involved in these outbreaks required hospitalisation. The number of *Clostridium* outbreaks had increased compared to 2008, from 110 to 141 in 2009.

Eighteen MSs reported 293 food-borne outbreaks caused by *Staphylococcus* spp., and 30.0 % of the outbreaks were verified (Table OUT17). Two cases from a verified outbreak and one from a possible outbreak were fatal.

Table OUT14. Total outbreaks and human cases in possible and verified food-borne outbreaks caused by **Bacillus** ***toxins, 2009***

Country	Total outbreaks		Verified outbreaks				Possible outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Belgium	4	0.04	4	53	0	0	0	-	-	-
Denmark	2	0.04	2	61	8	0	0	-	-	-
France	83	0.13	26	437	12	0	57	507	16	0
Germany	4	<0.01	4	6	0	0	0	0	0	0
Italy	4	0.01	-	-	-	-	4	118	-	-
Netherlands	14	0.08	14	45	-	-	0	-	-	-
Poland	3	0.01	3	129	5	0	0	0	0	0
Portugal	1	0.01	1	120	50	0	0	-	-	-
Slovakia	1	0.02	1	16	0	0	0	-	-	-
Spain	6	0.01	4	62	1	0	2	39	0	0
United Kingdom	2	<0.01	-	-	-	-	2	26	0	0
EU Total	**124**	**0.03**	**59**	**929**	**76**	**0**	**65**	**690**	**16**	**0**
Norway	3	0.06	1	2	0	0	2	9	0	0

Table OUT15. Total outbreaks and human cases in possible and verified food-borne outbreaks caused by **Clostridium** ***toxins, 2009***

Country	Total outbreaks		Verified outbreaks				Possible outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Belgium	4	0.04	3	24	1	0	1	19	0	0
Denmark	1	0.02	1	66	0	0	0	-	-	-
Finland	4	0.08	3	75	0	0	1	16	1	0
France	82	0.13	35	902	22	0	47	695	9	2
Germany	2	<0.01	2	10	2	1	0	0	0	0
Hungary	5	0.05	3	92	3	0	2	155	1	0
Ireland	1	0.02	-	-	-	-	1	11	0	0
Italy	3	<0.01	-	-	-	-	3	141	-	-
Netherlands	6	0.04	6	22	-	-	0	-	-	-
Poland	6	0.02	-	-	-	-	6	37	5	0
Portugal	4	0.04	4	9	4	0	0	-	-	-
Romania	5	0.02	5	22	22	1	0	-	-	-
Spain	15	0.03	9	482	0	0	6	220	0	0
United Kingdom	3	<0.01	-	-	-	-	3	273	0	0
EU Total	**141**	**0.03**	**71**	**1,704**	**54**	**2**	**70**	**1,567**	**16**	**2**
Norway	1	0.02	1	33	0	0	0	-	-	-

Note: Data include outbreaks caused by *Clostridium botulinum, Clostridium perfringens,* and *Clostridium* spp., unspecified.

Table OUT16. Verified food-borne outbreaks caused by* Clostridium botulinum *toxins, 2009

Country	Verified outbreaks			
	N	Human cases		
		Cases	Hospitalised	Deaths
France	1	3	3	0
Germany	1	2	2	1
Hungary	1	3	3	0
Portugal	3	4	4	0
Romania	5	22	22	1
Spain	1	2	0	0
EU Total	**12**	**36**	**34**	**2**

Table OUT17. Total outbreaks and human cases in possible and verified food-borne outbreaks caused by staphylococcal toxins, 2009

Country	Total outbreaks		Verified outbreaks				Possible outbreaks			
	N	Reporting rate per 100,000	N	Human cases			N	Human cases		
				Cases	Hospitalised	Deaths		Cases	Hospitalised	Deaths
Belgium	2	0.02	2	24	0	0	0	-	-	-
France	218	0.34	51	457	90	2	167	1,283	118	1
Germany	3	<0.01	3	8	0	0	0	0	0	0
Greece	1	0.01	-	-	-	-	1	12	0	0
Hungary	1	0.01	1	6	0	0	0	0	0	0
Italy	3	<0.01	-	-	-	-	3	31	-	-
Latvia	5	0.22	-	-	-	-	5	25	-	-
Lithuania	2	0.06	-	-	-	-	2	4	4	0
Malta	1	0.24	-	-	-	-	1	2	0	0
Netherlands	2	0.01	2	4	-	-	0	-	-	-
Poland	6	0.02	4	84	12	0	2	16	2	0
Portugal	2	0.02	2	56	-	0	0	-	-	-
Romania	8	0.04	8	59	51	0	0	-	-	-
Slovakia	1	0.02	1	17	0	0	0	-	-	-
Slovenia	1	0.05	-	-	-	-	1	5	1	0
Spain	30	0.07	11	232	12	0	19	245	1	0
Sweden	4	0.04	3	31	0	0	1	6	0	0
United Kingdom	3	<0.01	-	-	-	-	3	64	12	0
EU Total	**293**	**0.06**	**88**	**978**	**165**	**2**	**205**	**1,693**	**138**	**1**
Switzerland	3	0.04	2	69	0	0	1	-	0	0

Detailed information from verified outbreaks

Information on the type of outbreak was available for 85.8 % of verified outbreaks; 57.3 % were general outbreaks, 28.4 % were household outbreaks and for 14.2 % of outbreaks the outbreak type was unknown. General outbreaks accounted for 81.2 % of cases.

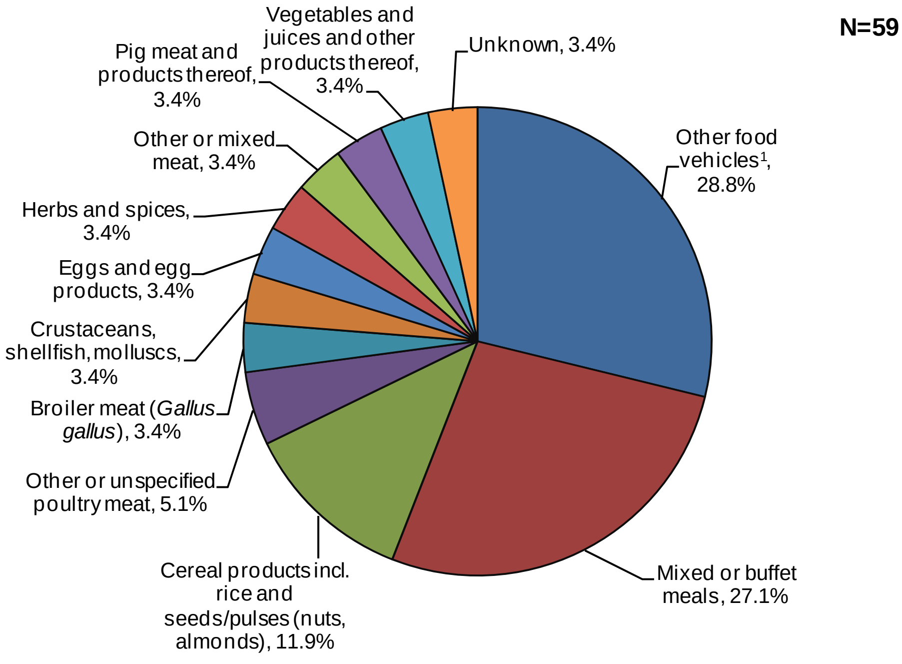
Many different food vehicles were reported for the verified outbreaks caused by *Bacillus* toxins, and mixed and buffet meals were the most commonly identified and associated with 27.1 % of verified outbreaks with detailed information on food vehicles followed by cereal products in 11.9 % of verified outbreaks (Figure OUT18).

Also in the case of verified outbreaks caused by *Clostridium* toxins, mixed and buffet meals were the most frequently identified food vehicles associated with 27.1 % of verified outbreaks but followed by pig meat and products thereof in 13.6 % of verified outbreaks (Figure OUT19). In addition, pig meat was the most common food vehicle implicated in verified outbreaks caused by *Clostridium botulinum* (nine out of twelve).

The largest proportion of verified outbreaks caused by staphylococcal toxins (21.6 %) was attributed to cheese, followed by mixed or buffet meals (15.9 %) (Figure OUT20).

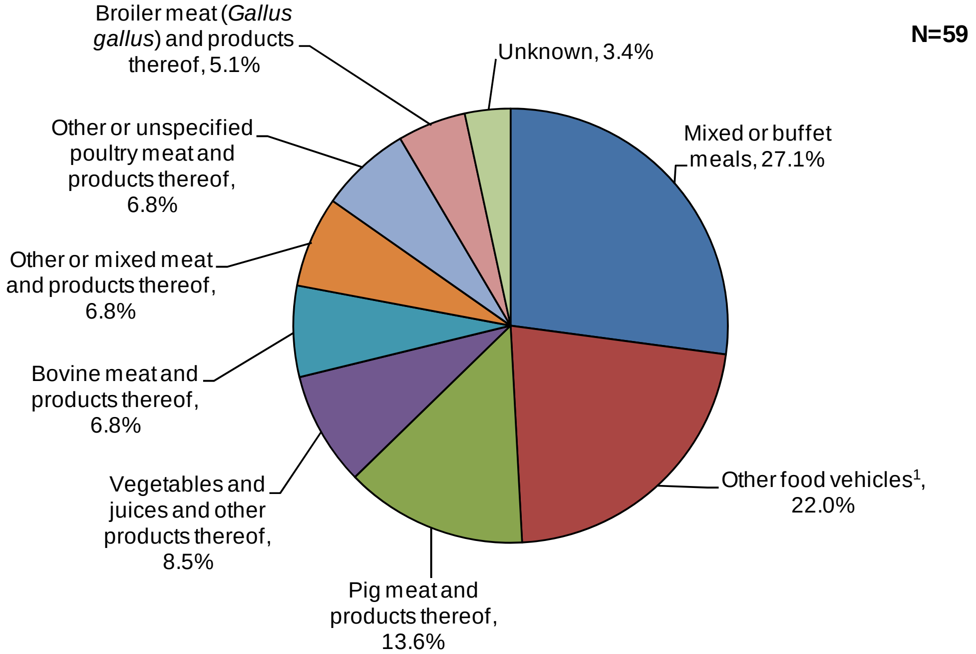
The origin of the food vehicle was reported in 37 verified bacterial toxin outbreaks and 36 outbreaks were caused by domestically produced foodstuffs.

Figure OUT18. Distribution of food vehicles in verified outbreaks caused by* Bacillus *toxins in EU, 2009



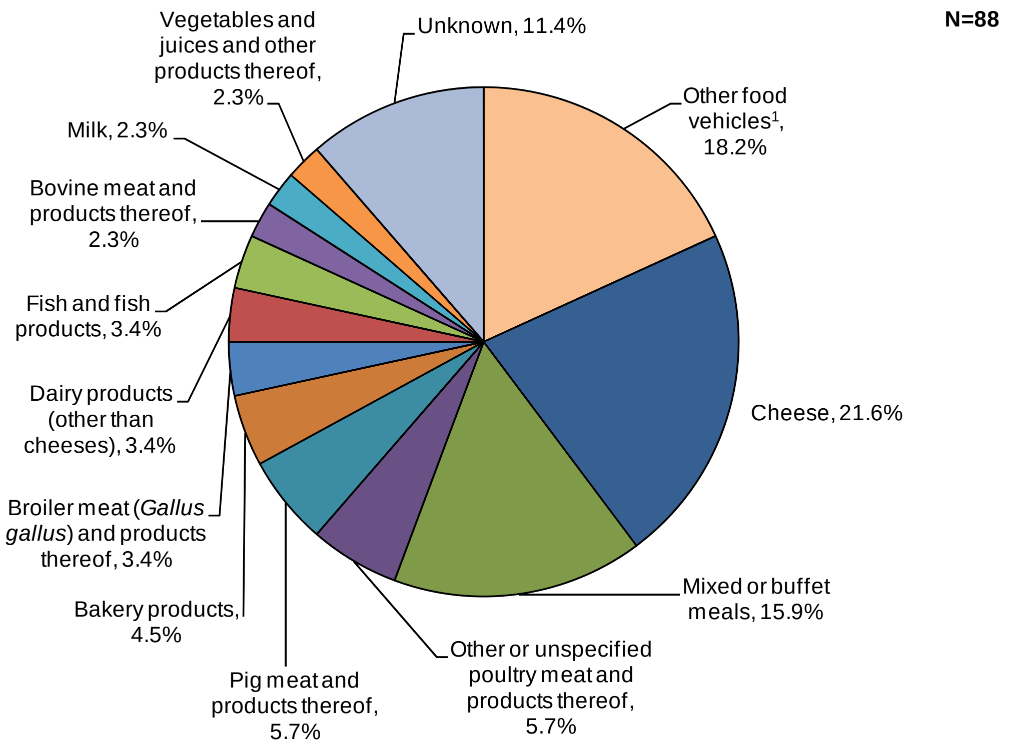
1. Other food vehicles include: other foods (13 outbreaks), ovine meat and products thereof (one outbreak), cheese (one outbreak), fish and fish products (one outbreak), turkey meat and products thereof (one outbreak).

Figure OUT19. Distribution of food vehicles in verified outbreaks caused by* Clostridium *toxins (not including* Clostridium botulinum*) in EU, 2009



1. Other food vehicles include: fish and fish products (one outbreak), turkey meat and products thereof (one outbreak), sheep meat and products thereof.

Figure OUT20. Distribution of food vehicles in verified outbreaks caused by staphylococcal toxins in EU, 2009



1. Other food vehicles include: cereal products including rice, seeds/pulses (nuts, almonds) (one outbreak), crustaceans, shellfish, molluscs and products thereof (one outbreak), eggs and egg products (one outbreak), other foods (13 outbreaks).

The majority of reported settings in the outbreaks caused by bacterial toxins were restaurants/cafés/pubs/bars (52 outbreaks) and households (47 outbreaks), with 477 and 290 human cases, respectively.

For 43 of the outbreaks caused by bacterial toxins, the place of origin of the problem was reported; 39.5 % of verified outbreaks were attributed to restaurants or catering services and the same percentage of outbreaks were attributed to households and domestic kitchens.

Infected food-handlers as well as inadequate chilling and storage time/temperature abuse were the most commonly reported contributory factors, reported in 27 and 21 verified outbreaks, respectively. The latter factors were frequently reported for *Bacillus cereus* outbreaks.

4.7 Viruses

Food-borne viral infections are usually of intermediate (one to three days) incubation period, causing illnesses which are self-limited in otherwise healthy individuals. Since most viruses are host specific, food-borne outbreaks caused by viruses are in most cases caused by foodstuffs contaminated by infected food-handlers.

Calicivirus (including norovirus) causes approximately 90 % of epidemic non-bacterial outbreaks of gastroenteritis around the world and is responsible for many food-borne outbreaks of gastroenteritis. The virus is transmitted by food or water contaminated with human faeces and by person-to-person contact. Outbreaks of norovirus disease often occur in closed or semi-closed communities, such as long-term care facilities, hospitals, prisons, dormitories, and cruise ships where, once the virus has been introduced, the infection spreads very rapidly by either person-to-person transmission or through contaminated food. Many norovirus outbreaks have been traced to food that was handled by one infected person.

Rotavirus is the leading single cause of severe diarrhoea among infants and young children. Rotavirus is transmitted by the faecal-oral route. It infects cells that line the small intestine and produces an enterotoxin, which induces gastroenteritis, leading to severe diarrhoea and sometimes death through dehydration.

The hepatitis A virus is distinguished from other viral agents by its prolonged (two to six week) incubation period and its ability to spread beyond the stomach and intestines into the liver. It often induces jaundice, or yellowing of the skin, and in rare cases leads to chronic liver dysfunction. The virus has often been associated with the consumption of contaminated fresh-cut vegetables and fruit.

Outbreaks caused by viruses in 2009

Twenty one MSs reported a total of 1,043 food-borne outbreaks caused by viruses (Table OUT18), and 61.1 % of these outbreaks were reported by Latvia. The overall reporting rate in EU was 0.21 outbreaks per 100,000 population, with Latvia having the highest reporting rate (28.17 per 100,000 population). Overall, the number of reported viral food-borne outbreaks increased by more than 40 % compared to 2007 and 2008. However, this increase may well be explained by increases in the number of outbreaks (possible and verified) reported by Latvia, who reported 25 outbreaks in 2008 but 637 outbreaks in 2009 due to the inclusion of household outbreaks. Estonia reported one possible food-borne outbreak caused by tick-borne encephalitis virus in 2009.

As in previous years, only a few (6.7 %) reported viral outbreaks were verified (Table OUT19). This could have led to the underestimation of the role of these agents in relation to different food products, as information on the food vehicle is not available for possible outbreaks. However, the number of verified outbreaks also increased remarkably by 84.2 %, from 38 outbreaks in 2008 to 70 in 2009. This is mainly due to 23 outbreaks calicivirus outbreaks reported by Finland and 23 outbreaks caused by unspecified viruses reported by France. Finland and France accounted for 65.7 % of verified outbreaks caused by viruses.

Table OUT18. Total and possible food-borne outbreaks caused by viruses, 2009

Country	Total outbreaks		Possible outbreaks			
	N	Reporting rate per 100,000	N	Human cases		
				Cases	Hospitalised	Deaths
Austria	10	0.12	9	110	5	0
Belgium	9	0.08	7	69	0	0
Czech Republic	1	0.01	1	114	1	0
Denmark	15	0.27	14	408	0	0
Estonia	1	0.07	1	3	3	0
Finland	32	0.60	9	174	7	0
France	77	0.12	54	1,390	19	0
Germany	91	0.11	88	779	143	0
Greece	1	0.01	1	4	2	0
Hungary	12	0.12	12	454	30	0
Ireland	1	0.02	0	0	0	0
Italy	42	0.07	42	232	-	-
Latvia	637	28.17	634	1,758	-	-
Lithuania	45	1.34	45	112	106	0
Malta	1	0.24	1	3	0	0
Netherlands	6	0.04	3	17	-	-
Poland	1	<0.01	0	0	0	0
Slovakia	2	0.04	2	235	72	0
Spain	15	0.03	10	182	18	0
Sweden	25	0.27	21	1,635	1	0
United Kingdom	19	0.03	19	1,057	5	2
EU Total	**1,043**	**0.21**	**973**	**8,736**	**412**	**2**
Norway	15	0.31	14	332	0	0
Switzerland	1	0.01	1	12	0	0

Table OUT19. Verified food-borne outbreaks caused by viruses, 2009

Agent	Country	Verified outbreaks			
		N	Human cases		
			Cases	Hospitalised	Deaths
Calicivirus (including norovirus)	Austria	1	167	2	0
	Belgium	2	29	0	0
	Denmark	1	8	0	0
	Finland	23	1,222	3	0
	Germany	3	271	0	0
	Ireland	1	28	0	0
	Netherlands	3	111	1	0
	Poland	1	13	0	0
	Spain	4	220	0	0
	Sweden	4	237	0	0
	EU Total	**43**	**2,306**	**6**	**0**
	Norway	1	3	0	0
Hepatitis A virus	Spain	1	2	1	0
	EU Total	**1**	**2**	**1**	**0**
Virus not specified	France	23	875	8	0
	Latvia	3	6	-	0
	EU Total	**26**	**881**	**8**	**0**

Detailed information from verified outbreaks

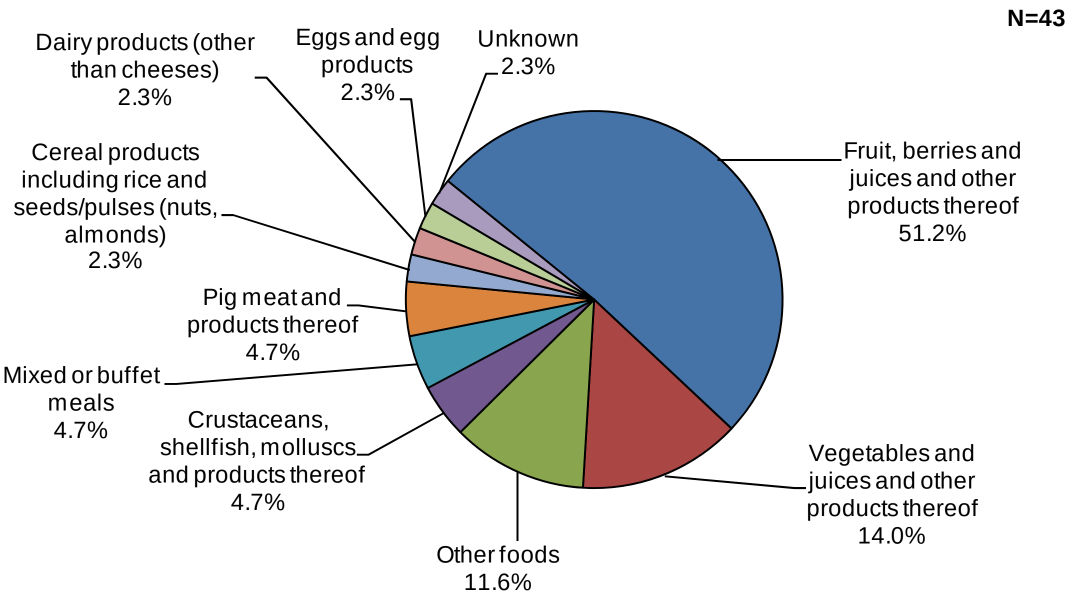
A total of 70 verified food-borne virus outbreaks were reported by MSs. Of these, 56 were reported as general outbreaks, involving 86.6 % of human cases. Five outbreaks were characterised as household outbreaks, involving 5.5 % of cases. For 22 outbreaks, the food vehicle was reported to derive from intra-EU trade, and identified as fruit/berries and juices and products thereof. These outbreaks were reported by Finland and Sweden and involved 1,223 cases (38.4 % of human cases). Other important food vehicles were crustaceans, shellfish, molluscs and products thereof, involved in 11 outbreaks, and resulting in 289 cases (9.1 % of the cases).

For those outbreaks where the source of origin of the problem was reported, 22 outbreaks were traced back to farm level and seven outbreaks were traced back to catering services and restaurants. Several contributory factors were linked to virus outbreaks; among the most common were infected food-handlers and inadequate cooking.

Calicivirus (including norovirus)

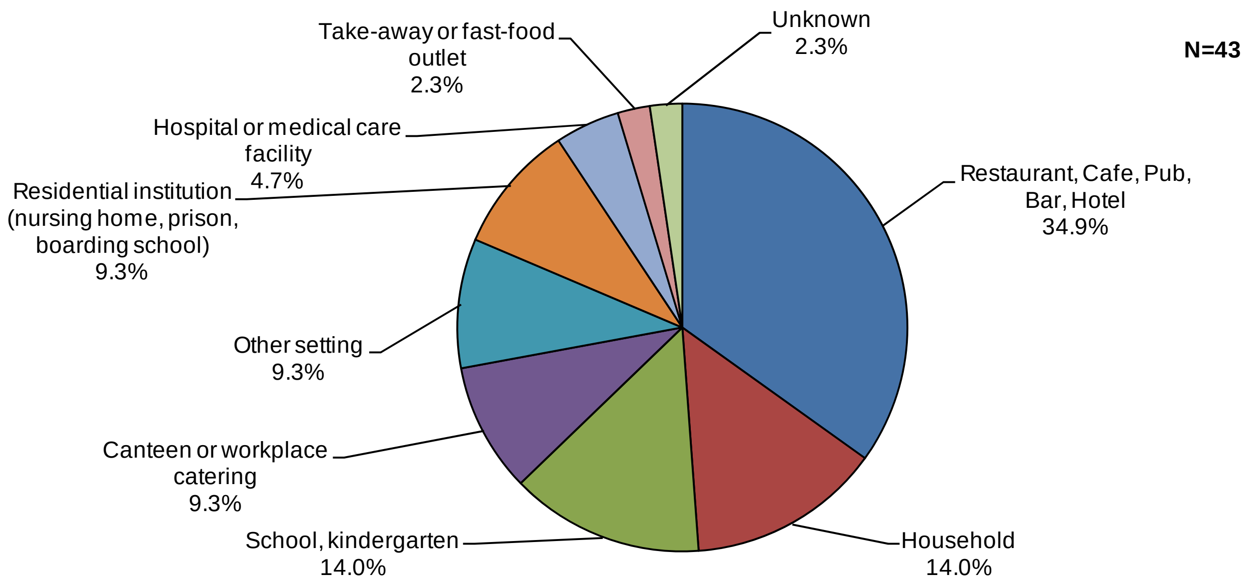
Information on the food vehicle was provided for all but one of the 43 verified outbreaks caused by calicivirus (including norovirus). In contrast to previous years, where crustaceans, shellfish, molluscs and products thereof, and buffet meals were the most frequently associated food vehicles, fruit, berries, juices and other products thereof were the major food vehicle in 2009, implicated in 22 outbreaks. Other relevant food vehicles were vegetables and juices and products thereof (six outbreaks, 254 cases) and mixed or buffet meals (two outbreaks, 204 cases) (Figure OUT21). The settings that were most often reported were restaurants, households, schools and kindergartens and canteen or workplace catering and residential institutions (Figure OUT22).

Figure OUT21. Distribution of food vehicles in verified outbreaks caused by calicivirus (including norovirus) in EU, 2009



Note: Data from 42 outbreaks are included: Austria (1), Belgium (2), Denmark (1), Finland (23), Germany (3), Netherlands (3), Poland (1), Spain (4) and Sweden (4).

Figure OUT22. Distribution of settings in verified outbreaks caused by calicivirus (including norovirus) in EU, 2009



Note: Data from 42 outbreaks are included: Austria (1), Belgium (2), Denmark (1), Finland (23), Germany (3), Netherlands (3), Poland (1), Spain (4) and Sweden (4).

During the period March to November 2009, a great number of norovirus outbreaks were reported in Finland. The outbreaks occurred in restaurants, hotels, cafés, canteens, day care centres, schools, catering services and households in different parts of the country. In these outbreaks, more than 1,100 persons were infected. In the largest outbreak in a school, more than 550 persons, mostly young children, became ill. Berries that had not been heat-treated and had been used in breakfasts, desserts and fine bakery products such as layer cakes were implicated as the food source. Based on the results of epidemiological, trace-back and laboratory investigations, altogether 23 norovirus outbreaks were linked to frozen raspberries from Poland.
In all these outbreaks, the berries had been grown, deep-frozen and packed in Poland. Norovirus was detected and confirmed in three of seven batches of frozen raspberries linked to the outbreaks. Raspberries had been imported by two companies and originated from different areas and farms in Poland.

4.8 Parasites

Outbreaks caused by parasites in 2009

Seven MSs reported a total of 51 food-borne outbreaks caused by parasites, accounting for 0.9 % of food-borne outbreaks reported in 2009; Romania reported 60.8 % of parasite outbreaks (Table OUT20). In total, 40 parasite outbreaks were verified, 39 were *Trichinella* outbreaks reported by five MSs and one was an *Anisakis* outbreak reported by Spain (Table OUT21). Romania accounted for 31 of the *Trichinella* outbreaks with a total of 406 cases. Generally, the hospital admission rate was very high for parasite outbreaks with 45.3 % of all cases being hospitalised in the verified outbreaks.

Table OUT20. Total and possible food-borne outbreaks caused by parasites, 2009

Country	Total outbreaks		Possible outbreaks			
	N	Reporting rate per 100,000	N	Human cases		
				Cases	Hospitalised	Deaths
Belgium	3	0.03	3	6	-	0
Germany	7	0.01	7	20	0	0
Hungary	1	0.01	0	0	0	0
Lithuania	2	0.06	0	0	0	0
Poland	3	0.01	0	0	0	0
Romania	31	0.14	0	-	-	-
Spain	4	0.01	1	2	0	0
EU Total	**51**	**0.01**	**11**	**28**	**0**	**0**
Norway	1	0.02	1	66	0	0

Table OUT21. Verified food-borne outbreaks caused by parasites, 2009

Agent	Country	Verified outbreaks			
		N	Human cases		
			Cases	Hospitalised	Deaths
Anisakis spp., unspecified	Spain	1	2	0	0
	EU Total	**1**	**2**	**0**	**0**
Trichinella spp., unspecified	Hungary	1	8	3	0
	Lithuania	2	114	60	0
	Poland	3	33	13	0
	Romania	31	406	181	0
	Spain	2	9	2	0
	EU Total	**39**	**570**	**259**	**0**

Detailed information from verified outbreaks

In the majority of outbreaks, the type of evidence reported was detection of the causative agent both in humans and in the food vehicle. Information on the type of outbreak was available for 37 verified outbreaks; five of them were general outbreaks and 32 were household outbreaks. The 32 household outbreaks caused 72.4 % of human cases, while the five general outbreaks caused 25.7 % of human cases.

Information concerning the food vehicle was provided in 37 verified parasite outbreaks. The five general outbreaks and two of the household outbreaks were linked to the consumption of wild boar meat. The remaining 30 household outbreaks, caused by *Trichinella,* were all attributed to pig meat and products thereof. These outbreaks accounted for 70.1 % of human cases and 66.0 % of hospitalisations in outbreaks caused by parasites. All the outbreaks related to pig meat reported by Romania were caused by meat which had not undergone meat inspection and *Trichinella* testing.

The origin of the foodstuff was reported in 35 of 40 verified parasite outbreaks and in all of these outbreaks the food vehicle had been produced domestically. The place of origin of the problem was reported in 80.0 % of all verified outbreaks caused by parasites. In 31 (77.5 %) of these outbreaks, all from Romania, the origin of the problem was reported to be the household, and the pig meat in question was not inspected and tested for *Trichinella*. Inadequate heat treatment of pig meat was listed as a contributory factor in the above-mentioned 31 outbreaks.

4.9 Other causative agents

In this report the category ‘other causative agents’ includes histamine, marine biotoxins, mushroom toxins, mycotoxins, wax esters from escolar fish as well as unspecified toxins.

Histamine is a biogenic amine involved in local immune responses as well as regulating physiological functions. It is found virtually in all animal body cells. Scombroid food poisoning results from eating spoiled (decayed) fish containing high amounts of histamine. Other chemicals have been found in decaying fish flesh, but their association to scombroid fish poisoning has not been clearly established. Symptoms consist of skin flushing, throbbing headache, oral burning, abdominal cramps, nausea, diarrhoea, palpitations, a sense of unease, and, rarely, prostration or loss of vision. It is most commonly reported with tuna, mahi-mahi, bonito, sardines, anchovies, and related species of fish that were inadequately refrigerated or preserved after being caught.

Outbreaks caused by other causative agents in 2009

Ten MSs reported a total of 159 possible food-borne outbreaks due to other causative agents which could include both chemical and bacterial agents if not specified (Table OUT22). Italy reported the highest number of outbreaks of this type.

In total, 55 reported outbreaks caused by other causative agents were verified (Table OUT23). The verified outbreaks comprised mainly outbreaks due to histamine in France, Denmark and Spain, and outbreaks due to mushroom toxins reported by Hungary.

Table OUT22. Possible food-borne outbreaks caused by other causative agents, 2009

Country	Possible outbreaks			
	N	Human cases		
		Cases	Hospitalised	Deaths
Belgium	1	2	-	0
Denmark	5	85	0	0
France	48	219	16	0
Hungary	5	28	6	0
Italy	64	472	-	-
Lithuania	3	12	3	0
Poland	4	23	11	0
Spain	13	64	5	0
Sweden	7	18	1	0
United Kingdom	9	127	1	1
EU Total	**159**	**1,050**	**43**	**1**
Norway	1	11	0	0

Table OUT23. Verified food-borne outbreaks caused by other causative agents, 2009

Agent	Country	Verified outbreaks			
		N	Human cases		
			Cases	Hospitalised	Deaths
Escolar fish (wax esters)	Spain	1	2	0	0
	EU Total	**1**	**2**	**0**	**0**
Histamine	Austria	1	2	0	0
	Belgium	1	11	2	0
	Denmark	5	55	27	0
	France	22	126	41	0
	Germany	2	-	-	-
	Spain	4	8	0	0
	Sweden	1	2	0	0
	EU Total	**36**	**204**	**70**	**0**
	Norway	1	4	0	0
	Switzerland	4	9	3	0
Marine biotoxins	France	1	3	-	0
	Spain	2	6	0	0
	EU Total	**3**	**9**	**0**	**0**
Mushroom toxins	Hungary	5	14	13	0
	EU Total	**5**	**14**	**13**	**0**
Mycotoxins	Spain	1	2	0	0
	EU Total	**1**	**2**	**0**	**0**
Other causative agents	France	8	150	10	0
	Slovakia	1	13	0	0
	EU Total	**9**	**163**	**10**	**0**

Detailed information from verified outbreaks

A total of 55 verified outbreaks due to other causative agents were reported by MSs. The majority (70.9 %) of these were general outbreaks involving 81.0 % of human cases caused by these outbreaks, while there were 25.5 % household outbreaks, involving 19.0 % of cases.

Information on the food vehicle was provided for all of the verified outbreaks. The majority of outbreaks were caused by histamine from fish and fish products, implicated as the causative agent in 36 outbreaks. Three marine biotoxin outbreaks were caused by crustaceans, shellfish, molluscs and products thereof, one outbreak caused by escolar fish was reported by Spain and, as in 2008, outbreaks caused by mushroom toxins and mycotoxins were reported by Hungary (five) and Spain (one). For the remaining nine outbreaks, the causative agent was not specified and the food vehicles were mainly different types of meat.

Information concerning the origin of the food vehicles was only provided for 11 outbreaks and seven of these implicated domestically produced foodstuffs while in four outbreaks the food vehicles had been imported from outside EU.

Contributory factors were given for a little more than half of the verified outbreaks and the main contributory factors were storage time/temperature abuse and infected food-handlers, reported in 20 of the verified outbreaks.

4.10 Waterborne outbreaks

Waterborne outbreaks may potentially be large, especially if the public drinking water supply is contaminated. Hospitals and institutions hosting young children or elderly people are often the most severely affected settings in such situations. Laboratory detection of pathogens from water can be complicated, especially if the level of contamination is low. In waterborne outbreaks, several zoonotic agents are often detected in the water as well as in human samples as a result of unspecific contamination, e.g. with sewage water. Contaminated water can spread pathogenic agents further to other food vehicles (e.g. vegetables), either in primary production or during food preparation. The most common contamination of raw water sources is from human sewage and in particular human faecal pathogens and parasites. Public water sources are used in urban areas, whereas private water supplies are frequently used in remote rural areas.

In 2009, seven MSs reported 15 waterborne outbreaks (Table OUT24), involving 987 human cases of which 4.6 % were hospitalised. No deaths were recorded. Four different pathogens were isolated from these 15 outbreaks: *Campylobacter,* calicivirus*, Shigella* and *Escherichia coli*.

Table OUT24. List of reported verified waterborne outbreaks in 2009

Isolated agents	Country	Verified outbreaks				Additional information
		N	Cases	Hospitalised	Deaths	
Calicivirus (including norovirus)	Finland	1	74	0	0	Untreated well water
		1	117	0	0	Waste water leakage
	Sweden	1	173	0	0	Unknown
Campylobacter jejuni	Denmark	1	500	3	0	Other setting
	Greece	1	60	14	0	Treated tap water of a rural area's water supply system on a Greek island was the implicated foodstuff of this outbreak
Campylobacter spp.,	France	1	11	1	0	Unknown
Escherichia coli (VTEC 157)	Ireland	4	8	3	0	Household
Escherichia coli, pathogenic	Sweden	1	4	0	0	Unknown
Shigella flexneri	France	1	4	4	0	Unknown
Shigella spp. , unspecified	France	1	15	10	0	Unknown
Unknown	France	1	15	10	0	Unknown
	Poland	1	6	0	0	Household
Total		**15**	**987**	**45**	**0**	

A large waterborne outbreak was reported in Denmark. The outbreak occurred in June in a town with approximately 5,000 inhabitants. A total of 39 cases of *Campylobacter jejuni* were laboratory-confirmed. Based on results from a questionnaire study, in which a little more than 1,000 inhabitants participated, it was estimated that the outbreak involved a total of 500 cases. The study showed a dose-response relationship between intake of tap water and the risk of becoming ill. The likely cause of the contamination was identified as a malfunctioning water pipe installation which became contaminated following heavy rainfall.

4.11. Discussion

In 2009, the overall number of reported food-borne outbreaks in EU remained at approximately the same level as in 2008, while the number of verified outbreaks increased by almost 10 %. The documentation on the outbreaks and data quality has improved in recent years and generally more detailed data were reported in 2009 than in the previous years. The number of food-borne outbreaks and the share of verified outbreaks varied between MSs, which is likely to reflect the differences in their outbreak investigations systems rather than levels of food safety.

Salmonella was once again the leading causative agent in reported outbreaks, but the number of *Salmonella* outbreaks has clearly declined from the two previous years. This is in line with the decreasing trend in notified salmonellosis cases in humans, described earlier in this report. Also, the *Salmonella* outbreaks caused by eggs and egg products dropped compared to previous years. It is likely that the successful *Salmonella* control programmes in poultry implemented by MSs have contributed to the decline of salmonellosis cases and outbreaks among humans. However improved hygiene measures, compliance with codes of good practice by food business operators, and greater awareness and education of consumers on correct storage, handling and preparation of foodstuffs may also have played an important role.

The total number of food-borne outbreaks caused by viruses increased in 2009, but this could be explained by the changed reporting practice in one MS. The number and proportion of verified food-borne outbreaks caused by viruses almost doubled compared to 2008, and the majority of these verified outbreaks were reported by two MSs. This is encouraging considering the difficulties often encountered when investigating virus outbreaks. In 2009, the virus outbreaks were mainly caused by fruit, berries, vegetables and juices and a number of large outbreaks caused by frozen raspberries used in dishes not requiring heat treatment, were reported from some MSs.

In addition, the number of reported outbreaks caused by *Clostridia* increased compared to 2008, but it is unclear whether this is a true increase or whether it is due to improved investigations and reporting of these classical types of food-borne outbreaks in MSs.

Typically, no or very few food-borne outbreaks caused by *Listeria monocytogenes* are recorded annually by MSs, but in 2009 three outbreaks were reported. One of them was a multinational outbreak caused by cheese and covering cases from three MSs and causing eight deaths. The *Listeria monocytogenes* outbreaks had the highest case fatality rate (22%, 15 deaths) of all the agents associated with food-borne outbreaks in 2009, emphasising the importance of the strict control of *Listeria monocytogenes* in foodstuffs.

As in 2008, the main food vehicles in reported food-borne outbreaks in 2009 were eggs and egg products, mixed or buffet meals and pig meat.

The number of waterborne outbreaks remained low in 2009 (15 outbreaks). Outbreaks caused by drinking water have the potential to become very large, especially if the public drinking water supply is contaminated. This was the case in the large outbreaks caused by calicivirus and in a large *Campylobacter* outbreak involving up to 500 human cases in 2009.

The current specifications for food-borne outbreak reporting define the strength of evidence that could link cases to a food vehicle drawing a distinction between “verified” and “possible” food-borne outbreaks. Detailed data were only reported for verified food-borne outbreaks, defined as those in which the causative agent had been detected in the food vehicle or where the food vehicle had been identified by analytical epidemiology. This approach has some limitations, including that it does not acknowledge that the nature of evidence is not necessarily correlated with its strength. Another difficulty is the reluctance of some MSs to identify a particular food vehicle as “verified” for legal reasons. For these reasons EFSA is in the process of revising the food-borne outbreak reporting specifications and it is expected that the new system would already apply to the reporting of data for 2010.

5. ANIMAL POPULATIONS

5.1 Distribution of farm animals within EU

In 2009, the majority of MSs reported data on farm animal populations (Table PO1). The distributions of the most important farm animal species (cattle, pigs, sheep and fowl: *Gallus gallus*) are presented in this chapter. Most countries reported total populations, however not all countries reported population data on animal categories within the different species. Therefore, it should be noted that the EU total figures calculated in this chapter do not represent the exact number of animals in EU since data were not provided by all MSs.

MSs also reported data on minor farm animal species. For information regarding animal species that are not covered in this chapter, please refer to Appendix Tables PO2, PO3 and PO4, and Level 3 Tables.

Table PO1. Overview of countries reporting data for 2009[1]

Animals	Total number of MSs reporting	Countries
Animals in general	27	**MSs**: All MSs **Non-MSs**: NO, CH
Gallus gallus	22	**MSs**: All MSs except CY,EE,IT,PT,SK **Non-MSs**: NO,CH
Cattle	26	**MSs**: All MSs except NL **Non-MSs**: NO, CH
Pigs	26	**MSs:** All MSss except CY **Non-MS:** NO, CH
Sheep	27	**MSs**: All MSs **Non-MS**: NO, CH

1. Includes all data reported of both livestock numbers, and numbers of herds and flocks. Note that some countries have not reported in both categories.

5.2 *Gallus gallus* (fowl)

The total *Gallus gallus* livestock populations in 2009, including data on specific animal categories (broilers and laying hens), were reported by 22 MSs and one non-MS (Table PO2). Furthermore, some countries also reported data on breeding hens, elite breeding hens and grandparent breeding hens for both broiler and egg production, and data on mixed flocks (Level 3 tables). As in 2008, Poland reported the largest population of *Gallus gallus*. In addition, the Czech Republic, France, Spain and the United Kingdom also reported high numbers of *Gallus gallus*, altogether accounting for just over 80 % of the total EU population. However, more significantly Poland has increased by 50 % its *Gallus gallus* population from just over six hundred million in 2008 to a little over nine hundred million, accounting for over 50 % of the reported EU total. In most countries, broilers accounted for more than 55 % of the total *Gallus gallus* population. Laying hens accounted for around 50 % of the population in Latvia and the Netherlands, and for 82.3 % in Luxembourg. For information on the number of flocks within the countries, please refer to Appendix Table PO4.

At EU level, broilers accounted for approximately 72 % of the total *Gallus gallus* population, while laying hens accounted for approximately 17 % (percentages based only on data from MSs reporting in the subgroups in question).

Table PO2. **Gallus gallus** *populations (livestock numbers), 2009*

Country	*Gallus gallus*, in total	Broilers		Laying Hens	
	N	N	% of total	N	% of total
Austria	62,228,426	56,211,083	90.3	5,348,103	8.6
Belgium	35,466,087	23,718,984	66.9	8,449,074	23.8
Bulgaria	16,847,770	8,956,204	53.2	4,236,754	25.1
Czech Republic	160,475,432	148,901,510	92.8	7,603,089	4.7
Denmark	-	21,993,093	-	4,420,000	-
Finland	9,047,796	4,918,452	54.4	3,785,009	41.8
France[1]	190,664,000	122,722,000	64.4	132,933,191	69.7
Germany	-	584,952,800	-	26,846,197	-
Greece	105,835,593	87,503,078	82.7	8,367,800	7.9
Hungary	32,128,372	26,757,681	83.3	2,675,681	8.3
Ireland	15,162,855	11,500,000	75.8	2,070,800	13.7
Latvia	3,982,028	1,688,339	42.4	2,193,073	55.1
Lithuania	-	6,149,000	-	2,548,500	-
Luxembourg	97,418	17,325	17.8	80,093	82.2
Malta	3,656,269	3,102,998	84.9	555,271	15.2
Netherlands	96,859,484	-	-	45,546,731	47.0
Poland	919,489,225	722,503,630	78.6	51,220,058	5.6
Romania	-	128,614,889	-	7,076,001	-
Slovenia	5,088,342	2,944,627	57.9	1,553,192	30.5
Spain	288,053,491	201,304,169	69.9	42,521,283	14.8
Sweden	12,420,871	5,262,269	42.4	5,260,612	42.4
United Kingdom	211,544,933	133,413,443	63.1	39,962,857	18.9
Total (22 MSs)	**2,169,048,392**	**2,303,135,574**	**106.2**	**405,253,369**	**18.7**
Switzerland	8,749,311	5,469,043	63	3,136,986	35.9

1. Figures for France include animal population in the overseas department

The reported densities of broiler populations in EU in 2009 (per hectare of utilised agricultural area) were highest in Malta, Poland and in the Czech Republic, while for laying hens, in Malta and the Netherlands (Figures PO1 and PO2).

Figure PO1. **Gallus gallus *broiler population in EU, 2009*[1]**

1. The colour scale indicates the population size per hectare of utilised agricultural area (UAA). UAA data obtained from EUROSTAT.

Figure PO2. **Gallus gallus *laying hen population in EU, 2009*[1]**

1. The colour scale indicates the population size per hectare of utilised agricultural area (UAA). UAA data obtained from EUROSTAT.

5.3 Cattle

In 2009, 26 MSs and two non-MSs reported data on the number of livestock. The total number of livestock and numbers of specific categories (calves <1 year of age, beef cattle and dairy cows and heifers) are summarised in Table PO3. France, Germany and the United Kingdom reported the largest populations of cattle, accounting for 49 % of EU total population. Two thirds of MSs reported data on cattle subcategories. Calves <1 year accounted for approximately one third of the total populations except in Greece and Italy where the population of calves <1 year was approximately 3.9 % and 1.2 % respectively. The percentage of meat production cattle varied widely, ranging from 4 % in Estonia to 49.2 % in France. It maybe that different criterion for the categorisation of cattle is used by MSs and this is reflected in the reporting. Dairy cows and heifers accounted for 22.9 % to 68.0 % of the total in the reporting MSs. For information on the number of herds and/or holdings of cattle within the countries, please refer to Appendix Table PO4.

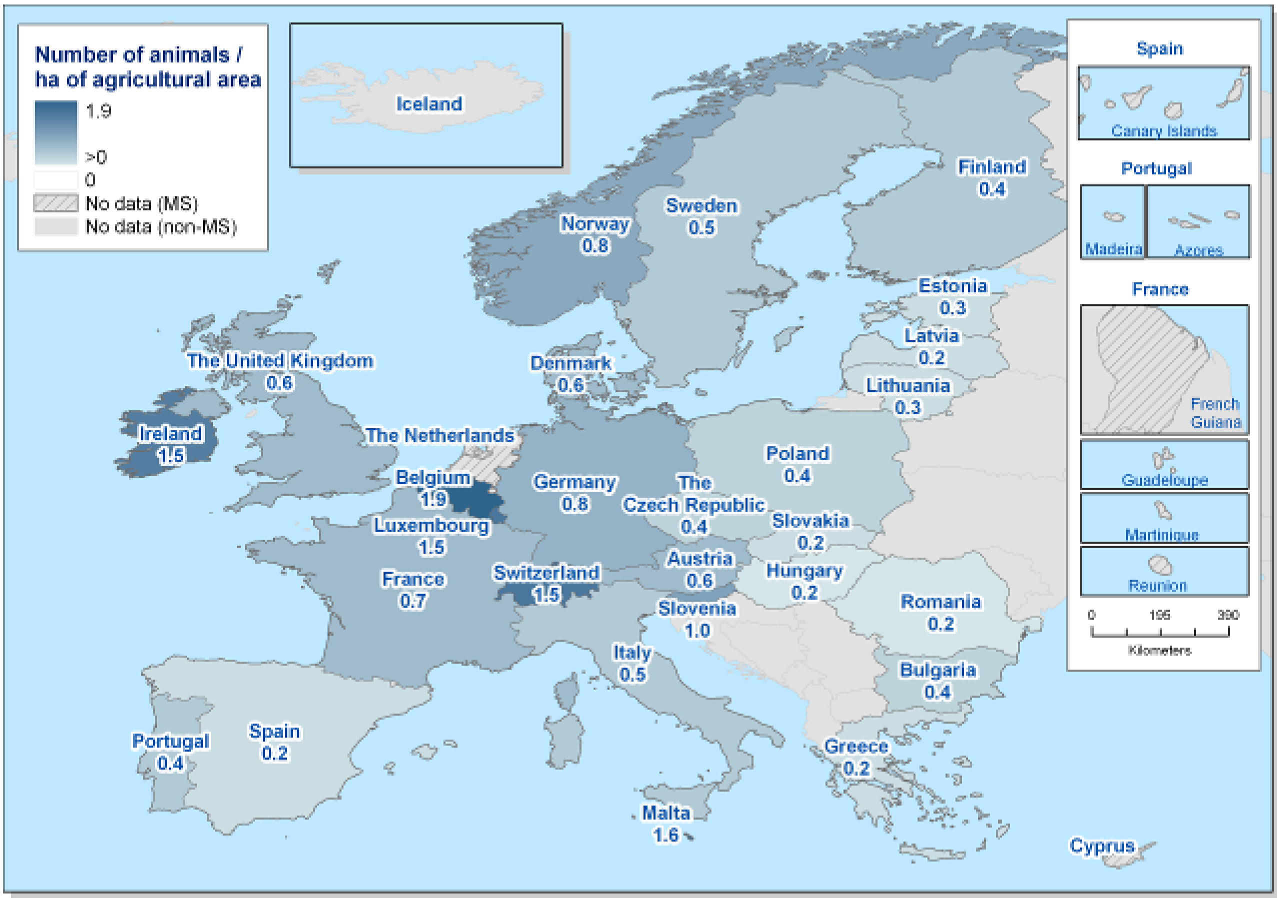
Table PO3. Cattle populations (livestock numbers) 2009

Country	Cattle, in total	Calves < 1 year		Meat production animals		Dairy cows and heifers	
	N	N	% of total	N	% of total	N	% of total
Austria	2,026,260	643,441	31.8	285,333	14.1	1,097,486	54.2
Belgium	2,594,358	-	-	-	-	-	-
Bulgaria	1,127,803	113,538	10.1	246,594	21.9	766,943	68.0
Cyprus	-	17,112	-	-	-	-	-
Czech Republic	1,374,328	392,090	28.5	235,228	17.1	747,010	54.4
Denmark	1,626,528	-	-	-	-	-	-
Estonia	233,158	59,394	25.5	9,406	4.0	130,721	56.1
Finland	918,268	304,346	33.1	118,699	12.9	421,485	45.9
France[1]	19,199,344	4,881,673	25.4	9,444,344	49.2	5,759,519	30.0
Germany	12,897,170	3,931,229	30.5	-	-	4,169,349	32.3
Greece	911,941	35,842	3.9	388,306	42.6	215,609	23.6
Hungary	792,505	-	-	-	-	-	-
Ireland	6,120,400	1,756,350	28.7	-	-	-	-
Italy	5,883,152	73,106	1.2	2,447,376	41.6	2,766,916	47.0
Latvia	377,725	-	-	-	-	-	-
Lithuania	695,614	-	-	-	-	357,114	51.3
Luxembourg	196,470	52,410	26.7	24,700	12.6	61,526	31.3
Malta	16,861	3,755	22.3	1,848	11.0	9,431	55.9
Poland	6,169,652	-	-	-	-	-	-
Portugal	1,514,898	439,621	29.0	-	-	-	-
Romania	2,274,838	-	-	-	-	-	-
Slovakia	480,888	-	-	-	-	-	-
Slovenia	472,878	147,338	31.2	-	-	133,018	28.1
Spain	5,841,473	1,809,488	31.0	2,087,931	35.7	1,386,574	23.7
Sweden	1,558,281	488,070	31.3	191,505	12.3	356,776	22.9
United Kingdom	10,025,481	2,858,534	28.5	4,186,456	41.8	2,647,373	26.4
Total (26 MSs)	**85,330,274**	**18,007,337**	**21.1**	**19,667,726**	**23.0**	**21,026,850**	**24.6**
Norway	876,300	-	-	-	-	-	-
Switzerland	1,602,513	-	-	-	-	-	-

1. Figures for France include animal population in the overseas department

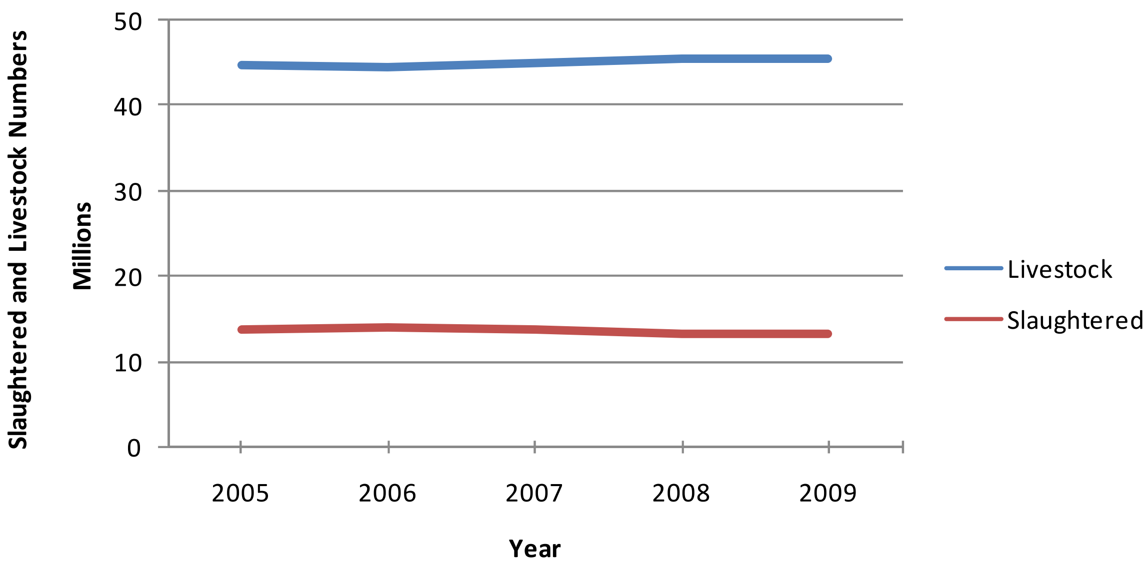
In Figure PO4 the density of cattle populations in the reporting countries are shown. Among MSs, the population density was highest in Belgium, Malta, Luxembourg and Ireland.

Figure PO3. Cattle populations in EU, 2009[1]



1. The colour scale indicates the population size per hectare of utilised agricultural area (UAA). UAA data obtained from EUROSTAT.

Figure PO4. Trend for slaughtered and livestock numbers in reporting Members States 2005 to 2009 in cattle[1]



1. Only MSs reporting data for both livestock and slaughtered animals in all the years are included (15 MSs).

5.4 Pigs

In 2009, a total of 26 MSs and two non-MSs reported data on pig population (livestock numbers). The total number of livestock and numbers in the categories fattening and breeding pigs are summarised in Table PO4. Five MSs (the Netherlands, France, Germany, Poland and Spain) reported markedly larger populations of pigs compared to the other MSs, accounting for 70 % of the reported EU total. Among MSs that reported data on pig categories, fattening pigs accounted for a large part of the total, ranging from 11.2 % to 92.8 %. Breeding pigs accounted for approximately 10 % of the total populations in most of the reporting MSs with the exception of Bulgaria (75 %) and Italy (46 %). For information on the number of herds and/or holdings of pigs within countries, please refer to Appendix Table PO4.

At EU level, fattening pigs accounted for approximately half of the total population, while breeding animals accounted for just above 12 % (based only on data from MSs reporting in both subgroups).

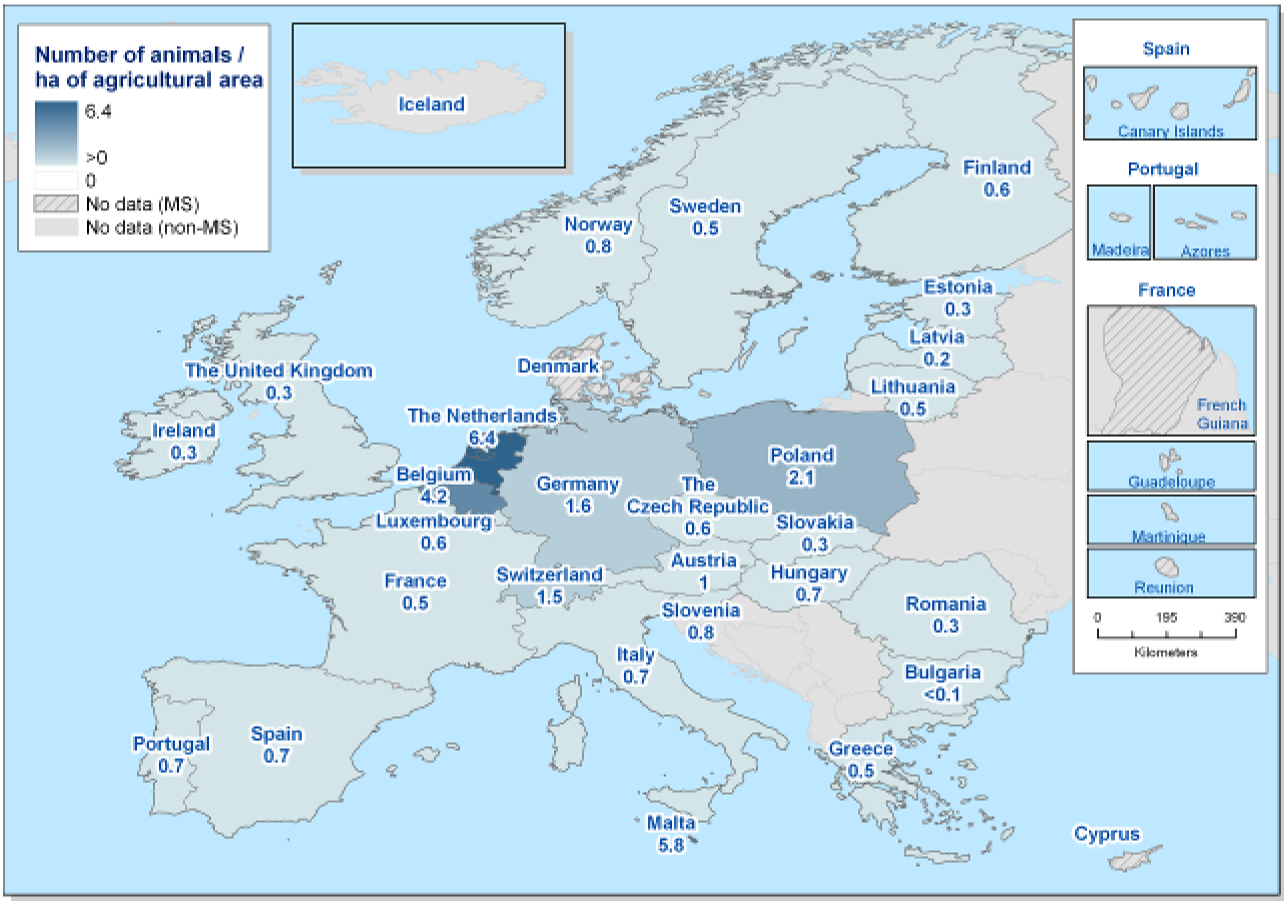
Table PO4. Pig populations (livestock numbers), 2009

Country	Pigs, in total	Fattening Pigs		Breeding Animals	
	N	N	% of total	N	% of total
Austria	3,143,509	1,127,650	35.9	293,250	9.3
Belgium	5,712,059	5,113,202	89.5	598,857	10.5
Bulgaria	285,412	34,052	11.9	214,192	75.0
Czech Republic	2,130,729	1,739,155	81.6	391,574	18.4
Denmark	-	6,657,061	-	-	-
Estonia	228,942	94,942	41.5	25,256	11.0
Finland	1,381,207	1,225,163	88.7	156,044	11.3
France[1]	14,552,330	13,334,961	91.6	1,200,185	8.2
Germany	26,841,000	11,353,400	42.3	2,265,400	8.4
Greece	2,140,847	1,977,969	92.4	151,013	7.1
Hungary	2,792,886	-	-	-	-
Ireland	1,296,166	145,708	11.2	6,663	0.5
Italy	8,894,288	4,683,417	52.7	4,088,749	46.0
Latvia	329,510	-	-	-	-
Lithuania	1,323,937	-	-	-	-
Luxembourg	80,217	29,475	36.7	7,473	9.3
Malta	60,208	53,000	88.0	7,208	12.0
Netherlands	12,186,453	5,872,351	48.2	1,245,603	10.2
Poland	31,875,637	-	-	-	-
Portugal	2,340,000	-	-	-	-
Romania	4,467,890	4,147,859	92.8	320,031	7.2
Slovakia	588,894	-	-	-	-
Slovenia	415,230	375,820	90.5	39,410	9.5
Spain	17,098,915	15,008,018	87.8	1,683,261	9.8
Sweden	1,528,740	942,521	61.7	160,265	10.5
United Kingdom	4,713,512	4,218,948	89.5	494,564	10.5
Total (26 MSs)	**146,408,518**	**78,134,672**	**53.4**	**13,348,998**	**9.1**
Norway	828,600	-	-	58,700	7.1
Switzerland	1,545,361	-	-	-	**-**

1. Figures for France include animal population in the overseas department

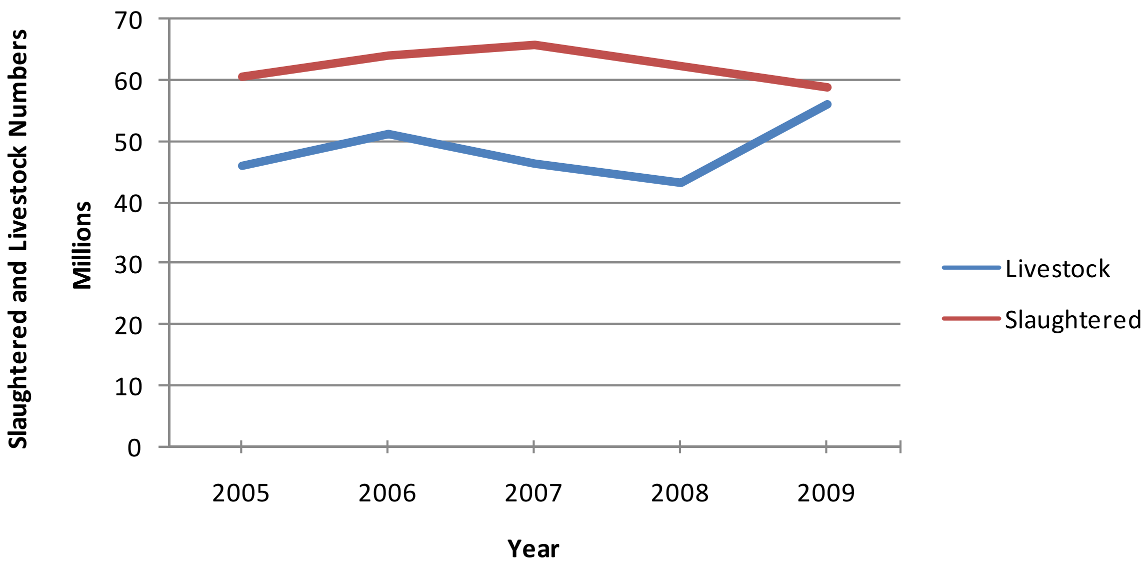
In Figure PO6 the density of pig populations in the reporting countries in EU are shown. The population size of pigs per hectare of utilised agricultural area was highest in the Netherlands, Malta and Belgium.

Figure PO5. Pig populations in EU, 2009



1. The colour scale indicates the population size per hectare of utilised agricultural area (UAA). UAA data obtained from EUROSTAT.

Figure PO6. Trend for slaughtered and livestock numbers in reporting Members States 2005 to 2009 in pigs[1]



1. Only MSs reporting data for both livestock and slaughtered animals in all the years are included (10 MSs).

5.5 Sheep

Data reported on sheep populations in 2009 are shown in Table PO5. A total of 26 MSs and two non-MSs reported data. The largest sheep populations were reported by Spain and the United Kingdom. These two MSs alone accounted for 53.5 % of the entire reported EU total population. In 2009, only a few MSs reported subgroup data. The data reported indicate that the majority of sheep were older than one year. For information on the number of herds and/or holdings of sheep within countries, please refer to Appendix Table PO4.

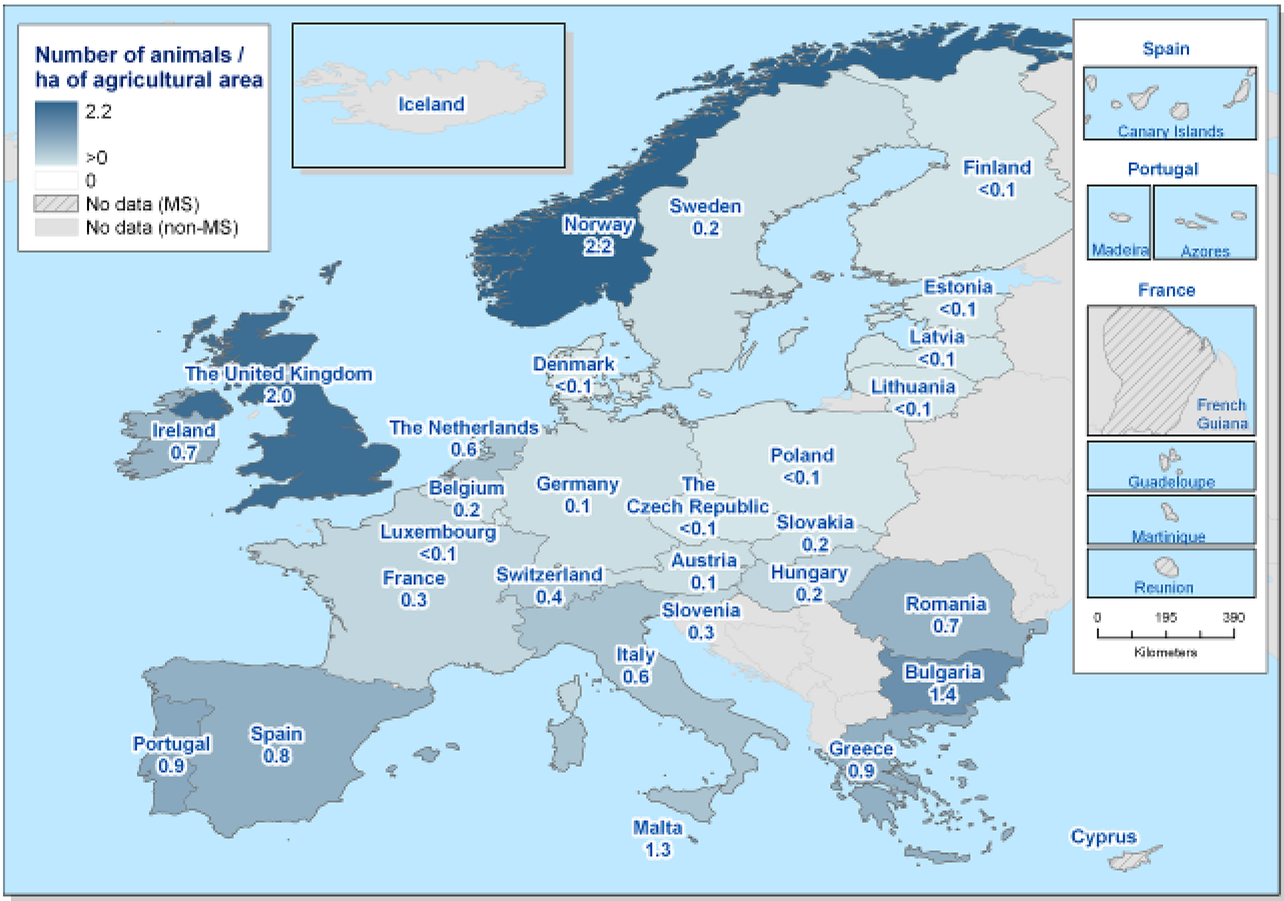
Table PO5. Sheep populations (livestock numbers), 2009

Country	Sheep, in total	Animals < 1 year		Animals > 1 year	
	N	N	% of total	N	% of total
Austria	405,365	172,312	42.5	233,053	57.5
Belgium	215,262	-	-	-	-
Bulgaria	4,234,359	239,310	5.7	1,955,837	46.2
Czech Republic	208,118	44,577	21.4	83,290	40.0
Denmark	164,857	-	-	-	-
Estonia	72,450	20,943	28.9	51,507	71.1
Finland	121,515	52,048	42.8	-	-
France[1]	7,528,202	1,334,880	17.7	-	-
Germany	2,350,400	862,900	36.7	1,487,500	63.3
Greece	3,561,634	-	-	-	-
Hungary	1,019,210	-	-	-	-
Ireland	2,968,183	-	-	-	-
Italy	7,370,087	-	-	-	-
Latvia	70,658	-	-	-	-
Lithuania	50,318	-	-	-	-
Luxembourg	8,824	3,719	42.1	436	4.9
Malta	13,018	2,324	17.9	10,694	82.1
Netherlands	1,116,509	555,197	49.7	561,312	50.3
Poland	251,060	-	-	-	-
Portugal	3,145,000	-	-	-	-
Romania	9,959,159	-	-	-	-
Slovakia	382,738	-	-	-	-
Slovenia	138,108	35,514	25.7	102,594	74.3
Spain	20,809,165	3,049,857	14.7	17,759,308	85.3
Sweden	540,487	286,570	53.0	253,916	47.0
United Kingdom	32,038,054	16,177,427	50.5	15,860,627	49.5
Total (27 MSs)	**98,742,740**	**22,837,578**	**23.1**	**38,360,074**	**38.8**
Norway	2,228,200	877,400	39.4	.	-
Switzerland	424,885	.	-	.	-

1. Figures for France include, animal population in the overseas department

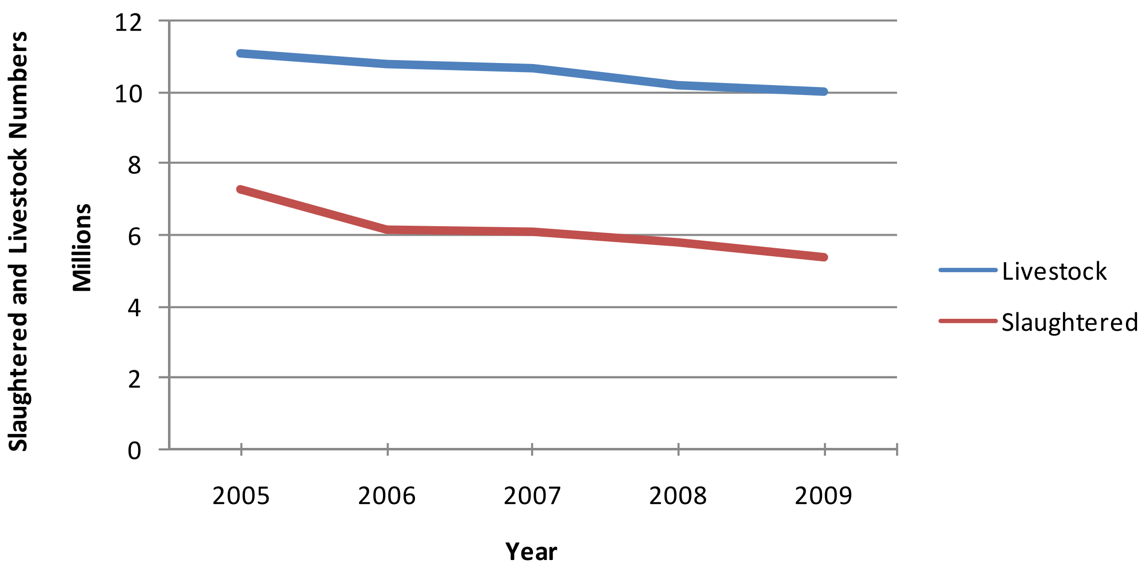
In Figure PO7 the density of sheep populations in the reporting countries in EU are shown. The sheep populations per hectare of utilised agricultural area were highest in the United Kingdom and the non-MS Norway.

Figure PO7. Sheep populations in EU, 2009[1]



1. The colour scale indicates the population size per hectare of utilised agricultural area (UAA). UAA data obtained from EUROSTAT.

Figure PO8. Trend for slaughtered and livestock numbers in reporting Members States 2005 to 2009 in sheep[1]



1. Only MSs reporting data for both livestock and slaughtered animals in all the years are included (11 MSs).

5.6 Goats

Data reported on goat populations in 2009 are shown in Table PO6. A total of 26 MSs and two non-MSs reported data. The largest goat populations were reported by Greece and Spain. These two MSs alone accounted for over 50 % of the entire reported EU total population. In 2009, only a few MSs reported subgroup data. The data reported indicate that the majority of goats were older than one year. For information on the number of herds and/or holdings of goats within countries, please refer to Appendix Table PO4.

In Figure PO10 the density of goat populations in the reporting countries are shown. The goat populations per hectare of utilised agricultural area were highest in Greece and Bulgaria.

Table PO6. Goat populations (livestock numbers), 2009

Country	Goats, in total	Goats > 1 year		Meat production animals	
	N	N	% of total	N	% of total
Austria	84,840	56,382	66.5	-	-
Belgium	57,371	-	-	-	-
Bulgaria	1,080,476	498,954	46.2	117,933	10.9
Czech Republic	24,727	7,058	28.5	1,868	7.6
Denmark	25,799	-	-	-	-
Estonia	2,529	2,202	87.1	-	-
Finland	5,924	-	-	-	-
France[1]	1,317,952	-	-	108,531	8.2
Germany	180,000	-	-	-	-
Greece	3,561,634	-	-	-	-
Hungary	16,043	-	-	-	-
Ireland	8,349	-	-	-	-
Italy	959,579	-	-	268,950	28.0
Latvia	13,247	-	-	-	-
Lithuania	7,106	-	-	-	-
Luxembourg	3,130	178	5.7	196	6.3
Malta	5,977	5,071	84.8	-	-
Netherlands	374,184	254,348	68.0	100,124	26.8
Poland	37,009	-	0.0	-	0.0
Portugal	496,000	-	-	-	-
Romania	1,237,844	-	-	-	-
Slovakia	8,484	-	-	-	-
Slovenia	29,896	24,645	82.4	-	-
Spain	2,920,869	2,311,852	79.1	1,032,639	35.4
Sweden	5,509	-	-	-	-
United Kingdom	98,597	-	-	-	-
Total (26 MSs)	**12,563,075**	**3,160,690**	**25.2**	**1,630,241**	**13.0**
Norway	67,800	-	-	-	-
Switzerland	79,793	-	-	-	-

1. Figures for France include, animal population in the overseas department

Figure PO9. Goat populations in EU, 2009[1]

1. The colour scale indicates the population size per hectare of utilised agricultural area (UAA). UAA data obtained from EUROSTAT.

5.7 Discussion

In 2009, 27 MSs and two non-MSs reported data on animal populations within the four most important animal categories: cattle, pigs, sheep, goats and fowl (*Gallus gallus*).

The distribution of these main farm animal species varied in EU. The fowl population was most concentrated in the Netherlands and some central European countries such as the Czech Republic and Poland as well as in Greece. The cattle population was more evenly distributed through EU, and the highest density was reported for Belgium and Ireland. Pig populations were clustered in central European countries and Denmark. The sheep population was more diversely distributed in EU; the United Kingdom, Cyprus and non-MS Norway reporting the highest population density. Bulgaria and Greece had the highest density of goat population.

Size and density of animal populations are important factors that influence the epidemiology of zoonoses. A high animal density, for example, may lead to elevated microbial loads in the environment, increasing the spread of zoonotic agents and the risk of exposure to animals and people.

6. MATERIALS AND METHODS

6.1 Data received in 2009

Human data

The human data analyses in the European Union Summary Report for 2009 were prepared by the Food and Waterborne Diseases section in the Surveillance Unit in ECDC and based on the data submitted to the European Surveillance System (TESSy), hosted at ECDC.

TESSy is a software platform that has been operational to collect data on 49 infectious diseases since April 2008. Both aggregated and case-based data were reported to TESSy. Although aggregated data did not include individual case-based information, both reporting formats have been used to calculate country-specific notification rates and trends in diseases.

Data on human zoonoses cases were received from all 27 MSs and additionally from two non-MSs: Iceland and Norway. Switzerland sent the data on human cases directly to EFSA.

Data on foodstuffs, animals and feedingstuffs

In 2009, data were collected on a mandatory basis for the following eight zoonotic agents: *Salmonella*, thermotolerant *Campylobacter*, *Listeria monocytogenes*, verotoxigenic *E. coli*, *Mycobacterium bovis*, *Brucella*, *Trichinella* and *Echinococcus.* Mandatory reported data also included antimicrobial resistance in isolates of *Salmonella* and *Campylobacter*, food-borne outbreaks and susceptible animal populations. Furthermore, based on epidemiological situations in each MS, data were reported on the following agents and zoonoses: *Yersinia*, *Lyssavirus* (rabies), *Toxoplasma*, *Cysticerci*, *Coxiella* (Q fever), *Francisella* and antimicrobial resistance in indicator *E. coli* and enterococci isolates. Finally, data concerning compliance with microbiological criteria were also reported for the staphylococcal enterotoxin, *Enterobacter sakazakii* and histamine.

In this report, data are presented concerning the eight mandatory zoonotic agents and *Yersinia,* Q fever, rabies, *Toxoplasma, Cysticerci* and *Francisella*.

For the sixth consecutive year, countries submitted data on animals, food, feed and food-borne outbreaks using a web-based zoonoses reporting system maintained by EFSA.

All MSs submitted national zoonoses reports for 2009. In addition, reports were submitted by the two non-MSs, Norway and Switzerland.

For each pathogen, an overview table presenting all MSs reporting data is included at the beginning of each chapter. However, for the detailed tables, data reported as HACCP, own control or imports and, unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Depending on the type of table, only countries reporting investigations with 25 samples or more have been included for analysis.

6.2 Statistical analysis of trends over time

Human data

Five-year trends for EU and for MSs were analysed with Poisson regression using a 99 % confidence level. Incidence rate ratios were calculated adjusting for clustering within countries and taking into account the underlying population. EU trend and the trends in MSs were reported as significant if the 99 % confidence interval for incidence rate ratios did not include number one. Data (number of confirmed cases and total population) at MS level were only included in the trend analysis when the MS reported human cases throughout the period 2005 to 2009.

Due to a wide variation in the reported case counts of zoonotic infections among MSs, any comparisons between notification rates by countries should be made with caution. When making comparisons between MSs, one should take into account such factors as the transition time to implement EU case definitions, different types of surveillance systems and population coverage, as well as microbiological methods employed by reporting countries.

The notification rate for each year is calculated as the ratio between the number of confirmed cases per 100,000 inhabitants in the population as of 1 January in the respective year. Population data were extracted from the Eurostat database and analyses were conducted using Stata/SE 10.0.

Changes in notification rates were visually explored for salmonellosis, campylobacteriosis and listeriosis, for each MS, by *trellis* graphs, using the *lattice* package in the R software (http://www.r-project.org). MS-specific notification rate trend graphs for salmonellosis and campylobacteriosis use a unique scale for countries shown in the same row, however scales differ among rows. MSs were ordered according to the maximum value of the notification rate. Moreover, in each row, countries are shown in alphabetical order. Due to more similar listeriosis notification rates across MSs, the same scale is used in the listeriosis trend graphs for all reporting MSs.

Data on animals

In the current report, temporal trends have been analysed for bovine tuberculosis, as well as for brucellosis in cattle and small ruminants (six years of data) in the group of MSs with a co-financed control and eradication programme.

MS-group weighted prevalences were estimated by weighting the MS-specific proportion of positive units with the reciprocal of the sampling fraction, which is the ratio between "the total number of units per MS per year" and the "number of tested units in the MS per year". For cattle and small ruminants, the annually reported population data were used. Source of data for weighting was indicated in footnotes of all figures that illustrate weighted prevalence estimates.

In order to obtain yearly estimates of the weighted prevalence for groups of examined MSs, the SURVEYLOGISTIC procedure in the SAS System was used. The weight was applied for each observation to take into account disproportionate sampling at MS level. Statistical significance of trends was tested by a weighted logistic regression for binomial data using the GENMOD procedure in SAS using a 5 % significance level. As non-independence of observations within each MS could not be excluded, for example due to the possibility of sampling animals belonging to the same holdings, the REPEATED statement was used. This yielded inflated standard errors for the effect of the year of sampling, reducing the probability of detecting significant time trends, and corresponding to a cautious approach to statistical analyses.

Changes in the proportions of positive units for zoonotic agents in animals during 2004 to 2009 were visually explored for each MS by *trellis* graphs using the *lattice* package in the R software (http://www.r-project.org).

6.3 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 to ECDC for the Annual Epidemiological Report on Communicable Diseases in Europe 2009[52].

6.3.1 *Salmonella* data

Humans

The notification of salmonellosis in humans is mandatory in most MSs, Switzerland, Iceland, Liechtenstein and Norway, except for five MSs, where reporting is based on a voluntary system (Belgium, France, the Netherlands and Spain) or other system (the United Kingdom) (Appendix Table SA19). In the United Kingdom, although the reporting of food poisoning is mandatory, isolation and specification of the organism is voluntary. However, the reporting of *Salmonella* is generally believed to be carried out by the majority of

52 ECDC (European Centre for Disease Prevention and Control), 2009. European Centre for Disease Prevention and Control. Annual Epidemiological Report on Communicable Diseases in Europe 2009. Stockholm, European Centre for Disease Prevention and Control, [237 pp.]. doi 10.2900/25588.

Available online: http://www.ecdc.europa.eu/en/publications/Publications/0910_SUR_Annual_Epidemiological_Report_on_Communicable_Diseases_in_Europe.pdf the laboratories testing for the organism in the United Kingdom. The coverage of the surveillance system for salmonellosis is estimated to be 25 % in Spain and 64 % in the Netherlands. These proportions of populations have been used in the calculation of notification rates for Spain and the Netherlands. Diagnosis of human infections is generally done by culture from human stool samples. The majority of countries perform serotyping of strains.

Foodstuffs

In food, *Salmonella* is notifiable in 14 MSs (Austria, Belgium, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Romania, Slovakia, Slovenia, Spain and Sweden) and Norway (Appendix Table SA19, information is missing from Bulgaria, Cyprus, the Czech Republic, Denmark, Greece, Lithuania, Luxembourg, Malta, the Netherlands, Poland and Portugal).

Commission Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs lays down food safety criteria for *Salmonella* in several specific food categories. This regulation came into force in January 2006 and was modified by Regulation (EC) No 1441/2007, entering into force in December 2007. Sampling schemes for monitoring *Salmonella* in foodstuffs e.g. place of sampling, sampling frequency, and diagnostic methods, vary between MSs and food types. For a full description of monitoring schemes and diagnostic methods in individual MSs, please refer to Appendix Tables SA7b, SA10, SA13, SA16 and SA17. The monitoring schemes were based on different samples, such as neck skin samples, carcass swabs and meat cuttings; these were collected at slaughter, processing, meat cutting plants and at retail. Several MSs reported data collected as part of HACCP programmes based on sampling at critical control points. These targeted samples could not be directly compared with those that were randomly collected for monitoring/surveillance purposes and were not included in data analysis and tables. Information on serotype distribution was not consistently provided by all MSs.

Animals

Salmonella in *Gallus gallus* and/or other animal species is notifiable in most MSs, Switzerland and Norway, except in Hungary (Appendix Table SA19, information is missing from Malta). In Denmark, clinical cases are not notifiable for poultry, but only in other animals, while in Romania only findings of *S.* Enteritidis and *S.* Typhimurium in poultry are notifiable. The monitoring of *Salmonella* in animals is mainly conducted through passive, laboratory-based surveillance of clinical samples, the active routine monitoring of flocks of breeding and production animals in different age groups, and tests on organs during meat inspection. Community Regulation (EC) No 2160/2003 prescribes a sample plan for the control of *S.* Enteritidis, *S.* Typhimurium, *S.* Infantis, *S.* Virchow and *S.* Hadar in breeding flocks of *Gallus gallus* and for the control of *S.* Enteritidis and *S.* Typhimurium in laying hen flocks and broiler flocks of *Gallus gallus* to ensure comparability of data among MSs. Non-MSs (EFTA members) must apply the regulation as well according to the Decision of the EEA Joint Committee No 101/2006.

In Appendix Tables SA2-SA4, monitoring programmes and control strategies in breeding flocks of *Gallus gallus* that are applied in different MSs are shown, in Appendix Tables SA5a-SA5b and SA6, monitoring programmes and control strategies in laying hen flocks are shown, and in Appendix Tables SA7a and SA8 monitoring programmes and control strategies for broiler flocks are shown. No requirements for the monitoring and control of other commercial poultry production systems have been applicable in 2009, but most MSs have national programmes for ducks (Appendix Tables SA11 and SA13), geese (Appendix Tables SA12 and SA13) and turkeys (Appendix Tables SA9 and SA10). Some MSs also monitor *Salmonella* in pigs (Appendix Tables SA14-SA16), cattle (Appendix Tables SA17-SA18) and other animals.

Feedingstuffs

There is no common sampling scheme for feed materials in EU. Results from compulsory and voluntary monitoring programmes, follow-up investigations, industry quality assurance programmes, as well as surveys, are reported (Appendix Table SA1). The MS monitoring programmes often include both random and targeted sampling of feedstuffs that are considered at risk. Samples of raw material, materials during processing and final products are collected from batches of feedstuffs of domestic and imported origin. The reported epidemiological units were either “batch” (usually based on pooled samples) or “single” (often several samples from the same batch). As in previous years, most MSs did not separate data from the different types of monitoring programmes or data from domestic and imported feed. Therefore, it must be emphasised that the data related to *Salmonella* in feedstuffs cannot be considered national prevalence estimates. Moreover, due to the lack of a harmonised surveillance approach, information is not comparable between countries. Nevertheless, data are presented in the same tables. Information was requested on feed materials of animal and vegetable origin and of compound feedstuffs (mixture of feed materials intended for feeding specific animal groups). Data on the detection of *Salmonella* in fish meal, meat and bone meal, cereals, oil seeds and products and compound feed for cattle, pigs and poultry in 2007 to 2009 are presented. Single sample and batch-based data from the different monitoring systems were summarised.

Serovars

The serovar data for food and animals originate from the *Salmonella* serovar tables (not from prevalence tables reporting the number of sample tested and the number of positive samples). In this table, MSs included isolates reported from monitoring and clinical investigations, but also data from investigations where the framework of sampling was not stated. Due to limited data on feed in the serovar tables, data from the prevalence tables were used. The ranking of serovars was done within each group by summing the number of each serotype across all countries. The distributions were based on the number of typed isolates, including non-typeable isolates. Most MSs reported a subset designated “other serotypes”. For some MSs this may include isolates belonging to the ten most common serovars in EU and the relative EU occurrence of some serovars may therefore be underestimated.

6.3.2 *Campylobacter* data

Humans

The notification of campylobacteriosis is mandatory in most MSs, Iceland, Liechtenstein, Norway and Switzerland, except for six MSs, where notification is based on a voluntary system (Belgium, France, Italy, the Netherlands and Spain) or other system (the United Kingdom) (Appendix Table CA2, information is missing from Greece and Portugal). Most MSs have had notification systems in place for many years. However, Cyprus and Ireland have implemented their notification systems in recent years (2004 to 2005). The coverage of the surveillance system for campylobacteriosis is estimated to be 25 % in Spain and 52 % in the Netherlands. These proportions of populations have been used in the calculation of notification rates for the two MSs. Diagnosis of human infections is generally done by culture from human stool samples (Appendix Table CA1). In some countries, isolation of the organism is followed by biochemical tests for speciation.

Foodstuffs

In food, *Campylobacter* is notifiable in 11 MSs (Austria, Belgium, the Czech Republic, Estonia, Germany, Italy, Latvia, the Netherlands, Slovakia, Slovenia and Spain) and Norway (Appendix Table CA2, information is missing from Bulgaria, Cyprus, France, Lithuania, Luxembourg, Malta, Poland, Portugal and Romania). 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, screenings, surveys and as part of HACCP programmes implemented within the food industry (Appendix Table CA1). HACCP data are not included in the report.

Animals

Campylobacteriosis is notifiable in *Gallus gallus* in Finland and Norway, and in all animals in Belgium, Estonia, Ireland, Latvia, Lithuania, the Netherlands, Spain and Switzerland (Appendix Table CA2, information is missing from Bulgaria, Cyprus, France, Malta and Poland). The most frequently used methods for detecting *Campylobacter* in animals at farm, slaughter and in foodstuffs were bacteriological methods ISO 10272[53] and NMKL 119[54] as well as PCR methods (Appendix Table CA1). 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 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. Campylobacteriosis is notifiable in cattle in Germany (veneric infection) ((Appendix Table CA2).

53 ISO (International Organization for Standardization), 2006. ISO 10272 Microbiology of food and animal feeding stuffs - Horizontal method for detection and enumeration of *Campylobacter* spp.

54 NMKL (Nordisk Metodikkomité for Næringsmidler- Nordic Committee on Food Analysis), 2007. NMKL 119. Thermotolerant *Campylobacter*. Detection, semi-quantitative and quantitative determination in foods and drinking water.

6.3.3 *Listeria* data

Humans

The notification of listeriosis in humans is mandatory in most MSs, Iceland, Liechtenstein, Norway and Switzerland, except for four MSs, where notification is based on a voluntary system (Belgium, the Netherlands, Spain, the United Kingdom) (Appendix Table LI2, information is missing from Portugal). The estimated coverage of the national surveillance system for listeriosis is 25 % in Spain and this population proportion has been used in the calculation of notification rates. Diagnosis of human infections is generally done by culture from blood, cerebral spinal fluid and vaginal swabs.

Foodstuffs

Notification of *Listeria* in food was required in 12 MSs (Austria, Belgium, Estonia, France, Germany, Hungary, Italy, Latvia, the Netherlands, Slovakia, Slovenia and Spain), however several other MSs report data (Appendix Table LI2, information is missing from Bulgaria, Cyprus, the Czech Republic, Denmark, Greece, Lithuania, Malta, Poland, Portugal, Romania and Switzerland). Commission Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs lays down food safety criteria for *Listeria monocytogenes* in ready-to-eat (RTE) foods. This regulation came into force in January 2006. National monitoring programmes and diagnostic methods for testing samples for *Listeria monocytogenes* are summarised in Appendix Table LI1. Surveillance in RTE foods was performed in most MSs. However, due to differences in sampling and analytical methods, comparisons from year-to-year and between countries were difficult.

Animals

Listeriosis in animals was notifiable in 13 MSs (Belgium, the Czech Republic, Estonia, Finland, Germany, Greece, Latvia, Lithuania, the Netherlands, Slovakia, Slovenia, Spain and Sweden), Switzerland and Norway (Appendix Table LI2, information is missing from Bulgaria, Cyprus, Ireland, Malta and Poland). The monitoring of *Listeria* in animals is mainly conducted through passive, laboratory-based surveillance of clinical samples, active routine monitoring or random national surveys.

6.3.4 Tuberculosis data

Humans

The notification of tuberculosis in humans is mandatory in all MSs, Iceland, Liechtenstein, Norway and Switzerland, (Appendix Table TB1). This is the second year that data for human tuberculosis due to *Mycobacterium bovis* was collected in TESSy. Unlike for other diseases, the data for tuberculosis represents the year 2008. In several of the reporting MSs, the notification system for human tuberculosis does not distinguish the tuberculosis cases caused by different species of *Mycobacterium*.

Animals

Tuberculosis in animals is notifiable in 25 MSs, Norway and Switzerland (Appendix Table TB1, information is missing from Bulgaria and Malta). In Cyprus, Greece, Hungary, Poland and Romania only bovine tuberculosis is notifiable, and in Ireland only ruminant animals. Rules for intra-EU bovine trade, including requirements for cattle herds and country qualification as officially free from tuberculosis are laid down in Council Directive 64/432/EC, as last amended by Commission Decision 2007/729/EC[55]. By the end of 2009, 13 MSs (Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Poland, Slovakia, Slovenia and Sweden), Switzerland and Norway were officially bovine tuberculosis-free (OTF). In the United Kingdom, Scotland was declared OTF during 2009 and in Italy, 17 provinces and four regions have now been declared OTF. An overview of the OTF status is presented in Appendix Table TB-BR1. In 2009, eradication programmes in cattle herds in Ireland, Italy, Portugal and Spain received co-financing (Commission Decision 2008/897/EC).

55 Commission Decision 2007/729/EC of 7 November 2007 amending Council Directives 64/432/EEC, 90/539/EEC, 92/35/EEC, 92/119/EEC, 93/53/EEC, 95/70/EC, 2000/75/EC, 2001/89/EC, 2002/60/EC, and Decisions 2001/618/EC and 2004/233/EC as regards lists of national reference laboratories and State institutes. OJ L 294, 13.11.2007, p. 26–35.

6.3.5 *Brucella* data

Humans

The notification of brucellosis in humans is mandatory in almost all MSs, Iceland, Liechtenstein, Norway and Switzerland (Appendix Table BR1, information is missing from Greece and Portugal). Five MSs have a voluntary (Belgium, France, Italy, the Netherlands and Spain) or other (the United Kingdom) surveillance system.

Foodstuffs

The notification of brucellosis in food is mandatory in ten MSs (Austria, Belgium, Finland, Germany, Italy, Latvia, the Netherlands, Slovenia, Spain and the United Kingdom) (Appendix Table BR1, information is missing from Bulgaria, Cyprus, the Czech Republic, Denmark, France, Greece, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia and Switzerland).

Animals

Brucellosis in animals is notifiable in 24 MSs, Norway and Switzerland (Appendix Table BR1, information is missing from Bulgaria, Cyprus and Malta). In Ireland, only tuberculosis in ruminant animals is notifiable.

Cattle: Rules for intra-EU bovine trade, including requirements for cattle herds and country qualification as officially free from brucellosis are laid down in Council Directive 64/432/EEC, as last amended by Commission Decision 2007/729/EEC. By the end of 2009, 14 MSs (Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, Poland, Slovakia, Slovenia and Sweden), Norway and Switzerland, were officially free from brucellosis in cattle (OBF). OBF regions have been declared in Italy (ten regions and five provinces), Portugal (six islands of the Azores), Spain (two provinces of the Canary Islands) and in the United Kingdom (Great Britain) (Appendix Table TB-BR1). In 2009, eradication programmes in cattle herds in Cyprus, Italy, Malta, Portugal, Spain and The United Kingdom (Northern Ireland) received co-financing (Commission Decision 2008/897/EC).

Sheep and goats: Rules for intra-EU trade of ovine and caprine animals and country qualification as officially free from ovine and caprine brucellosis caused by *B. melitensis* (ObmF) are laid down in Council Directive 91/68/EC[56], as last amended by the Council Directive 2006/104/EC[57]. By the end of 2009, 16 MSs (Austria, Belgium, the Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Luxembourg, the Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden and the United Kingdom), Norway and Switzerland, were officially free from ovine and caprine brucellosis caused by *B. melitensis* (ObmF). ObmF regions have been declared in France (64 departments), Italy (nine regions and seven provinces), Portugal (the Azores) and Spain (the Canary Islands) (Appendix Table TB-BR1). In 2009, eradication programmes for ovine and caprine brucellosis in Cyprus, Greece, Italy, Portugal and Spain, received co-financing (Commission Decision 2008/897/EC).

6.3.6 Rabies data

Humans

The notification of rabies in humans is mandatory in all MSs, Iceland, Liechtenstein, Norway and Switzerland, (Appendix Table RA3). Most countries examine human cases based on blood samples or cerebrospinal fluid. However, in case of post mortem examinations, the central nervous system is sampled. Identification is mostly based on antigen detection, isolation of virus and the mouse inoculation test (Appendix Table RA2).

Animals

In accordance with Council Directive 64/432/EEC, rabies must be notifiable in animals in 23 MSs and Norway and Switzerland (Appendix Table RA3, information is missing from Bulgaria, Ireland, Luxembourg

56 Council Directive 91/68/EEC of 28 January 1991 on animal health conditions governing intra-Community trade in ovine and caprine animals. OJ L 46, 19.2.1991, p. 19–36.

57 Council Directive 2006/104/EC of 20 November 2006 adapting certain Directives in the field of agriculture (veterinary and phytosanitary legislation), by reason of the accession of Bulgaria and Romania. OJ L 363, 20.12.2006, p. 352–367.

and Malta). 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 WHO[58] and OIE[59], and the mouse inoculation test. However, ELISA, PCR and histology are also used (Appendix, Table RA2). Information on vaccination programmes for rabies in animals is included in Appendix Table RA1.

Austria, Belgium, the Czech Republic, Finland, France, Ireland Luxembourg and the United Kingdom, Norway (mainland) and Switzerland have declared themselves free from rabies. Cyprus, Germany, Greece, Italy, Malta, Spain (mainland and islands) and Sweden consider themselves free from rabies. See Appendix Table RA3 for more information.

6.3.7 VTEC data

Humans

In humans, the notification of VTEC infections is mandatory in most MSs, Iceland, Norway and Switzerland, except for the United Kingdom (Appendix Table VT1, information is missing from Liechtenstein). In France, only cases with HUS are notified. Diagnosis of human gastrointestinal infections is generally done by culture from human stool samples.

Foodstuffs and animals

VTEC is notifiable in food in 11 MSs (Austria, Belgium, Estonia, Germany, Italy, Latvia, the Netherlands, Romania, Slovakia, Slovenia and Spain) and in animals in eight MSs (Belgium, the Czech Republic, Estonia, Finland, Latvia, Lithuania, Spain and Sweden) (Appendix Table VT1, missing information from Bulgaria, Cyprus, the Czech Republic, Denmark, Greece, Hungary, Lithuania, Malta, Poland, Portugal and Switzerland for food, and from Bulgaria, Cyprus, France, Germany, Greece, Ireland, Malta, Poland, Portugal and Romania for animals).

Samples were collected in a variety of settings, such as slaughterhouses, cutting plants, dairies, wholesalers and at retail level, and included different samples such as carcass surface swabs, cuts of meats, minced meat, milk, cheese, and other products. The majority of investigated products were raw but intended to undergo preparation before consumption. The samples were taken as part of official control and monitoring programmes as well as random national surveys. The number of samples collected and types of food sampled varied among individual MSs. Most of the animal samples were collected at the slaughterhouse or at the farm.

6.3.8. *Yersinia* data

Humans

Notification of yersiniosis in humans is mandatory in most MSs, Liechtenstein, Norway and Switzerland, (Appendix Table YE1, missing information from Greece, the Netherlands and Portugal and Iceland). Four MSs (Belgium, France, Italy and Spain,) have a voluntary notification system and the United Kingdom has another system. The coverage of the national surveillance for yersiniosis is 25 % in Spain and this population proportion has been used in the calculation of notification rates. Diagnosis of human gastrointestinal infections is generally done by culture from human stool samples.

Foodstuffs and animals

Yersinia is notifiable in food in ten MSs (Austria, Belgium, Estonia, Germany, Italy, Latvia, the Netherlands, Slovakia, Slovenia and Spain), and in animals in six MSs (Belgium, Ireland, Latvia, Lithuania, the Netherlands and Spain) and Switzerland (Appendix Table YE1, missing information from Bulgaria, Cyprus, the Czech Republic, Denmark, France, Greece, Hungary, Lithuania, Malta, Portugal, Romania and Switzerland for food, and from Bulgaria, Cyprus, France, Germany, Greece, Malta and Poland for animals).

58 WHO (World Health Organization), 1996. Laboratory Techniques in Rabies, 493 pp.

59 OIE (Organisation Mondiale de la Santé Animale - World Organisation for Animal Health), 2009. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.

Primarily, domestic animals were tested, but only results from pigs are presented in the report. The reporting of specific human pathogenic serotypes/biotypes found in food and animals is often missing and differences in sampling and analytical methods make comparison between countries difficult.

6.3.9 *Trichinella* data

Humans

The notification of *Trichinella* in humans is mandatory in most MSs, Liechtenstein, Norway and Switzerland (Appendix Table TR2, information is missing from Denmark and Iceland). Three MSs (Belgium, France and the United Kingdom) have a voluntary surveillance system for trichinellosis. In humans, diagnosis of *Trichinella* infections is primarily based on clinical symptoms and serology (ELISA and Western Blot). Comparatively, histopathology on muscle biopsies is rarely performed.

Foodstuffs and animals

Trichinella in foodstuffs is notifiable in 17 MSs and Norway, only Ireland and Switzerland report that *Trichinella* is not notifiable (Appendix Table TR2, information is missing from Bulgaria, Cyprus, the Czech Republic, Denmark, Lithuania, Luxembourg, Malta, the Netherlands and Poland). Trichinellosis in animals is notifiable in most MSs and Norway and Switzerland except for Hungary (Appendix Table TR2, information is missing from Bulgaria and Malta).

Rules for testing for *Trichinella* in slaughtered animals are laid down by Commission Regulation (EC) No 2075/2005[60]. In accordance with this regulation, all finisher pigs, sows, boar, horses, wild boar and some other wild species must be tested for *Trichinella* at slaughter. The regulation allows for the possibility that MSs can apply for status as a region with negligible risk of trichinellosis, and Denmark is the only MS to be assigned this status. Some MSs reported using digestion and compression methods as described in Directive 77/96/EEC[61] (see Appendix Table TR1 for more information).

6.3.10 *Echinococcus* data

Humans

The notification of echinococcosis in humans is mandatory in most MSs, Liechtenstein and Norway (Appendix Table EH2, information is missing from Denmark, Italy and Iceland). The Netherlands has no surveillance system for echinococcosis. Three MSs (Belgium, France and the United Kingdom) have a voluntary surveillance system for echinococcosis.

Foodstuffs and animals

Echinococcus is notifiable in food in 11 MSs (Austria, Belgium, Estonia, Finland, Hungary, Italy, Latvia, the Netherlands, Slovenia, Spain and Sweden) and Norway, and in animals in 18 MSs (Austria, Belgium, Denmark, Estonia, Finland, Germany, Greece, Italia, Latvia, Lithuania, the Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom), Norway and Switzerland. In the Czech Republic, France, Hungary and Luxembourg, *Echinococcus* is not notifiable in animals (Appendix Table EH2, information is missing from Bulgaria, Cyprus, the Czech Republic, Denmark, France, Greece, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania and Switzerland for food, and from Bulgaria, Cyprus, Germany, Ireland, Malta and Poland for animals).

Guidelines for the control of the *E. granulosus* through meat inspection of animal carcasses for human consumption are provided through Council Directive 64/433/EEC[62], whereby visual inspection of all slaughtered animals is carried out by official veterinarians examining organs and muscles intended for

60 Commission Regulation (EC) No 2075/2005 of 5 December 2005 laying down specific rules on official controls for *Trichinella* in meat. OJ L 338, 22.12.2005, p. 60–82.

61 Council Directive 77/96/EEC of 21 December 1976 on the examination for *trichinae* (*trichinella spiralis*) upon importation from third countries of fresh meat derived from domestic swine. OJ L 26, 31.1.1977, p. 67–77.

62 Council Directive 64/433/EEC of 26 June 1964 on health problems affecting intra-Community trade in fresh meat. OJ 121, 29.7.1964, p. 2012–20321.

human consumption. Whole carcasses or organs are destroyed in cases where *Echinococcus* cysts are found. An overview of the monitoring and diagnostic methods is set out in Appendix Table EH1.

6.3.11 *Toxoplasma* data

Humans

Toxoplasmosis surveillance is compulsory in 17 MSs and voluntary in Spain, and the United Kingdom (Appendix Table TO1). The national surveillance systems cover all age groups whereas EU level surveillance is targeted to congenital toxoplasmosis. The reporting of toxoplasmosis cases has not been adjusted to EU case definition yet and most of the countries have reported all cases from their systems. In the United Kingdom, data for 2009 are derived directly from the *Toxoplasma* Reference Unit. Thus, the large apparent increase in the numbers of cases is due to a change in data collection and does not reflect a true change in disease incidence. In Spain, the population coverage was estimated to be 25 % and this proportion of population has been used to calculate the notification rates.

Animals

Toxoplasmosis is a notifiable disease in Latvia, Poland and Switzerland in all animals and in Finland in all animals except hares, rabbits and rodents; no monitoring programmes are in place in these countries. In Germany, toxoplasmosis is notifiable in pigs, dogs and cats. In Austria, Denmark, and Sweden toxoplasmosis is not notifiable (Appendix Table TO1, information is missing from Belgium, Bulgaria, Cyprus, the Czech Republic, Estonia, France, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, Spain and the United Kingdom).

6.3.12 Q fever data

Humans

The notification of Q fever in humans is mandatory in most MSs and Norway (information is missing from Denmark, Ireland, Luxembourg, Malta, Romania, Iceland and Liechtenstein). Four MSs (Belgium, France, Spain and the United Kingdom) have a voluntary surveillance system for Q fever in humans.

Animals

Coxiella burnetii in animals is notifiable in 15 MSs (Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Italy, Latvia, Lithuania, the Netherlands, Poland, Slovenia, Spain and Sweden) and Switzerland. In Austria, *Coxiella burnetii* in animals is not notifiable (Appendix Table QF2), information is missing from the remaining 12 MSs and Norway.

Data reported is mostly based on suspect sampling due to an increase in abortions in the herd and identification is mostly carried out using serological testing methods as ELISA or immunofluorescence assay tests or direct identification methods as real-time PCR (Appendix Table QF1).

6.3.13 Other zoonotic agents

Cysticercus in foodstuffs and animals

Monitoring is carried out as a visual inspection (macroscopic examination) of carcasses at the slaughterhouse by meat inspection according to Regulation (EC) No 854/2004[63], or by specific serological tests.

63 Regulation (EC) No 854/2004 of 29 April 2004 on laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption. OJ L 139, 30.4.2004, p. 206- 320.

6.3.14 Data on food-borne outbreaks

Food-borne outbreaks are incidences of two or more human cases of the same disease or infection where the cases are linked or are probably linked to the same food source. Situations in which the observed human cases exceed the expected number of cases and where the same food source is suspected, are also indicative of a food-borne outbreak.

Information on the total number of food-borne outbreaks (including both possible and verified food-borne outbreaks) and the total number of verified food-borne outbreaks that occurred during the reporting year was provided by 24 MSs and two non-MSs. Bulgaria, Cyprus and Luxembourg did not report any outbreaks. For possible food-borne outbreaks, the causative agent, human cases, hospitalisations, and deaths should be reported. For the verified food-borne outbreaks, an additional table is available to collect more detailed information. Aggregated data is presented in overview tables only, since such data will not allow more detailed analysis.

6.4 Terms used to describe prevalence or proportion-positive values

In the report a set of standardised terms are used to describe the proportion of positive sample units or the prevalence of zoonotic agents in animals and foodstuffs:

- Rare: <0.1 %
- Very low: 0.1 % to 1 %
- Low: >1 % to 10 %
- Moderate: >10 % to 20 %
- High: >20 % to 50 %
- Very high: >50 % to 70 %
- Extremely high: >70 %

- Majority of MSs: 60 % (in 2009 this was 16 MSs)
- Most MSs: 75 % (in 2009 this was 20 MSs)

APPENDIX 1.

List of Abbreviations

Abbreviation	Definition
AFLP	Amplified Fragment Length Polymorphism
ANSES	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail
AHAW	EFSA'S Scientific panel dealing with Animal Health and Welfare
BIOHAZ	EFSA'S Scientific panel dealing with Biological Hazards
CFU	Colonies Forming Unit
CI	Confidence Interval
EBLV	European Bat *Lyssavirus*
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EEC	European Economic Community
EFSA	European Food Safety Authority
EFTA	European Free Trade Association
ELISA	Enzyme Linked Immunosorbent Assay
EU	European Union
EUROSTAT	Statistical Office of the European Communities
FAT	Fluorescent antibody test
g	Gram
HACCP	Hazard Analysis and Critical Control Point
HUS	Haemolytic Uraemic Syndrome
ISO	International Organization for Standardization
LHT	Low heat-treated
MLST	Multilocus sequence typing
MLVA	Multiple-Locus Variable number tandem repeat Analysis
MS	Member State
NT	Not typeable
OBF	Officially Brucellosis Free specification e.g. "as regards bovine herd"
OBmF	Officially *Brucella melitensis* Free specification e.g. "as regards ovine and caprine" herds
OIE	World Organisation fro Animal Health
OTF	Officially Tuberculosis Free specification e.g. "as regards bovine herd"
PCR	Polymerase Chain Reaction
PFGE	Pulsed field gel electrophoresis
RDNC	Reacts but does not conform
RTE	Ready-to-eat
spp.	Subspecies
TESSy	The European Surveillance System
UHT	Ultra-high temperature
VT	Verocytotoxin
VTEC	Verotoxigenic *Escherichia coli*
WHO	World Health Organization
ZCC	Zoonoses Collaboration Centre

Member States of the European Union and other reporting countries in 2009

Member States of the European Union, 2009

Member State	ISO Country Abbreviations
Austria	AT
Belgium	BE
Bulgaria	BG
Cyprus	CY
Czech Republic	CZ*
Denmark	DK
Estonia	EE
Finland	FI
France	FR
Germany	DE
Greece	GR
Hungary	HU
Ireland	IE
Italy	IT
Latvia	LV
Lithuania	LT
Luxembourg	LU
Malta	MT
Netherlands	NL*
Poland	PL
Portugal	PT
Slovakia	SK
Slovenia	SI
Spain	ES
Romania	RO
Sweden	SE
United Kingdom	UK*

* In text, referred to as the Czech Republic, the Netherlands and the United Kingdom.

Non Member States reporting in 2009

Country	ISO Country Abbreviations
Iceland	IS
Liechtenstein	LI
Norway	NO
Switzerland	CH

APPENDIX 2.

Tables

Appendix Table PO1. Human population (x100), 2007-2009

Country	2009	2008	2007
Austria	83,553	83,319	82,989
Belgium	107,500	106,669	105,845
Bulgaria	76,066	76,402	76,793
Cyprus	7,969	7,893	7,787
Czech Republic	104,675	103,811	102,872
Denmark	55,055	54,758	54,471
Estonia	13,404	13,409	13,424
Finland	53,263	53,005	52,770
France	643,670	639,829	633,921
Germany	820,024	822,178	823,149
Greece	112,604	112,138	111,717
Hungary	100,310	100,454	100,662
Ireland	44,500	44,013	43,125
Italy	600,451	596,193	591,313
Latvia	22,613	22,709	22,813
Lithuania	33,499	33,664	33,849
Luxembourg	4,935	4,838	4,762
Malta	4,136	4,103	4,078
Netherlands	164,858	164,043	163,580
Poland	381,359	381,156	381,255
Portugal	106,273	106,176	105,991
Romania	214,986	215,286	215,651
Slovakia	54,123	54,010	53,936
Slovenia	20,324	20,259	20,104
Spain	458,282	452,833	444,746
Sweden	92,563	91,829	91,133
United Kingdom	615,960	611,793	608,167
EU total	**4,996,952**	**4,976,834**	**4,951,058**
Norway	47,993	47,372	46,811
Switzerland	77,830	77,019	75,935

Appendix Table PO2. Animal livestock population 2009

Country	Cattle (bovine animals)	Ducks	*Gallus gallus*	Geese	Goats	Pigs	Sheep	Solipeds, domestic	Turkeys
Austria	2,026,260	-	62,228,426	-	84,840	3,143,509	405,365	70,427	-
Belgium	2,594,358	42,040	35,466,087	400	57,371	5,712,059	215,262	179,141	272,705
Bulgaria	1,127,803	1,195,771	16,847,770	-	1,080,476	285,412	4,234,359	170,123	35,081
Czech Republic	1,374,328	4,070,825	160,475,432	217,476	24,727	2,130,729	208,118	79,101	1,108,000
Denmark	1,626,528	-	-	-	25,799	-	164,857	-	486,839
Estonia	233,158	-	-	-	2,529	228,942	72,450	-	-
Finland	918,268	2,409	9,047,796	1,144	5,924	1,381,207	121,515	72,300	306,113
France	19,199,344	25,085,904	190,664,000	644,000	1,317,952	14,552,330	7,528,202	362,969	24,422
Germany	12,897,170	2,617,858	-	327,197	180,000	13,618,800	2,350,400	-	10,892,177
Greece	911,941	18,303	105,835,593	8,794	3,561,634	2,140,847	3,561,634	42,028	343,200
Hungary	792,505	3,713,000	32,128,372	-	16,043	2,792,886	1,019,210	61,000	3,018,000
Ireland	6,120,400	-	15,162,855	15,000	8,349	1,296,166	2,968,183	-	1,226,456
Italy	5,883,152	-	-	-	959,579	8,894,288	7,370,087	-	-
Latvia	377,725	398	3,982,028	-	13,247	329,510	70,658	12,616	-
Lithuania	695,614	-	-	2,171	7,106	1,323,937	50,318	18,324	-
Luxembourg	196,470	208	97,418	213	3,130	80,217	8,824	4,562	105
Malta	16,861	0	3,656,269	0	5,977	60,208	13,018	-	-
Netherlands	-	-	96,859,484	-	374,184	12,186,453	1,116,509	144,924	-
Poland	6,169,652	5,623,009	919,489,225	11,887,571	37,009	31,875,637	251,060	216,426	24,582,837
Portugal	1,514,898	-	-	-	496,000	2,340,000	3,145,000	46,000	-
Romania	2,274,838	1,743,482	-	1,754,442	1,237,844	4,467,890	9,959,159	709,653	1,447,101
Slovakia	480,888	-	-	-	8,484	588,894	382,738	-	-
Slovenia	472,878	9,909	5,088,342	2,747	29,896	415,230	138,108	19,623	94,477
Spain	5,841,473	604,452	230,600,558	5,423	2,920,869	17,098,915	20,809,165	559,598	5,025,568
Sweden	1,558,281	-	12,420,871	-	5,509	1,528,740	540,487	283,100	100,743
United Kingdom	10,025,481	6,264,213	211,544,933	260,193	98,597	4,713,512	32,038,054	370,225	9,887,372
Total	**85,330,274**	**50,991,781**	**2,111,595,459**	**15,126,771**	**12,563,075**	**133,186,318**	**98,742,740**	**3,422,140**	**58,851,196**
Norway	876,300	-	-	-	67,800	828,600	2,228,200	-	-
Switzerland	1,602,513	-	8,749,311	-	79,793	1,545,361	424,885	-	52,887

Appendix Table PO3. Animal Slaughter populations 2009

Country	Cattle (bovine animals)	Ducks	*Gallus gallus*	Geese	Goats	Pigs	Sheep	Solipeds, domestic	Turkeys
Austria	699,783	-	70,330,516	-	41,276	5,597,387	290,088	978	-
Belgium	799,256	52,581	290,556,915	1,107	6,143	11,677,883	135,071	8,910	916,554
Bulgaria	38,169	4,178,688	52,077,180	-	4,149	531,631	581,285	6,647	51,580
Czech Republic	286,149	3,007,115	131,985,020	-	627	3,289,761	11,083	332	202,741
Denmark	507,200	-	-	-	2,073	-	89,987	2,863	7,588
Estonia	54,373	-	-	-	268	407,710	16,369	12	-
Finland	268,056	-	52,320,225	-	-	2,331,712	25,687	1,049	954,197
France	4,961,750	75,084,000	757,267,000	450,000	783,279	24,907,765	4,432,173	15,468	58,582,000
Germany	3,803,554	-	785,868	-	27,821	56,415,489	1,045,718	9,413	-
Greece	252,374	52,428	118,782,502	17,690	3,730,690	1,860,183	3,730,690	-	375,858
Hungary	111,104	-	-	-	-	3,368,067	9,478	-	-
Ireland	1,608,227	-	73,114,245	40,000	173	2,460,003	2,754,071	4,240	786,449
Italy	2,580,535	-	-	-	-	-	-	-	-
Latvia	99,903	-	9,359,772	-	9,329	323,588	-	400	-
Lithuania	-	-	-	-	-	551,811	5,402	2,441	-
Luxembourg	25,982	-	122,695	-	521	139,936	3,176	44	-
Malta	6,241	0	2,817,333	0	698	90,140	1,619	-	-
Netherlands	-	-	472,572,500	-	80,900	13,856,916	670,900	2,193	-
Poland	1,594,696	3,242,231	620,805,839	6,587,270	37,238	17,799,002	23,689	42,554	23,864,169
Portugal	446,402	1,560,870	256,502,264	-	1,075,959	4,894,208	1,075,959	1,552	3,474,943
Romania	126,364	-	-	-	-	-	-	-	-
Slovakia	61,560	-	45,894,888	-	83	768,981	81,015	-	26,122
Slovenia	123,760	-	-	-	450	295,491	9,608	1,426	443,813
Spain	-	-	-	-	-	-	-	-	-
Sweden	426,504	1,049	-	8,376	773	2,942,912	252,873	3,807	476,652
United Kingdom	2,523,327	14,746,543	822,795,297	411,177	8,446	9,030,841	15,381,684	-	14,925,338
Total	**21,405,269**	**101,925,505**	**3,778,090,059**	**7,515,620**	**5,810,896**	**163,541,417**	**30,627,625**	**104,329**	**105,088,004**
Norway	322,900	-	-	-	22,400	1,497,200	1,140,600	1,300	1,388,600
Switzerland	649,006	-	-	-	27,883	2,711,101	238,683	-	-

Appendix Table PO4. Animal herd and flock populations 2009

Country	Cattle	Ducks	*Gallus gallus*	Geese	Goats	Pigs	Sheep	Solipeds, domestic	Turkeys
	Herd	Herd	Flock	Flock	Herd	Herd	Herd	Herd	Flock
Bulgaria	129,432	-	-	-	120,576	68,912	145,318	125,390	-
Czech Republic	-	99	7,122	31	-	-	-	-	284
Denmark	22,476	-	-	-	3,626	-	8,738	-	49
Estonia	5,618	-	59	-	504	87	1,883	-	-
Germany	-	-	-	-	-	-	28,500	-	-
Greece	34,883	2,023	8,959	1,087	18,454	6,053	18,454	21,921	106
Hungary	18,618	394	-	-	-	-	-	-	394
Ireland	108,303	30	749	45	345	-	32,978	-	113
Italy	162,151	477	9,106	369	58,157	122,178	103,299	88,369	1,135
Latvia	39,994	4	166	-	2,800	2,498	4,204	6,581	-
Lithuania	-	-	-	-	-	-	-	-	-
Luxembourg	1,480	40	425	63	92	151	223	529	10
Malta	363	0	745	0	-	-	-	-	0
Poland	726,055	8,991	25,335	4,417	8,103	457,617	8,078	85,932	3,272
Romania	-	2	-	-	-	-	-	-	20
Slovenia	-	-	3,444	-	-	-	-	-	-
United Kingdom	-	-	33,883	-	-	-	-	-	-
Total	**1,266,773**	**12,060**	**89,993**	**6,012**	**213,957**	**659,996**	**366,475**	**328,722**	**5,383**
Norway	17,400	-	-	-	1,300	2,500	14,800	-	-

Appendix Table SA1. Surveillance systems on Salmonella in feedingstuffs, 2009

Country	Surveillance compulsory	Domestic raw feed material		Imported raw feed material (EU and Non-EU countries)	
		Animal	Vegetable	Animal	Vegetable
Austria	Yes	Each farm, processing plant and retailer are sampled at least twice per year		Each farm, processing plant and retailer are samples at least twice per year	
Belgium	Yes	Official monitoring		-	-
Bulgaria		Official monitoring		The samples are taken from farm, processing plant and retail on the random selection	
Cyprus	-	-	-	-	-
Czech Republic	-	-	-	-	-
Denmark	Yes	Targeted sampling	Targeted sampling	Targeted sampling	Targeted sampling
Estonia	Yes	Monitoring	Monitoring	-	-
Finland	Yes	Self control systems based on requirements of legislation		Every consignment is sampled or random sampling depending on feed type	Every consignment is sampled
-	-	-	-	Sampling frequency depends on raw feed material and it is based on risk assessment	
France	Yes[1]	Official monitoring, random sampling		None	-
Germany	Yes	Official surveillance, random sampling		Samples are taken by official labs. At least 25 samples per batch	-
Greece	-	Targeted and routine sampling	Targeted and routine sampling	-	-
Hungary	-	-	-	-	-
Ireland	Yes	Compulsory sampling regime drawn up in accordance with Directive 1995/53/EC - both imported and domestic			
Italy	Yes	-	Official control as well as HACCP or own check by the industry	-	-
Latvia	Yes	Official and HACCP or own check by the industry		Border inspections checks, official and HACCP or own check by the industry	
Lithuania	Yes	Official control and own check	Official control and own check	Official control and own check	Official control and own check
Luxembourg	-	-	-	-	-
Malta	-	-	-	-	-
Netherlands	Yes	Own check		-	-
Poland	-	-	-	-	-
Portugal	-	-	-	-	-
Slovakia	-	-	-	-	-
Slovenia	Yes	Official target sampling and own check programme based on HACCP by the industry		Official target sampling and own check programme based on HACCP by the industry	
Spain	Yes	Monitoring	Monitoring	-	-
Sweden	Yes	Targeted sampling/self control		Targeted sampling	
United Kingdom	-	Sampling of rendered material is required if the rendered material is intended for use in livestock feedingstuffs; reportable		Tested according to a risk assessment	-
Norway	Yes	Own check programme based on requirements of legislation. Random sampling by the official surveillance programme		x	x
Switzerland	Yes	Targeted sampling	Targeted sampling	Targeted sampling (fish meal)	Targeted sampling

x - routinely performed

1. In France, surveillance is compulsory for feed for breeders (*Gallus gallus*).
2. In Sweden, at feed mills producing feedingstuffs for poultry a minimum of five samples per week is collected; at feed mills producing feedingstuffs for ruminants, pigs or horses two samples a week are collected.

Process control	Compound feed			Comments
	Cattle	Pig	Poultry	
x	Each farm, processing plant and retailer are samples at least twice per year			Official sampling is carried out according to Directive 1976/371/EC. Analysis method: ISO 6579:2002
-	x	x	x	
yes	yes	yes	yes	Official sampling is carried out according to Directive 1976/371/EC. Analysis method: ISO 6579:2002
-	-	-	-	
-	-	-	-	
Targeted sampling	-	-	-	
-	Monitoring	Monitoring	Monitoring	
x	Self control systems based on requirements of legislation. Final products: risk-based official sampling			Official sampling is carried out according to Directive 1976/371/EC. Analysis method in Evira: ISO 6579:2002 with some minor modifications.
-	-	-	-	
Yes[1]	Official monitoring, random sampling			Specific agreement for breeding poultry feed plants
Yes	Yes	Yes	Yes	
-	-	-	ISO 6571, ISO 6581	
-	-	-	-	
-	x	x	x	
-	Official control as well as HACCP or own check by the industry			
HACCP by the industry	Official and HACCP by the industry			Official sampling is carried out according to Rules of Cabinet of Ministers No 1591 (22.12.2009.). Analysis method: LVS EN ISO 6579:2003
Official control and own check	Official control and own check	Official control and own check	Official control and own check	Analysis method: LST EN ISO 6579:2003 It
-	-	-	-	
-	-	-	-	
-	Routine testing	-	-	
-	-	-	-	
-	-			
-	-	-	-	
Official target sampling and own check programme based on HACCP by the industry	Official target sampling and own check programme based on HACCP by the industry			
-	Monitoring	Monitoring	Monitoring	
HACCP sampling prescribed by law[2] and official targeted control	-	-	-	
Codes of practice for control is applied as part of the HACCP process	yes	yes	yes	
Own check programme based on HACCP by the industry	All complete feedingstuffs must be subject to heat treatment[3]			Official sampling according to Directive 1976/371/EC
Self control and official target sampling	yes	yes	yes	

3. In Norway, establishments producing feed are required to establish own check programme based on HACCP. In addition, random samples are collected through an official surveillance programme.

Appendix Table SA2. Salmonella *surveillance programmes in poultry breeders* (Gallus gallus), *2009*

Countries, running an approved monitoring and control programme[1,2] according to Directive 1992/117/EC; meeting at least the minimum sampling requirements set out by Regulation (EC) No 2160/2003			
MSs with approved surveillance programme (Decision 2008/897/EC)		All MSs except FI, LT, SE	
Non-MS with approved surveillance programmes (ESA Decision No 364/07/COL)		NO	
MSs with EU co-financing (Decision 2008/897/EC as amended by Decision 2009/858/EC)		20 MSs except EE, FI, LT, MT, SI, SE, UK	
Countries with additional sampling (see Appendix Table SA3)		AT, DK, FR, NL, SE, UK	
MS with no production of poultry breeders		LU	
Minimum requirement according to Regulation (EC) No 2160/2003			
Rearing period		**Production period**	
Day old chicks	Dead chickens / destroyed chickens Samples from the inside of the delivery boxes (internal lining/paper/crate material)	Every 2 weeks	Dead chickens or meconium samples/5 pairs of sock samples
4th week	faecal samples	Within 8 weeks before end of the production cycle	Official sampling instead of above mentioned sampling
2 weeks before moving	faecal samples		
Diagnostic methods used			
ISO 6579:2002	BE, BG, CZ, EE, GR, IT, NO, PL, SK, NL, SE		
Modified ISO 6579:2002	AT, DK, LV, UK		
Annex D of ISO 6579:2002	LV		
ISO 6579:2002 / Amendment 1:2007	FI, ES		
ISO 6579:2002, Annex D:2007	SI		
AFNOR NF U 47 100 and 47 101	FR		

1. Regulation (EC) 1003/2005 sets the community targets for the reduction of the prevalence of certain *Salmonella* types in breeding flocks of *Gallus gallus*, and sets the testing scheme to verify the achievement of the community targets for *S.* Enteritidis, *S.* Hadar, *S.* Infantis, *S.* Typhimurium and *S.* Virchow.
2. Non-MSs (EFTA members) must apply EU legislation according to Decision of the EEA Joint Committee No 101/2006.

Appendix Table SA3. **Salmonella** *monitoring programmes in poultry breeders* **(Gallus gallus)**, *2009 - additional sampling*

Country	Rearing period		Production period	
Austria	At week 4, 12 and before laying start	Faecal samples or boot swaps	Every 4 weeks	Faecal samples or boot swabs
Denmark	Week 1,2 and 8	Faecal samples	Every week	Faecal samples
Denmark			Hatcheries: after each hatch when sampling according to Directive 1992/117/EC is not carried out	Wet dust samples
Denmark			0-4 weeks before moving, 8-0 weeks before slaughter	Faecal samples
France	day old chicks, 4 weeks and 2 weeks before transfert	Faecal samples and chiffs	Every two weeks at hatchery	5 Hatch tray layers or 250 g of shells or swabs
France			At farm: before 24, at 34, 42, 50, and 8 weeks before slaughter (meat production line); before 24, at 38, 54 and 8 weeks before slaughter (egg production line)	Faecal samples and swabs
Netherlands	max. 21 days before transfer	cloacal swabs	From 20 weeks every 4 Hatchery	Cloacal swabs, 6x25/flock Fluff samples (25 g) / hatching
Netherlands	4 weeks	cloacal swabs	From 20 – 24 weeks and every 9 weeks	
Netherlands	max. 21 days before transfer	cloacal swabs	No vaccination	blood samples[1]
Netherlands			Vaccination: From week 26 and on	fluff samples, every hatch, every machine
United Kingdom			Additional operator sampling at hatchery - every hatch	Fluff, dust, meconium, chicks, etc.

1. Sample size depends on flock size.

Appendix Table SA4. Control measures[1] taken in poultry breeder flocks in case of* Salmonella *infection, 2009

Control measures	Countries
Serovars covered	
All Serovars	DK, FI, SE, NO, NL, LT
S. Enteritidis and *S.* Typhimurium	BG, CZ, DE, IE, IT, LV, ES, UK
S. Enteritidis, *S.* Typhimurium, *S*. Hadar, *S.* Virchow, *S*. Infantis	AT, BE, CH, EE, ES, FR, RO, SI, SK
Restrictions on the flock	
After confirmation of *Salmonella* infection	CH, ES, NL, PL, IT, SK
Immediately following suspicion of *Salmonella*	AT, BE, BG, CZ, DK, EE, FR, IE, LV, NO, RO, SI, SE, UK
Chicks already delivered covered by restrictions	NO
Consequence for the flock	
Slaughter	BE, EE, ES, GR, IE, PL, SK, UK[2], IT
Restrictions for the delivery of hatching eggs	AT[3], BE[4], BG, CZ, EE, ES, FI, LV, NO, NL, DK[3], PL[4], SI, SK, FR, IT, FI, RO, UK[4]
Slaughter and heat treatment	CZ, DK, DE, FI, FR, LV, LT, NL[5], NO, SI[6]
Destruction	AT, CH, CZ, RO, SE, SI[6]
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	DK, EE, FR, NO, SE, SI[7]
Disposal of manure restricted	EE, FR, FI, NO, LV, SE, UK, DK, PL, SI, SK
Cleaning and disinfection	
Obligatory	AT, BE, BG, CH, CZ, DK, EE, ES, FR, FI, SE, IE, IT, LT, LV, NO, NL, PL, RO, SI, SK, UK
Negative bacteriological result required before restocking	AT, BE, BG, CH, CZ, DK, EE, ES, FR, FI, IE, IT, LT, LV, NO, NL, RO, SI, SE, UK
Requirement of an empty period	AT (14 days), EE (3 weeks), ES (12 days after disinfection), FR (less than 30 days), N0 (30 days after disinfection), IT (30 days after disinfection)
Further investigations	
Epidemiological investigation is always started	BE, CZ, EE, ES, FI, FR, IE, IT, LV, NO, NL, RO,SK, SE, SI, UK
Feed suppliers are always included in the investigation	CZ, FI, NO, SE, IE, NL, UK, SI, SK, LV
Contact herds are included in the investigation	CZ, FI, FR, IE, NO, NL, SE, UK, LV
Vaccination	
Mandatory	AT (only for *S*. Enteritidis), BE, CZ
Recommended	RO[8]
Permitted	BG, CY, DK[9], EE[10], ES[11], IT , LT, LV, SI, SK, UK
Prohibited	CH, FI, FR[12], NO, SE

1. Minimum control measures are set out in Regulation (EC) 2160/2003, annex II (C).
2. In the United Kingdom, only flocks that are positive for *S*. Enteritidis or *S*. Typhimurium are compulsorily slaughtered.
3. Destruction of the hatching eggs.
4. Destruction of incubated eggs, not yet incubated eggs may be pasteurised.
5. In the Netherlands, only flocks that are positive for *S.* Enteritidis or *S.* Typhimurium are obligatory slaughtered.
6. In Slovenia, only flocks that are positive for *S*. Enteritidis or *S*. Typhimurium are obligatory slaughtered or destroyed.
7. In case of detection of *S*. Enteritidis, *S*. Typhimurium, *S.* Hadar, *S.* Virchow, *S*. Infantis in feedingstuffs.
8. In Romania vaccination against *Salmonella* could only be performed based on the CSVFS Directorate approval.
9. In Denmark, no vaccination occurs, as no vaccinations have been approved by the Danish Veterinary and Food Administration.
10. In Estonia, vaccination against *Salmonella* could only be performed based on the Veterinary and Food Board approval.
11. In Spain vaccination against the relevant *Salmonella* type is mandatory in meat production line breeder flocks entering in a house, where a flock was previously positive for the given Salmonella type.
12. In France, vaccination is prohibited in breeding flocks for the egg production line and selection meat line breeders.

Appendix Table SA5a.* Salmonella *monitoring programmes in laying hens* (Gallus gallus) *producing table eggs, 2009

Countries running an approved monitoring and control programme[1] according to Regulation (EC) No 2160/2003 and meeting at least the minimum sampling requirements set out by Regulation (EC) No 1168/2006[2]			
MSs with approved surveillance programme (Decision 2008/897/EC)		All MSs except FI, LT, SE	
Non-MS with approved surveillance programmes (ESA Decision No 364/07/COL)		NO	
MSs with EU co-financing (Decision 2008/897/EC as amended by Decision 2009/858/EC)		20 MSs except DK, FI, IE, LT, MT, SI, SE	
Countries with additional sampling (see Appendix Table SA5a)		AT, DK, EE, FR, LT, NL, PL, SK, UK	
Minimum requirement according to Regulation (EC) No 2160/2003 as ammended by Regulation (EC) No 1168/2006			
Rearing period		**Production period[3]**	
Day old chicks	Samples from the inside of the delivery boxes (internal lining/paper/crate material)	Week 24 ± 2 weeks	Feacal samples or boot swabs
		At least every 15th week thereafter	Feacal samples or boot swabs
2 weeks before moving	Faecal samples or boot swabs		
Diagnostic methods used			
ISO 6579:2002		AT, BG, CZ, EE, GR, IT, NO, PL, SE, SI[4], SK	
ISO 6579:2002, Annex D		LU	
ISO 6579:2002 / Amendment 1:2007		BE, FI, ES, LV, RO, UK	
AFNOR NF 47 100 and 47 101		FR	
Buffered Peptone water		PT	
Various bacteriological		DK, LT, UK	
No information		CY, DE, HU, IE, MT	

1. Non-MSs (EFTA members) must apply EU legislation according to Decision of the EEA Joint Committee No 101/2006.
2. Regulation (EC) 1168/2006 sets the Community targets for the reduction of the prevalence of certain *Salmonella* types in laying hen flocks of *Gallus gallus* and sets the testing scheme to verify the achievement of the Community targets for *S.* Enteritidis and *S.* Typhimurium.
3. Once a year, the competent authority sample one flock per holding comprising at least 1,000 birds .
4. ISO 6579:2002, Annex D:2007.

Appendix Table SA5b. Salmonella monitoring programmes in laying hens (Gallus gallus) producing table eggs, 2009 - additional sampling

Day old chicks		Rearing period		Production period	
Type of sample					
Meconium	AT, EE, PL, SK	Faecal samples	DK[1,2], LT, SK	Blood samples	NL[1]
		Dust samples	FR, UK[3]	Egg samples	DK[2]
		Blood samples	DK[1,2], NL[1]	Faecal samples collected more frequently than every 15th week	DK, IE, LT, SK

1. Sample size depends on flock size.
2. All flocks are sampled.
3. Additional dust samples taken by large proportion of UK producers on a voluntary basis before start of lay.

Appendix Table SA6. Control measures[1] taken in laying hens* (Gallus gallus) *producing table eggs in case of* Salmonella *infections, 2009

Control measures	Countries
Serovars covered	
All Serovars	AT[2], DK, FI, NO, LT, LU, SE[3]
S. Enteritidis and *S.* Typhimurium	AT, BE, BG, CH, CZ, EE, ES, LV, NL, IE, PL, RO, SK, SI, UK[4]
Restrictions on the flock	
Immediately following suspicion	AT, BE, BG, CZ, DK, EE, FR, IE, LV, NO, NL, PL, RO, SI, SE
Eggs covered by restrictions already on the basis of suspicion	AT, BE, DK, FR, IE, LV, NO, NL, PL, RO, SE, SI
Consequence for the flock	
Recovery or slaughter	
Slaughtered	ES, GR, IE, LU, PL, RO, SK
Flocks destroyed	LT
Sanitary slaughter	AT, BE, DK, FR
Destruction	CY, SE
Slaughter or destruction	BG, CH, EE, SI
Sanitary slaughter or destruction	NO
Slaughter and heat treatment or destruction	AT, CZ, FI, LV, SI
Treatment with antibiotics	PL
Consequence for the table eggs[1]	
Destruction	BG, CY, EE, SE[5]
Heat treatment	AT, BE, CH, CZ, DK, FI, IE[6], LT, NL[6], RO, SE[7]
Destruction or heat treatment	ES, FR, LU, LV, NO, PL, SK, SI, UK
Other consequences	
destruction)	DK, EE, LU, NO, SI[8], SE
Disposal of manure restricted	EE, FI, FR, NO, PL, SK, SI, SE
Cleaning and disinfection	
Obligatory	AT, BE, BG, CH, EE, FR, FI, DK, IE, LT, LU, LV, NO, NL, PL, RO,
Negative bacteriological result required before restocking	AT, BE, BG, CH, DK, ES, FR, FI, IE, LV, NO, NL, RO, SI, SE
Requirement of an empty period	AT (14 days), DK, EE (21 days), LU (21 days), NO (30 days)
Further investigations	
Epidemiological investigation is always started	BE, EE, ES, FR, FI, IE, LU, LV, NO, NL, RO, SE, UK, SI
Feed suppliers are always included in the investigation	AT, EE, FI, IE, LU, LV,NO, NL, SE, SI
Contact herds are included in the investigation	AT, EE, FI, FR, IE, LU, LV, NO, NL, SE
Intensification of the examination of non-infected flocks on the same farm	AT, DK, FI, FR, IE, LU, LV, NO, NL, SE
Vaccination	
Mandatory	AT[9], BE[10], CZ, HU
Recommended	BE[10]
Permitted	BG, DK[11], EE[12], ES[13], FR, LT, LV, RO[14], SK, SI, UK
Prohibited	CH, FI, NO, SE

Note: No measures are fixed in Directive 2003/99/EC.

1. Minimum control measures are set out in Regulation (EC) 2160/2003, annex II (D). By 1st January 2009, eggs originating from flocks with unknown health status, that are suspected of being infected or from infected flocks may be used for human consumption only if treated in a manner that guarantees the elimination of all *Salmonella* serotypes with public health significance in accordance with Community legislation on food hygiene.
2. In Austria, all serovars are covered in case of food-borne outbreaks.
3. In Sweden, for invasive serovars and non-invasive serovars different control strategies may be applied.
4. In the United Kingdom, all isolations of *Salmonella* must be reported.
5. Invasive *Salmonella.*
6. Eggs are pasteurised until the flock is destroyed.
7. Non- invasive *Salmonella.*
8. In Slovenia, cases of detection of *S*. Enteritidis or *S*. Typhimurium in feedingstuffs.
9. In Austria, vaccination against *S*. Enteritidis mandatory since 2009.
10. In Belgium, vaccination against *S*. Enteritidis is mandatory and vaccination against *S*. Typhimurium is recommended.
11. In Denmark, no vaccination occurs, as no vaccines have been approved by the Danish Veterinary and Food Administration.
12. In Estonia, vaccination against *Salmonella* could only be performed based on the Veterinary and Food Board approval.
13. In Spain, only in rearing period.
14. In Romania, vaccination against *Salmonella* could only be performed based on the CSVFS directorate approval.

Appendix Table SA7a. Salmonella *monitoring programmes in broiler flocks (Gallus gallus), 2009*

Countries running an approved monitoring and control programme[1] according to Regulation (EC) No 2160/2003 and meeting at least the minimum sampling requirements set out by Regulation (EC) No 646/2007[2]	
MSs with approved surveillance programme (Decision 2008/815/EC)	All MSs
Non-MS with approved surveillance programmes (ESA Decision No 364/07/COL)	NO
MSs with EU co-financing (Decision 2008/897/EC as amended by Decision 2009/858/EC)	All MSs except FI, LT, SE
Countries with additional sampling	DK[3]
Minimum requirement according to Regulation (EC) No 2160/2003 as ammended by Regulation (EC) No 646/2007	
Rearing period[4]	
Within 3 weeks of slaughter	At least two pairs of boot/sock swabs pooled into one sample[5]
Diagnostic methods used	
ISO 6579:2002	CZ, EE, ES, FI, FR, GR, IT, NO, PL, SE (faecal samples), SK, UK
Modified ISO 6579, Annex D	LU
Modified ISO 6579:2002	AT, CH, DE, SI
ISO 6579:2002 / Amendment 1:2007	BE, ES, FI (Flocks), LV (Flocks), RO
NMKL No 71:1999	FI
Bacteriological culture	DK, LT, UK, IE
Method in accordance with the OIE manual, 5th ed., 2004	SI

1. Non-MSs (EFTA members) must apply EU legislation according to Decision of the EEA Joint Committee No 101/2006.
2. Regulation (EC) 646/2007 sets the Community targets for the reduction of the prevalence of certain *Salmonella* types in broiler flocks and sets the testing scheme to verify the achievement of the Community targets for *S*. Enteritidis and *S*. Typhimurium.
3. In Denmark, all flocks are tested twice during rearing at 15-21 days and 7-10 days before slaughter.
4. Once a year, the competent authority sample at least one flock on 10% of holdings comprising at more than 5,000 birds.
5. Two pairs of boot/sock swabs might be replaced by one pair of boot/sock swabs and one sample of dust collected in multiple places in the broiler house.

Appendix Table SA7b.* Salmonella *monitoring programmes in broiler meat products, 2009

Slaughterhouse and cutting plant		Processing plants		At retail	
Type of sample					
Neck skin samples	AT, BE, CZ, EE, IE, LV, LT, RO, SE, SI, UK[1]	Depend on survey or own-control plans	DK, SE	Depend on survey or own-control plans	DK, SE, UK
Breast skin samples	NL	Fresh meat, minced meat, final products	AT, BE, EE, LT, LV	Fresh meat and/or, final products	AT, BE, EE, LT, LV
Carcass swabs	IE	Carcass, fresh meat, final products	IE	Fresh meat	NL, SI
At cutting plants: Crushed meat samples	DE, EE[2],FI[2], SE[2]	Final product	CZ, DE, IE	Final product	CZ, DE, IE
				Meat preparations, meat products,minced meat	SI[3]
Frequency of sampling					
Weekly	CZ, SI	Weekly	BE, CZ	Monitoring	DE[4], IE, NL
Every 2 weeks	IE	Surveys or own-control	DK, SE	Survey or own-control	DK, SE
Random	BE	Random and continuous	AT, EE	Random and continuous	AT, CZ, EE, IE, SI
Random and continuous	AT, EE, FI	Continuous	IE, LV	Continuous	LV, UK
Systematic and continuous	SE	Twice a year	IE	Weekly	BE
Continuous	LV	Random or routine, depend on programme	LT		
Each flock	IE, LT				
Each flock/batch	IT, NL, UK				
Diagnostic methods					
ISO 6579 (2002)		CZ, EE, ES, FI, FR, GR, NO, PL, SK, UK			
ISO 6579 (2002), Annex D		LU			
Modified ISO 6579 (2002)		AT, DE, SI			
ISO 6579 (2002) / Amendment 1:2007		BE, ES, RO			
NMKL No 71:1999		FI, SE (meat samples)			
Bacteriological culture		DK, LT, UK, IE			
Method in accordance with the O.I.E. Manual, 5th ed., 2004		SI			
Countries with no official monitoring, 2007					
		CZ, ES, IT[5], LU, PT[6], UK[1]			

1. Voluntary operator monitoring in the United Kingdom. All isolations of *Salmonella* must be reported.
2. Number of samples depend on flock size or slaughterhouse/cutting plant capacity.3. Voluntary operator monitoring.
4. In Germany, the food surveillance covers all level off the food chain.
5. In Italy, a monitoring programme is running in the Veneto Region.
6. In Portugal, a surveillance programme is running in the Beira Lotoral Region.

Appendix Table SA8. Measures taken in broilers* (Gallus gallus) *in case of* Salmonella *infections, -2009

Control measures	Countries
Serovars covered	
All Serovars	BE, DK, FI, LT, LU, NO, NL, SE[1]
S. Enteritidis and *S.* Typhimurium	AT, BG, CH, EE, ES, FR[2], IE, LV, RO, SI, SK, UK[3]
Restrictions on the flock	
Immediately following suspicion	DK, EE, FR, LU, NO, NL, RO, SI, SE
Consequence for the flock	
Slaughter	SK
Slaughtered and heat treated	CH, DK, FI, LT, LU, LV, NO, SI
Sanitary slaughter	AT, BE, IE, NL, UK
Destruction	FI, FR, LV, SE
Slaughter or destruction	BG, EE, IE, SK, UK
Other consequence	
Feedingstuffs are restricted (heat treatment or destruction)	EE, LU, NO, SE
Disposal of manure restricted	EE, FI, NO, SK, SI, SE
Cleaning and disinfection	
Obligatory	AT, BE, BG, CH, DK, EE, ES, FI, FR, LT, LV, NO, NL, SI, SE, ES, FR, SE
Negative bacteriological result required before restocking	AT, BE, BG, CH, CZ, DK, EE, ES, FI, FR, LU, NL, NO, RO, SI, SE
Requirement of an empty period	AT (14 days), EE (21 days), LU (21 days), NO (30 days after disinfection), DK, ES (12 days)
Further investigations	
Epidemiological investigation is always started	CZ, EE, ES, FI, FR, IE, LU, NO, SE, SK,
Feed suppliers are always included in the investigation	AT, EE, FI, IE, LU, NO, NL, SE
Contact herds are included in the investigation	EE, FI, FR, LU, NO, SE
Breeding flock that contributed to the hatch will be traced	AT, FI, FR, IE, LU, NO, NL, UK, SE
Vaccination	
Permitted	AT, CZ, EE[4], FR, LT, LU, LV, SI, SK, UK
Vaccine not registered	AT, BE, DK, ES
Prohibited	CH, FI, NO, SE

Note: No measures fixed in Directive 2003/99/EC.
1. In Sweden, for invasive serovars and non-invasive serovars different control strategies may be applied but are not used in practice.
2. In France, all isolation of *Salmonella* spp. must be reported.
3. In the United Kingdom, all isolations of *Salmonella* must be reported.
4. In Estonia, vaccination against *Salmonella* could only be performed based on the Veterinary and Food Board approval.

Appendix Table SA9. Salmonella *monitoring programmes in turkey breeders, 2009*

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 1992/117/EC							
Samples from the inside of the delivery boxes (internal lining/paper/crate material)	FI, NO, PL, SK, LT	At age of 4 weeks and 2 weeks before moving	Faecal samples	FI, NO , PL, SK, LT	Official sampling every 8 weeks	Meconium samples at the hatchery	PL, SK
Meconium	SE	At age of 4 weeks and 2 weeks before moving	2 pairs of sock samples	SE	At hatchery: every 2 weeks	Samples from the underlying papers of hatching baskets	FI
Dead chickens/destroyed chickens	PL, SK, LT				Every 2 weeks	Faecal samples	LT
					Every 2 weeks	5 pair of sock samples	NO, SE
					Offical sampling 3 times during production period	5 pair of sock samples	NO, SE
					Every 2 weeks	Dead chickens	PL, SK
					At holding: twice during laying period	Faecal samples	FI
Other sampling schemes							
Internal lining papers of delivery boxes	FR		Swabs/faeces	FR, NL		Swabs/faeces	FR, NL
Sample scheme approved by EU (Decision 96/389/EC)	IE	Every 4 weeks	Chicks, dust swab	FR	Every 4 weeks	On farm: Chicks, dust swab	FR
Samples from the lorry and 1 week after arrival: Wooswool samples	NL	Sample scheme approved by EU (Decision 96/389/EC)		IE	Sample scheme approved by EU (Decision 96/389/EC)		IE
					Hatchery, every hatch, every machine	Fluff samples	NL
					Every 4 weeks	At hatchery: Environmental	FR
					Hatchery	Samples of imported eggs	AT
Diagnostic methods used							
ISO 6579:2002		CZ, NO, PL, SE					
ISO 6579:2002 / Amendment 1:2007		FI					
Countries not providing detailed information about monitoring programmes							
No information available		CY, FR, DE, GR, HU, IE, LT, LU, MT, PT, ES					
No official surveillance programme		BG, CZ, DK, IT, NL, UK[1]					
No turkey breeder flocks present		AT, BE, EE, LV, SI					

1. In the United Kingdom monitoring programmes are voluntary. Farmers producing breeders are encouraged to monitor in the same way as for Gallus gallus under Regulation (EC) No 2160/2003. All isolations of *Salmonella* must be reported.

Appendix Table SA10. Salmonella monitoring programmes in turkeys, turkey meat and meat products, 2009

Day old chicks		Rearing period and before slaughter	
Type of sample			
Dust samples	IE	Faecal samples/boot swabs	AT, DK[1], FI, FR, NO, NL, RO, SE, SK, SI[3]
Chicks	NL	Dust samples	FR
Sampling based on the directive	PL	Sampling based on the directive	PL
Frequency of sampling			
Every two months	IE	1 – 3 weeks before slaughter	AT, DK, FI, NO, PL, SK, SI[3]
		Max 4 weeks before slaughter	NL
		2 weeks before slaughter	SE
Diagnostic methods used			
ISO 6579:2002		CZ, EE, FI, FR, IT, LT, LV, NO, PL, SE (faecal samples), SI, UK	
NMKL No 71:1999		FI, SE (meat samples)	
Modified ISO 6579:2002		AT, DE, IT	
ISO 6579:2002 / Amendment 1:2007		FI (Flocks), RO	
Depend on the laboratory and/or survey		DK	
Bacteriological culture		IE	
Countries not providing detailed information about monitoring programmes			
No information available		AT, CY, DE, GR, HU, LT, LU, MT, PT, SK, ES	
No official surveillance programme		BE, BG, CZ, IT, UK[7]	
No turkey production flocks present		EE, LV	

1. In Denmark, a monitoring programme exists however all turkeys are slaughtered abroad, hence no sampling.
2. Sample size and frequency depend on slaughterhouse and cutting plant capacity.
3. Voluntary operator monitoring.
4. Crushed fresh meat from cleaning tools, tables etc.; similar approach for ducks, geese and guinea fowl.
5. In Germany, the food surveillance covers all level of the food chain.
6. One year national monitoring programme.
7. Monitoring programme in the United Kingdom is voluntary. All isolations of *Salmonella* must be reported.

At slaughter and at cutting plants		Processing plants		Turkey meat and meat products at retail	
Fresh meat	AT, SI	Crushed meat	SE[2]	Fresh meat, meat preparations, meat products, minced meat	SI
		Fresh meat, minced meat, final products	AT, IE, LV, LT	Fresh meat, final products	EE, LV, LT
Neck skin samples	AT[2], LT, SE[2]			Final product	CZ, DE, IE
Dependent on survey	UK	Final product	IE, DE[5]	Depend on survey	DK, SE, UK
Carcasses	AT	Depend on survey	DK, UK	Fresh meat, meat preparations	DE[6]
Cloacal swabs and caecum	IT				
Crushed meat	FI[2, 4]				
Every Batch	SE	Twice yearly	IE	Surveys	DK
Random and continuos	FI	Surveys	DK, UK	Random and continuous	CZ, EE, SI
Continuous	AT	Continuous	AT, IE, LV, SE	Continuous	IE, LV
Monthly	SI	Random or routine, depend on programme	LT	Monitoring	DE, UK, LT
Every flock	LT				
Every 2 weeks	SI				

Appendix Table SA11. Salmonella *monitoring programmes in duck breeders, 2009*

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 1992/117/EC							
Dead chickens	PL, SK, LT	At age of 4 weeks and 2 weeks before moving	Faecal samples	NO, PL, SK, LT, SE	Every 2 weeks	Dead chickens	PL, SK
Samples from the internal linings of the delivery boxes	NO, PL, SK, LT				Every 2 weeks	Sock samples	NO, SE
Meconium	SE				Every 2 weeks	Faecal samples	LT
Each flock is sampled six times a year in accordance with plan approved by Decision 96/389/EC	IE		Each flock is sampled six times a year in accordance with plan approved by Decision 96/389/EC	IE	Official sampling - 3 times during the production period		NO, SE
					Official sampling every 8 weeks	Meconium samples at the hatchery	PL, SK
Other schemes							
Internal lining papers of delivery boxes	FR	At 2, 10 weeks and 2 weeks before moving	On farm: Faecal and litter samples, dust swab	FR[1]	Every 2 month	On farm: Faecal and litter samples, dust swab	FR[1]
						In hatchery: Environmental swab	FR[2]
Diagnostic methods used							
ISO 6579:2002		NO, PL, LT, SE (faecal samples)					
NMKL No 71:1999		SE (meat samples)					
Countries not providing detailed information about monitoring programmes							
No information available		AT, CY, FI, FR, DE, GR, HU, IE, LT, LU, MT, NL, PT, SI, ES					
No official surveillance programme		BE, BG, CZ, DK, IT, SI, UK[3]					
No duck breeder flocks present		EE, LV					

1. In France, 1 gauze swab (the sampling method consists in wiping 5 different sites of the poultry house).
2. In France, 1 gauze swab (the sampling method consists in wiping the wall of the hatching cabinets or the lining pads of 5 different hatching trays).
3. In the United Kingdom monitoring programmes are voluntary. Farmers producing breeders are encouraged to monitor in the same way as for *Gallus gallus* under Regulation (EC) No 2160/2003. All isolations of *Salmonella* must be reported.

Appendix Table SA12. *Salmonella* monitoring programmes in geese breeders, 2009

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 1992/117/EC							
Samples from the internal linings of the delivery boxes	NO, PL, SK	At age of 4 weeks and 2 weeks before moving	Faecal samples	NO, PL, SK, SE	Every 2 weeks	Dead chickens	PL, SK
Dead chickens	PL, SK				Every 2 weeks and once in between production cycles	5 pair of sock samples	NO[1]
Meconium	SE				Every 2nd week	Sock samples	SE
					Official sampling every 8 weeks	Meconium samples at the hatchery	PL, SK
Other schemes							
Internal lining papers of delivery boxes	FR	At 2, 10 weeks and 2 weeks before moving	On farm: Faecal and litter samples, dust swab	FR	Every 2 month	On farm: Faecal and litter samples, dust swab	FR
						In hatchery: Environmental swab	FR
Diagnostic methods used							
ISO 6579:2002		CZ, NO, PL, SE					
Countries not providing detailed information about monitoring programmes							
No information available		AT, CY, FI, DE, GR, HU, IE, LT[2], LU, MT, NL, PT,ES					
No official surveillance programme		BE, BG, CZ, DK, IT, SI, UK[3]					
No geese breeder flocks present		EE, LV					

1. Official sampling twice during production period.
2. In Lithuania there are no breeding flocks at the moment. Lithuania applies general monitoring programme for poultry.
3. In the United Kingdom monitoring programmes are voluntary. Farmers producing breeders are encouraged to monitor in the same way as for *Gallus gallus* under Regulation (EC) No 2160/2003. All isolations of *Salmonella* must be reported.

Appendix Table SA13. **Salmonella** *monitoring programmes in ducks and geese – production level, 2009*

Day old chicks		Rearing period and before slaughter		At slaughter	
Type of sample					
Sampling based on the Directive 2003/99/EC	PL	Faecal samples/ boot swabs	AT, DK[1], NO, SE	Carcass samples	AT, IE
		Sampling based on the Directive 2003/99/EC	PL	Sampling based on the Directive 2003/99/EC	PL
		Cloacal swabs	AT	Neck skin samples	AT[2], SE
Frequency of sampling					
		1 – 3 weeks before slaughter	AT, DK, NO, PL, SE		
Diagnostic methods used					
ISO 6579:2002	NO, PL, LT, SE				
NMKL No 71:1999	SE (neck skin)				
Countries not providing detailed information about monitoring programmes					
No information available	AT, CY, FI, FR, DE, GR, HU, LT, LU, MT, NL, PT, SK, ES				
No official surveillance programme	BE, BG, CZ, IT, SI, UK[3]				
No duck and geese production flocks present	EE, LV				

1. In Denmark, from 2007 all flocks are slaughtered abroad hence no sampling at the moment.
2. In Austria, flocks with positive findings in boot swabs (and if the carcasses is not subject to heat-treatment).
3. Monitoring programme in the United Kingdom is voluntary. All isolations of *Salmonella* must be reported.

Appendix Table SA14.* Salmonella *monitoring programmes in pigs, 2009

Breeding and multiplying herds - at farm		Fattening herds – at farm		Fattening herds – at slaughter	
Type of sample					
Blood samples	DK	Blood samples	BE[1]	Meat juice	DE[2], DK[3], UK[4]
Faecal samples/ boot swabs	CZ, DK[5], EE [6], FI[6], NO, SE	Faecal samples/ boot swabs	DK[5], EE[6], FI, NL, NO, SE[7]	Faecal samples/ boot swabs	DK[1], ES
Carcass/rectal swabs/litter/feed	SI	Carcass/rectal swabs/litter/feed	SI	Lymph nodes	BG, EE, ES, FI[1], LU, NO[1, 8], SE[1]
				Fresh meat	SI
				Carcass swabs	BE, DK, EE, FI[1], LU, NO[1, 8], SE[1]
Frequency of sampling					
Monthly	DK	Clinical suspicion	FI, NO, SE, SI, SK	Clinical suspicion	NO, SE
Clinical suspicion	FI, NO, SE, SI, SK	Random samples	NL	Continuous, random samples	BE, BG, DK, EE, ES, FI, NO, SE, SI
Once a year – all elite herds	FI, NO, SE	Every four months	BE		
Twice a year - all sow herds	SE				
Diagnostic methods used					
Modified ISO 6579:2002		AT, LT, SE (faecal samples)			
ISO 6579:2002		BG, EE, FI, GR, LU, NL, SI, SK, ES			
Mix ELISA		BE, DK, UK			
NMKL No 71:1999		FI, NO, SE (at slaughter)			
Strategies in countries with no official sampling strategies					
No official monitoring		CY, FR, GR, IT[9], LV, PL, SK, LT, UK[4]			

Note: Monitoring is not compulsory according to Directive 2003/99/EC.
1. Sample size depends on slaughterhouse capacity or farm capacity.
2. In Germany, meat juice monitoring by Quality control systems of meat producers.
3. In Denmark, all herds producing more than 200 pigs for slaughter per year are monitored.
4. In the United Kingdom, sampling is voluntary. All isolations of *Salmonella* must be reported.
5. In Denmark, pen feacal sampling is carried out if serological results from the blood samples (breeding and multiplying herds) and meat juice samples (fattening pigs) are too high.
6. In Finland and Estonia, all pigs sent to semen collection centres have to be examined for *Salmonella* with negative results.
7. In Sweden, pen faecal samples herds are affiliated to voluntary health control program.
8. In Norway, sows from multiplying herds are sampled in the same way as slaughter pigs at slaughter.
9. In Italy, a monitoring programme is running in the Veneto Region.

Appendix Table SA15. Measures taken in pig herds in case of* Salmonella *infections or* Salmonella *findings, 2009

Control measures	Countries
Serovars covered	
All Serovars	AT[1], BE[2], DK, EE, FI, LU, SE, NO, UK[3], SI
Only *S*. Enteritidis, *S*. Typhimurium	CZ
Restrictions on the farm	
Animal movement prohibited	FI, SE, NO, SI[4]
Isolation of *Salmonella* positive animals	EE, FI, NO, SE, SI[4]
Person contacts restricted	EE, LU, NO, SI[4], SE
Advise to the farm for controlling the infection	BE[2], FI, SE, NO, UK, SI[4]
Consequence for slaughter animals	
Slaughterhouse is informed on positive animals	BE[2], EE, FI, LU, NO, SE
Sanitary slaughter	DK[5], EE, FI, NO[6], SE[7]
Contaminated food withdrawn from market	NO, SE
Treatment with antibiotics	EE, SI
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	LU, SE, SI
Treatment of manure / sludge	EE, DK[5], LU, SI[4] SE, NO
Public health advice	UK
Cleaning and disinfection obligatory	EE, FI, LU, NO, SI[4], SE
Repeated negative testing necessary before lifting the restrictions[8]	EE, FI, SE, NO, SI[9]
Reduction in payment for positive slaughter pigs	DK
Further investigations	
Epidemiological investigation is started	BE[2], DK, EE, FI, LU, NO, SI[4], SE
Feed suppliers are included in the investigation	DK, EE, FI, LU, NO, SE
Contact herds are included in the investigation	DK, FI, LU, NO, SE
Vaccination	
Permitted	BG, CZ, LU, SI[4], UK
No vaccination occur	AT, BE[10], DK[10], SE
Prohibited	EE, FI, NO

Note: No measures fixed in Directive 2003/99/EC.

1. In Austria, the carcasses contaminated with *Salmonella* are unfit for human consumption and must be removed. In all slaughtered animals descending from the same holding a post-mortem bacteriological examination has to be initiated.
2. In Belgium, measures only for *Salmonella* risk herds (3 consecutive mean S/P ratio's of > 0,6).
3. Monitoring programme in the United Kingdom is voluntary. All isolations of *Salmonella* must be reported.
4. Measures are taken in case of clinical signs.
5. In Denmark, herds with a high serological *Salmonella* index.
6. In Norway, samples from all sanitary slaughtered animals must be tested for *Salmonella.* If positive, the carcase is condemned.
7. In Sweden, samples are collected from all sanitary slaughtered animals.
8. Typically, two consecutive samplings one month apart.
9. Two consecutive samplings 7 days apart.
10. No vaccine has been approved.

Appendix Table SA16. Salmonella monitoring programmes in pigs and pig meat, 2009

Slaughterhouse and cutting plant		Processing plants		Pork and pork products at retail	
Type of sample					
Meat juice	UK[1]	Surface swabs	HU, LU	Depend on survey or own-control plans	DK[2], SE[2], UK
Surface swabs	BE, CZ, DK[3], EE[3], FI[3], DE, NO[3], SE[3]	Depend on survey or own-control plans	DK[2], SE[2]	Fresh meat	DE[4], LU, NL
Fresh meat	EE[3], HU[5], SI	Fresh meat	EE, HU[4], IE, LV	Final product	CZ, DE, IE, LU
Lymph nodes	BG, EE[3], FI, NO[3], SE[3]	Final product	CZ, DE, EE, IE, LU, SI	Minced meat	AT, DE[4], LU
Cutting and minced meat samples	BE, NO[6]	Minced meat, meat products, meat preparations	BE	Meat preparations	DE[4], LU, NL
Crushed meat samples (cutting plants)	FI[3], NO[3,7], SE[3]			Minced meat, meat products, meat preparations	BE, LU
Not reported	ES			Meat products, meat preparations (meat from bovine animals and pig)	SI
				Fresh meat, final	AT, EE, LV, LT , LU
		Not reported	ES	Not reported	ES
Frequency					
Random and continuous	BG, DK, EE, ES, FI, HU, NO, SE, SI[4]	Random and continuous	CZ, DE, EE, ES, LV, LU, SI	Random and continuous	AT, CZ, DE, EE, ES, LU, LV, NL, SE, SI
Weekly	BE	Random	BE	Weekly	BE
Monthly	CZ	Continuous	IE	Continuous	IE
Diagnostic methods used					
Modified ISO 6579:1999		AT, DE, IT			
Belgian official method SP-VG-M002		BE			
ISO 6579:2002		BG, CZ, EE, FI, HU, IT, LV, SI, SE, ES			
Depend on the laboratory and/or survey		DK			
NMKL No 71:1999		FI, NO, SE			
Any method according to Comm. Decision 2003/470		SE			
Bacteriological culture		IE			

Note: Monitoring is not compulsory according to Directive 2003/99/EC.
In this table priority is given to slaughterhouse sample based approaches; farm based approaches at slaughterhouse may be described in Table SA14.
1. Voluntary monitoring and control scheme in the United Kingdom.
2. Sampling by local authorities.
3. Sample size and frequency depend on slaughterhouse capacity.
4. Frequency of sampling depends on slaughterhouse and cutting plant capacity.
5. In Hungary, sampling strategy is based on the previous years production.
6. Sampling according to Directive 94/65/EC.7. Samples collected from cutting equipment, cleaning tools, tables etc.

***Appendix Table SA17. Salmonella* monitoring programmes in cattle and bovine meat, 2009**

Breeding herds - at farm		Cattle - at farm		Slaughterhouse and cutting plant	
Type of sample					
Faecal samples	EE[1], FI[1], LU	Faecal samples	DK[2], CZ, EE[3], FI, DE, NL, NO, SE, SK, SI[4], UK[5]	Carcass swabs	CZ, DK[6], EE[6], FI[6], NO[6], SE[6]
		Bulk milk/Blood samples	DK	Lymph nodes at slaughter	FI[6], NO[6], SE[6]
		Organ samples	SI[4], UK[5]	Fresh meat at cutting plants	AT, HU, SI
				Crushed meat samples[8] at cutting plants	EE[6],FI[6], NO[6], SE[6]
				Faeces (at slaughterhouse)	DE, ES, SK
				Minced beef	AT, BE
Frequency of sampling					
		Every three month	DK	Random	BE
		Once a year	NL	Monthly	CZ
		Clinical suspicion	FI, DE, LU, NO, CZ, SK, SE, SI[4]	Random and continuous	AT, EE, DK, DE, FI, NO, SE, SI[5], ES
				Clinical suspicion	CZ, DE
Diagnostic methods used					
Modified ISO 6579:2002			AT, CZ, DE, EE, FI, FR, HU, IT, SE, SK, SI, ES, LT		
ISO 6579:2002			CZ, EE, FI, GR, LU, LV, SK		
ISO 6579:2002, Annex D			LU		
Mix-ELISA			DK		
Belgian official method SP-VG-M002			BE		
NMKL No 71:1999			FI, NO, SE		
Other approved methods according to Decision 2003/470/EC			SE		
Bacteriological culture			IE		
Strategies in countries with no official sampling strategies, 2009					
No official monitoring			BE, BG, CY, CZ, FR, GR, IT[10], PL, SK, UK[11]		

Note: Monitoring is not compulsory by Directive 2003/99/EC.

1. In Estonia and Finland, all animals sent to semen collection centres have to be examined for *Salmonella* with negative results.
2. In Denmark, when requested by the farmer.
3. In Estonia, sample size depend on herd size.
4. In Slovenia, sampling of calves.
5. Frequency of sampling depends on slaughterhouse and cutting plant capacity.
6. Sample size and frequency depend on slaughterhouse and cutting plant capacity.
7. Sampling by local authorities.
8. Samples collected from cutting equipment, cleaning tools, tables etc.
9. One year national monitoring programme.
10. In Italy, a monitoring programme is running in the Veneto Region.
11. In the United Kingdom, sampling is voluntary. Reporting of isolation of *Salmonella* in all farmed animals is statutory.

Processing plants		Beef at retail	
Depend on survey or own-control plans	DK[7], SE[7]	Depend on survey or own-control plans	DK[7], SE[7], UK[7]
Scrapings	SE	Minced beef	AT, BE, EE
Fresh meat, minced meat, final products	AT, BE, DE, EE, ES, IE, HU, LU	Fresh meat	NL
Final product	CZ, DE, HU, SI	Fresh meat, final products	AT, EE, HU, LT
		Final product	CZ, DE, IE
		Fresh veal meat and meat preparations from veal	DE[9]
		Meat preparations,meat products	BE, SI, LU, LV
Random	BE	Random	BE
Random and continuous	AT, CZ, EE, DE, HU, ES, SI	Random and continuous	AT, CZ, EE, HU, DE, ES, SI
Sampling according to Directive 94/65/EC	NO	Sampling distributed evenly throughout the year	LV
Continuous	IE	Continuous	IE

Appendix Table SA18. Measures to take in cattle herds in case of* Salmonella *infections or* Salmonella *findings, 2009

Control measures	Countries
Serovars covered	
All Serovars	AT, DE, DK, EE, FI, NO, SE, UK[1], SI
Only *S*. Enteritidis, *S*. Typhimurium	CZ
Restrictions on the farm	
Animal movement prohibited	FI, DK (Multiresistant *S*. Typhimurium DT 104), SE, NO, SI[2]
Isolation of *Salmonella* positive animals	EE, FI, NO, SE, SI[2]
Person contacts restricted	EE, NO, SE, SI[2]
Restriction on marketing of milk	FI, NO, SE
Pasteurisation of milk obligatory	EE, FI, NO, SE
Advise to the farm for controlling the infection	DK, FI, NO, SK, SE, UK, SI[2]
Consequence for slaughter animals	
Slaughterhouse is informed on positive animals	EE, FI, NO, SE
Sanitary slaughter	EE, DK, FI, NO[3], SE[4]
Contaminated food withdrawn from the market	AT, NO, SE
Destruction of positive animals	DE, SE (in some instances)
Treatment with antibiotics	EE, SI[2]
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	LU, SK, SE, SI[2]
Treatment of manure / sludge	EE, DK, NO, SK, SE, SI[2]
Cleaning and disinfection obligatory	EE, FI, NO, SE, SI[2]
Repeated negative testing necessary before lifting the restrictions[5]	EE, DE, DK, FI, NO, SE, SI[2,6]
Public health advise	UK
Further investigations	
Epidemiological investigation is always started	DK (Multiresistant *S*. Typhimurium DT 104), EE, FI, NO, SK, SE, UK[7], SI[2]
Feed suppliers are always included in the investigation	EE, FI, NO, SE
Contact herds are included in the investigation	DK (Multiresistant *S*. Typhimurium DT 104), FI, NO, SE
Vaccination	
Permitted	CZ, DE, LU, UK (*S.* Dublin), SI
No vaccination occur	AT, BE[8], DK[8], SE
Prohibited	EE, FI, NO

Note: No measures fixed in Directive 2003/99/EC.
1. Scanning surveillance in the United Kingdom in 2009. All isolations of *Salmonella* must be reported.
2. Measures are taken in calves in case of clinical signs.
3. In Norway samples from all sanitary slaughtered animals must be tested for *Salmonella*. If positive, the carcase is condemned.
4. In Sweden, all sanitary slaughtered animals are analysed for *Salmonella.*
5. Typically, two consecutive samplings one month apart.
6. Two consecutive samplings 7 days apart.
7. In Northern Ireland, when *S.* Enteritidis, *S.* Typhimurium is isolated, or any serotype is isolated in milk.
8. No vaccine has been approved.

Appendix Table SA19. Notification on Salmonella in humans (V=Voluntary, O=Other), Gallus gallus, other animals and food, 2009

Country	Notifiable in humans since	Notifiable in *Gallus gallus* since	Notifiable in other animals since	Notifiable in food since
Austria	1947[1, 2]	1998[3]	1994[4]	1975
Belgium	< 1999 V	1998	1998	2004
Bulgaria	yes	2008	2007	-
Cyprus	yes	yes	yes	-
Czech Republic	yes	yes	yes	-
Denmark	1979	no	1993[4]	-
Estonia	1958	2000	2000	2000
Finland	1995[5]	1970's	1970's	1970's
France	1986 V	1995	-	yes
Germany	yes	yes[6]	yes	yes
Greece	yes	1992	1980	-
Hungary	1959	no	no	1984
Ireland	1948	1996	1992	no
Italy	1990	1954	1954	1962
Latvia	1958	1967	1967	2002
Lithuania	1962	yes	yes	-
Luxembourg	yes	-	1985	-
Malta	yes	-	-	-
Netherlands	no[7]V	yes	yes	-
Poland	1961	1999[8]	-	-
Portugal	yes	yes	yes	-
Romania	yes	yes[9]	no	RASFF
Slovakia	yes	2004	yes[4]	2000
Slovenia	1949	1991[10]	1991[10]	2003
Spain	1982 V	1994	1994	1994
Sweden	1968	1961	1961	1961
United Kingdom	no O	1989[11]	1989[11]	no
Iceland	yes			
Liechtenstein	yes			
Norway	1975	1965	1965	1995[12]
Switzerland	yes	1966	1966	-

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Austria, clinical cases notifiable since 1996.
3. In Austria, detection of *S.* Enteritidis, *S.* Typhimurium, *S.* Pullorum and *S.* Gallinarum notifiable in breeding animals.
4. Clinical cases notifiable.
5. In Finland, notifiable also before 1995, but legislation changed in 1995.
6. In Germany, as in all MS, controls and reports are notifiable according to Reg 1168/2006.
7. In the Netherlands, only notifiable if the patient is working in the food industry, hotels, restaurants or cafés, treating or nursing other persons, or belongs to a group of two or more persons which eat/drink the same food within a period of 24 hours.
8. In Poland, *S.* Enteritidis, *S.* Typhimurium, *S.* Pullorum and *S.* Gallinarum are notifiable in poultry.
9. In Romania, only findings of *S.* Enteritidis and *S.* Typhimurium in poultry is notifiable.
10. In Slovenia, the year of independence, however this disease was notifiable before 1991.
11. Reportable diseases (in animals) are those where there is a statutory requirement to report laboratory confirmed isolation of organisms of the genus *Salmonella* under the Zoonoses Order 1989.
12. In Norway, only those detected in the national control programme.

Appendix Table CA1.* Campylobacter *monitoring, surveys and diagnostic methods used for humans animals and food, 2009

Country	Human Sample type	Diagnostic	*Gallus gallus* Sample type	Diagnostic
Austria	Faecal	Bacteriology	At slaughter: Caeca	Bacteriology, ISO 10272-1:2006(E)
Belgium	-	-	-	-
Bulgaria		Bacteriology	At slaughter: Caeca	
Cyprus	-	-	-	-
Czech Republic	-	-	At slaughter: Intact caeca	ISO 10272:1997
Denmark	Faecal	Bacteriology	At slaughter: Clocal swabs	PCR
Estonia	Faecal	Bacteriology	At slaughter: Intact caeca	ISO 10272 -1:2006 (E)
Finland	-	Bacteriology	At slaughter: Caeca	NMKL 119:2007 w/no enrichment
France	Faecal	Bacteriology	At slaughter: Caeca	ISO 10272
Germany	-	-		
Greece	-	-	-	-
Hungary	Faecal	Bacteriology	-	-
Ireland	-	-	Carcass	Bacteriology
Italy	-	-	At slaughter: Cloacal swabs	Bacteriology
Latvia	-	-	In 2009, there was no control programme in place for the thermophilic *Campylobacter* in food and animals.	
Lithaunia	-	Bacteriology	At slaughter: Cloacal and neck skin	Bacteriology
Luxembourg	-	-	Meat	Vidas,conf. Bacteriology
Netherlands	-	-	-	-
Poland	Faecal	Bacteriology	-	-
Portugal	-	-	-	-
Romania				
Slovakia	Faeces or blood	Bacteriology	-	-
Slovenia	Faecal	Bacteriology	At slaughter: Caeca	ISO 10272-1:2006
Spain	-	Bacteriology	At slaughter: Caeca	ISO 10272/PCR
Sweden	Faeces and blood	Bacteriology	At slaughter: Caeca	ISO 10272
United Kingdom	Faecal	Bacteriology	At slaughter: Caeca and neck skin	ISO 10272:2006
Norway	Faecal	Bacteriology	At the farm, before slaughter: Faeces At slaughter: Caeca	At the farm, before slaughter: PCR At slaughter: NMKL 119:1990 (without enrichment)
Switzerland	-	-	At slaughter: Cloacal swabs	Bacteriology

Broiler meat Sample type	Diagnostic	Other sample type	Diagnostic
At slaughter: Carcass. At processing/retail: Fresh and meat products	Bacteriology, ISO 10272-1:2006(E)	Retail: Raw milk, cheeses made from raw milk Cattle and pig: Colon	ISO 10272:1995 or enrichment method Bacteriology (in cattle at first enrichment)
At slaughter/ processing/ retail: Carcass, cut and meat preparation	SP-VG-M003 (enrichment, bacteriology and PCR)	Pork at slaughter/ processing/ retail: Carcass and minced meat	SP-VG-M003 (enrichment, bacteriology and PCR)
At slaughter/processing/ retail: Carcass, cut and meat preparation		no	no
-	-	-	-
At slaughter: Carcass At processing/retail: Fresh and meat products	ISO 10272:1995	Retail: Cheeses	ISO 10272:1995
At processing/retail: Depends on survey	-	-	-
At slaughter: Carcass (neck skin at laboratory), Intact caeca At retail: Meat preparation, meat products, minced meat	Slaughter/ processing: ISO 10272-1:2006	Pig meat and bovine meat at retail	Retail: NMKL 119:1990
At slaughter: Carcass (neck skin) At retail: Fresh meat	ISO 10272	-	-
Fresh meat, meat preparations	ISO 10272	Food surveillance	ISO 10272
-	-	-	-
-	-	-	-
At slaughter/processing: carcass At processing/retail: Meat products	Bacteriological culture	Retail/Processing: Pork & Turkey meat products Retail: Bovine meat products, Processed foods and prepared dishes	Various bacteriological methods
-	-	-	-
In 2009, there was no control programme in place for the thermophilic *Campylobacter* in food and animals.	-	-	-
At processing/retail: Depends on survey	-	-	-
Meat	Vidas/bacteriology	Meat	Vidas/bacteriology
at retail	ISO 10272:2006	Raw meat at retail; turkey at retail	ISO 10272:2006
-	-	-	-
-	-	-	ISO 10272, typing by Lior method
At slaughter: Neck skin	Bacteriology, ISO 10272-1:2006(E)		
-	-	-	ISO 10272
At slaughter: Neck skin, fresh meat At retail: Fresh meat	ISO 10272-1:2006 ISO 10272-2:2006	At retail: Turkey meat, prepared dishes	ISO 10272-1:2006
At slaughter/processing/ retail: Fresh meat and skin	ISO 10272:2006	-	-
At retail	NMKL 119:1990	-	NMKL 119:1990, ISO
At retail: Fresh refrigerated meat	ISO 10272:2006	-	-
At retail: Fresh meat	NMKL 119:1990	-	-
At retail: Fresh meat	Swiss food manual	-	-

Appendix Table CA2. Notification on* Campylobacter *in humans (V=Voluntary, O=Other), animals and food, 2009

Country	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1996	no	1975
Belgium	2000 V	1998	2004
Bulgaria	yes	-	-
Cyprus	2005	-	-
Czech Republic	yes	no	yes
Denmark	1979	no	no
Estonia	1988	2000	yes[1]
Finland	1995	2004[2]	no[3]
France	2002 V	-	-
Germany	2001	yes[4]	yes
Greece	-	no	no
Hungary	1998	no	no
Ireland	2004	1992	no
Italy	1990 V	no	1962
Latvia	1999	yes	2004
Lithuania	1990	>30 years	-
Luxembourg	yes	no	-
Malta	yes	-	-
Netherlands	yes V	yes	yes
Poland	2004	-	-
Portugal	-	no	-
Romania	yes	no	-
Slovakia	1980's	no	2000
Slovenia	1987	no	2003
Spain	1989 V	1994	1994
Sweden	1989	no	no
United Kingdom	no O	no	no
Iceland	yes	-	-
Liechtenstein	yes	-	-
Norway	1991	yes[4]	yes[4]
Switzerland	yes	1966	no

1. In Estonia, only *C. jejuni.*
2. In Finland, *Campylobacter* notifiable in *Gallus gallus* only.
3. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
4. In Germany, *Campylobacter* is notifiable in cattle (veneric infection).
5. In Norway, only positive samples from *Gallus gallus* detected in the national control programme.

Appendix Table LI1. Monitoring programmes and diagnostic methods for Listeria monocytogenes, *2009*

Country	Surveillance	Frequency and type of samples	HACCP	Diagnostic method	Human diagnostic	Survey on cheeses from raw and thermised milk
Austria	No monitoring programme. Surveys by the local authorities	-	yes	ISO 11290-1:1996 (E):1996,1998	Isolation of *L. monocytogenes* from blood, cerebral spinal fluid, vaginal swabs	-
Belgium	Monitoring programme started in 2004	Fresh meat and final products sampled weekly	-	Afnor validated VIDAS LMO2 followed by a chromogenic medium	-	-
Bulgaria	No monitoring programme.		yes			yes
Cyprus	-	-	-	-	-	-
Czech Republic	Monitoring according to the Decree of the Ministry of Health No. 132/2004 Coll	-	yes	ISO 11290-1:1996 (E):1996,1998	-	yes
Denmark	No monitoring programme. Surveys by the local authorities	-	-	-	Bacteriology	yes
Estonia	No monitoring programme. Surveys by the local authorities	Random sampling	-	ISO 11290	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	-
Finland	Survey on gravad and cold-salted fishery products	Monthly sampling	-	ISO 11290-1:1996 /Amd.1:2004(E)and ISO 11290-2:1998 /Amd.1:2004(E)	Bacteriological culture	-
France	Official monitoring programme on meat products at retail	Random sampling	yes	ISO 11290-1 (detection) or ISO 11290-2 (enumeration) or AFNOR alternative methods validated against reference methods	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid.	no
Germany	Surveillance, surveys and own-control	Food surveillance: Random sampling	-	-	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	Food surveillance: Random sampling
Greece	No monitoring programme. Surveys by the local authorities	Routine and target sampling	-	-	-	-
Hungary	Monitoring milk products (EU requirements) based on Directive 92/46	-	-	-	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	-
Ireland	Surveillance in RTE foods. Survey on pre-packed sandwiches. Survey on cooked meat slicers (swabs)	Continuous Depend on survey	no	Bacteriological culture	-	no
Italy	-	-	yes	-	-	-
Latvia	No monitoring programme for animals. State surveillance programme for food.	Food - target sampling	yes	ISO 11290; AR; Bacteriological culture	Isolation of *L.* monocytogenes from blood and cerebral spinal fluid; serology	yes
Lithuania	-	-	-	-	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	-
Luxembourg	-	Meat and meat products	-	BRD:07/04-09/98+ BRD:07/05-09/01	-	-
Malta	Survey on cheese	-	-	-	-	-
Netherlands	Survey on raw meat; survey on smoked fish	Random sampling	-	ISO 11290	-	-
Poland	-	-	-	-	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid, articular or pericardial fluid	-
Portugal	Surveillance in raw milk and milk cheese	-	-	ISO 11290	-	-
Romania	Surveillance in ready-to-eat food for infants and special medical purposes, minced meat, meat preparations and meat products to be eaten raw, fish products, raw milk from milk industry, milk products from raw milk.			ISO 11290-1,2/2000 A1/2005		yes
Slovakia	No monitoring programme. Surveys by the local authorities	-	-	ISO 11290	Isolation of *L. monocytogenes*	-
Slovenia	No active monitoring programme for animals. Annual monitoring programme for food. In 2009 - sampling of RTE meat products (at processing) and different RTE roducts (at retail).	Depend on monitoring programme.	yes	ISO 11290-1:1996 (E):1996,1998 ISO 11290-2:1998	Isolation of *L. monocytogenes*	yes
Spain	-	-	-	ISO 11290-1:1996 ISO 11290-2:1998	Isolation of *L. monocytogenes* from a normally sterile site.	-
Sweden	No official programme. Surveys by the local authorities	Depend on survey	surveys	NMKL 136:2004, SLO METHOD	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	-
United Kingdom	No monitoring programme. National and regional surveys by the local authorities	Depend on survey	surveys	BS EN ISO 11290	culture	yes
Norway	No monitoring programme. Surveys. Obligatory own-check of certain products of milk and fish	Depend on survey	yes	NMKL 136	Isolation of *L. monocytogenes* from a normally sterile site.	-
Switzerland	Annual monitoring programme for cheeses	Random sampling	yes	ISO 11290-1 ISO 11290-2	Isolation of *L. monocytogenes*	

Appendix Table LI2. Notification of Listeria *in humans (V=Voluntary), animals and food, 2009*

Country	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1]	no	1975
Belgium	< 1999[2] V	1998	2004
Bulgaria	yes	-	-
Cyprus	2005	-	-
Czech Republic	yes	yes	-
Denmark	1993	no	-
Estonia	2003	2000	2000
Finland	1995	1995[3]	no[4]
France	1998	no	1994
Germany	yes	yes	yes
Greece	yes	1980	-
Hungary	1998	no	2003
Ireland	2004	-	no
Italy	1990	no	1962
Latvia	1990	yes	2003
Lithuania	1998	>30 years	-
Luxembourg	yes	no	no
Malta	yes	-	-
Netherlands	yes[5]	yes	yes
Poland	1966	-	-
Portugal	-	no	-
Romania	yes	no	-
Slovakia	yes	yes	2000
Slovenia	1977	<1991[6]	2003
Spain	1982 V	1994	1994
Sweden	1969[7]	yes	no
United Kingdom	yes V	no	no
Iceland	yes	-	-
Liechtenstein	yes	-	-
Norway	1975	1965	no
Switzerland	yes	1966	-

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Belgium, in the Flemish Community.
3. In Finland, notifiable also before 1995, but legislation changed in 1995.
4. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
5. Notification is mandatory since December 2008.
6. In Slovenia, the year of independence, however this disease was notifiable before 1991.
7. In Sweden, only clinical cases notifiable.

Appendix Table TB-BR1. Status as officially free of bovine brucellosis (OBF), officially free of* B. melitensis *in sheep and goats (ObmF) and officially free of bovine tuberculosis (OTF), 2009

Country	Bovine brucellosis		*Brucella melitensis*		Bovine tuberculosis	
	OBF[1]	Comments	ObmF[2]	Comments	OTF[1] since	Comments
Austria	1999	-	2001	-	1999	
Belgium	2003	No cases since 2000	2001	-	2003	
Bulgaria	no	No cases since 1958	-		no	
Cyprus	no	Never detected in domestic animals, imported cases in 1921 and 1932	no	Eradication programme.	-	
Czech Republic	2004	Eradication programme terminated in 1964	2004	Never detected	2004	Eradication programme terminated in 1967
Denmark	1980	No cases since 1962	1979	Never detected	1980	
Estonia	no	No cases since 1961	no	No cases since 1962, surveillance of breeding herds	-	No cases since 1986
Finland	1994	No cases since 1960	1994	Never detected	1994	No cases since 1982
France	2005	No case since 2002	2001 (64 de-partements)	No case in the other departements since 2003	2000	
Germany	2000	-	2000	-	1997	
Greece	no	Eradication programme. Thessaloniki area is eradication and vaccination area for Bovine brucellosis, only	no	Eradication programme on Islands, vaccination on the mainland	-	
Hungary	no	Declared free by OIE in 1985	2004	Never detected	no	
Ireland	2009	No confirmed case since April 2006	1993	Never detected	no	
Italy	yes (5 provinces and 10 regions)	Vaccination in two areas (Monti Nebrodi in Sicily and Caserta in Campania)	yes (7 provinces and 9 regions)	Vaccination in Sicily	yes (17 provinces and 4 regions)	
Latvia	no	No cases since 1963	no	Never detected		No cases since 1989
Lithuania	no	Yes, according to OIE demands	no	Yes, according to OIE demands	no	
Luxemburg	1999	No cases since 1999	yes	-	1996	
Malta	no	No cases since 1996	no	No cases since 1996	-	
Netherlands	1996	-	1993	Never detected	yes	
Poland	2009	-	yes	Surveillance of breeding herds, *B. melitensis* never detected	2009	
Portugal	2002 (six islands of the Azores)	Eradication programme, vaccination in exeptional situations	2002 (Azores)	Eradication programmes, regional vaccination	no	
Romania	no		2007	According EU Decision 399/2007	no	
Slovakia	2005		2004	Never detected	2005	No case since 1992
Slovenia	yes	No cases since 1961	2005		2009	No cases since 1997
Spain	no	Eradication programmes, vaccination in high risk areas	2001 (Canaries)	Eradication programmes, vaccination in high risk areas	no	
Sweden	1995	No cases since 1957	1994	-	1995	No cases since 1958
United Kingdom	1985 (GB)	Northern Ireland not officially free	1991	Never detected	2009 (Scotland)	
Norway	1994	Declared eliminated in 1953	1994	Never detected	1994	
Switzerland	1959	-	1998	-	1959	

1. OBF and OTF according to Directive 64/432/EC and Decision 2003/467/EC as last amended by Decision 2009/761/EC.
2. ObmF according to Directive 91/68/EC and Decision 93/52/EC, as last amended by Decision 2008/97/EC.

Appendix Table TB1. Notification of tuberculosis in humans,* Gallus gallus, *other animals and food, 2009

Country	Notifiable in humans since	Notifiable in *Gallus gallus* since	Notifiable in other animals since	Notifiable in food since
Austria	1947/2004[1]	-	1909/1999[1]	-
Belgium	< 1999	1998	1963	2004
Bulgaria	yes	-	-	-
Cyprus	1932	-	yes (bovine)	-
Czech Republic	yes	yes	yes	-
Denmark	1905	1993	1920[2]	-
Estonia	1950	1962	1962	no
Finland	1995[3]	1995[3]	1902	1902
France	yes	-	1934	-
Germany	yes	yes	yes	yes
Greece	yes	-	1936 (bovine)	-
Hungary	1946	no	yes (bovine)	no
Ireland	1948	-	1966 (Cattle), 1992 (Other ruminant animals)	not notifiable[4]
Italy	1990	-	1954	1928
Latvia	yes	yes	1927	-
Lithuania	1990	yes	yes	-
Luxembourg	yes	-	1912	-
Malta	yes	-	-	-
Netherlands	yes	no	yes	-
Poland	1919	-	yes (bovine)	-
Portugal	yes	yes	yes	-
Romania	yes	-	yes(bovine)	-
Slovakia	yes	no	yes	-
Slovenia	1949	-	<1991[5]	2003
Spain	1948	-	1952	1952
Sweden	>30 years ago	yes	1897	-
United Kingdom	yes	no	>1984[6]	-
Iceland	yes	-	-	-
Liechtenstein	yes	-	-	-
Norway	1900	1965	1894	1894[7]
Switzerland	yes	1950	1950	-

1. In Austria, *M. bovis* notifiable since 2004 in humans and since 1999 in animals, *M. tuberculosis* notifiable since 1947 in humans and since 1909 in animals.
2. In Denmark, only clinical cases are notifiable.
3. In Finland, notifiable also before 1995, but legislation changed in 1995.
4. In Ireland, reportable by food business operators to competent authority under SI 154/2004 - European Communities (Monitoring of Zoonoses) Regulations 2004.
5. In Slovenia, the year of independence. The disease was notifiable before 1991.
6. In the United Kingdom, the first TB Orders were passed in 1913 and 1925 to remove clinically ill cattle. In deer, tuberculosis has been notifiable since 1st June 1989. In 2005, tuberculosis became notifiable in all mammals except man.
7. In Norway, mandatory meat inspection at slaughterhouse.

Appendix Table BR1. Notification of* Brucella *in humans (V=Voluntary, O=Other), animals and food, 2009

Country	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1]	1957	1975
Belgium	< 1999 V	1978	2004
Bulgaria	yes	-	-
Cyprus	1983	-	-
Czech Republic	yes	yes	-
Denmark	no[2]	1920[3]	-
Estonia	1947	1962	no
Finland	1995	1920's	1920's
France	1960[4] V	1965	-
Germany	yes	yes	yes
Greece	-	1972	-
Hungary	1950	1928	no
Ireland	1948	1966 (Cattle), 1992 (Other ruminant animals)	no
Italy	1990 V	1954	1929
Latvia	1974	1927	yes
Lithuania	1957	>30 years	-
Luxembourg	yes	1948	-
Malta	yes	-	-
Netherlands	yes [5]	yes	yes
Poland	1946	1951	-
Portugal	-	yes	-
Romania	yes	yes	-
Slovakia	yes	yes	-
Slovenia	1977	<1991[6]	2003
Spain	1943 V	1952	1952
Sweden	2004	yes	no
United Kingdom	1996[7] O	1971[8]	1989
Iceland	yes		
Liechtenstein	yes		
Norway	1975	1903	no
Switzerland	yes	1966	-

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Denmark, only imported cases registered centrally.
3. In Denmark, only clinical cases are notifiable.
4. In France, mainly imported cases.
5. Notification is mandatory since December 2008.
6. In Slovenia, the year of independence. The disease was notifiable before 1991.
7. In the United Kingdom, reportable under Reporting of Injuries, Disease and Dangerous Occurrences Regulations – applies to all work related activities but not to all incidents.
8. In the United Kingdom organisms of the genus *Brucella* are reportable in animals - i.e. there is a statutory requirement to report laboratory confirmed isolation of the organism.

Appendix Table RA1. Vaccination programmes for rabies in animals, 2009

Country	Vaccination programmes in pets	Vaccination programmes in wildlife
Austria	Voluntary vaccination of pets	Oral vaccines distributed to foxes twice a year in fox populations in areas of higher risk.
Bulgaria	Compulsory vaccination of dogs	-
Belgium	Compulsory vaccination of dogs and cats in the south and if staying at public campgrounds	Oral vaccines was distributed from 1989 to 2003.
Cyprus	Compulsory vaccination of animals entering Cyprus	-
Czech Republic	Compulsory vaccination of carnivores in captivity	In 1989, oral vaccination of foxes in some districts. In 2003, covers the whole country except for rabies free districts. Since 2004, vaccination twice a year by air in selected areas, mainly along the border with Poland and Slovakia. The programme is approved and co-financed by EU (Decision 2007/782/EC) for 2008-2009.
Denmark	-	-
Estonia	Compulsory vaccination of dogs and cats	In autumn 2005 oral vaccination of wildlife in the Northern part of the country. Since 2006 oral vaccines distributed to foxes twice a year by airplane. The programme is approved and co-financed by EU (Decision 2007/782/EC) for 2008-2011.
Finland	Vaccination in dogs and cats are recommended	Since 1991, oral vaccines distributed to foxes and raccoon dogs twice a year along the Russian border by flight. Since 2004, oral vaccines distributed to foxes twice a year. The programme is approved and co-financed by EU (Decision 2007/782/EC) for 2008-2010.
France	Voluntary vaccination of pets	-
Germany	Voluntary vaccination of pets	Oral vaccines distributed to foxes twice a year in endemic areas until 2008. Germany is free of rabies.
Greece	Compulsory vaccination of dogs and cats	-
Hungary	Compulsory vaccination of dogs, voluntary vaccination of cats	Since 2004, oral vaccines distributed to foxes twice a year by flight. The programme started in 1997.
Ireland	-	-
Italy	Compulsary vaccination of dogs in infected municipalities	Oral vaccines distributed to foxes in the Region Friuli Venezia Giulia
Latvia	Compulsory vaccination of dogs, cats and pet ferrets	Since 1998, oral vaccines distributed to foxes and raccoon dogs twice a year, from 2005, by flight. The programme is approved and co-financed by EU (Decision 2007/782/EC) for 2008-2010.
Lithuania	Compulsory vaccination of dogs and cats	Since 1995, Oral vaccines distributed to foxes twice a year by flight.
Luxembourg	Compulsory vaccination of dogs	-
Malta	-	-
Netherlands	-	-
Poland	Vaccination programme for dogs since 1949	Since 2002, oral vaccines distributed to foxes twice a year by flight.
Portugal	Compulsory vaccination of dogs since 1925	-
Romania	Compulsory vaccination of dogs and cats	In 2009, aerial vaccination programme was not implemented for foxes
Slovakia	Compulsory vaccination of domestic carnivores	Since 1994, oral vaccines distributed to foxes twice a year by flight.
Slovenia	Compulsory vaccination of dogs since 1947	Oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (Decision 2007/782/EC) for 2008-2012.
Spain	Compulsory vaccination dogs in 14 regions, Ceuta and Melilla. Voluntary in the remaining 3 regions.	From 2004, compulsory surveillance according to Directive 2003/99/EC
Sweden	Vaccination of dogs and cats being brought in and out of the country	-
United Kingdom	Vaccination is permitted those animals being exported, and those undergoing quarantine	-
Norway	Vaccination of dogs and cats being brought in and out of the country	-
Switzerland	Compulsory vaccination of dogs, cats and ferrets brought in to the country from countries not free from rabies	

Appendix Table RA2. Type of samples and diagnostic methods used when diagnosing rabies in humans and animals, 2009

Country	Humans		Animals	
	Type of sample	Diagnostic test	Type of sample	Diagnostic test
Austria	Liquor, smears from pharynx, swab from conjuntivae, biopsy at the nape of the neck and serum	FAT, immunohistochemistry, RT-PCR	Brain	Fluorescent antibody test (FAT), rabies tissue culture infection test (RT-CIT). Mouse inoculation test (MIT)
Belgium	Blood, cerebrospinal fluid, saliva, post mortem brain tissue	Antigen detection, Virus isolation in neuroblastoma cells, RT-PCR, Virus isolation in mice; Rapid Fluorescent Focus Inhibition test RFFIT.	Brain	FAT, virus cultivation in neurobast
Bulgaria	-	-		Direct immune-flourescent test (IFT)
Cyprus	-	-	Brain	Hellers stain
Czech Republic	-	-	Brain	FAT
Denmark	Blood samples, skin biopsy from neck	-	Brain	FAT, virus isolation
Estonia	-	-	Brain	FAT
Finland	-	Human: cultivation, serology, antigen-test, direct microscopy.	Brain	FAT, cell culture, RT-PCR
France	Cerebrospinal fluid, blood, saliva, if post-mortem: brain tissue	PCR, FAT, immunohistochemistry, direct microscopy, RFFIT	Brain	FAT, cell culture, RT-PCR, MIT
Germany	-	-	-	FAT, cell culture
Greece	-	-	-	-
Hungary	Cerebrospinal fluid, blood	In vivo from cornea imprint of the patient by immunofluorescence method, or determination of specific antibody titre of the blood or liquor by immunofluorescence method during the second week of the illness. Post mortem: detection of the Negri-body in the brain tissue, or the antigen by immunofluorescence method, or identification of the viral genetic material by PCR, or isolation of the virus in mouse.	-	-
Ireland	-	-	-	-
Italy	Cerebrospinal fluid, liquor, saliva, blood, brain tissue	FAT, TCIT, RT-PCR	Brain	FAT, TCIT, RT-PCR
Latvia	Cerebrospinal fluid, blood, saliva, if post-mortem: brain tissue	Serology, antigen detection, isolation of virus	Brain tissue	FAT, cell culture, PCR
Lithuania	Cerebrospinal fluid, saliva	Isolation of virus, antigen detection, mouse inoculation test, ELISA, PCR.	-	-
Luxembourg	-	-	Brain	FAT, virus isolation (by sub-contractance)
Malta	-	-	-	-
Netherlands	-	-	-	-
Poland	Cerebrospinal fluid, blood, saliva, if post-mortem: brain tissue	FAT, RT-PCR, MIT, RFFIT	Brain	FAT, MIT, RFFIT
Portugal	-	-	-	Direct immune-flourescent test (IFT)
Romania	-	-	Brain	FAT, MIT, RT-PCR, FAVN, ELISA
Slovakia	Cerebrospinal fluid, saliva, serum, brain tissue	Isolation of virus, antigen detection, detection of virus nucleic acids, virus neutralization assay	Brain	FAT, ELISA, RT-PCR, MIT, FAVN
Slovenia	Cerebrospinal fluid, saliva, if post-mortem: brain tissue	Serology, isolation on cell cultures, mouse inoculation test, RT-PCR, FAT	Brain	Serology, isolation on cell cultures, mouse inoculation test, RT-PCR, FAT
Spain	Cerebrospinal fluid, skin biopsy from neck.	FAT, RFFIT, MIT, PCR	Brain tissue	FAT, ELISA
Sweden	Serum, CSF	Serology, antigen detection, isolation of virus, PCR	Brain tissue	FAT, MIT, PCR, virus isolation
United Kingdom	Cerebrospinal fluid, blood, saliva	Serology, antigen detection, isolation of virus	Brain tissue	FAT, MIT, histology, PCR
Norway	Cerebrospinal fluid, serum, if post-mortem: brain tissue	Serology, antigen detection, virus isolation	Brain tissue	FAT, RT-PCR
Switzerland	-	RFFIT	-	FAT, RTCIT, RFFIT

Appendix Table RA3. Notification of rabies in humans (O=Other) and animals, and Official Rabies Free status, 2009

Country	Notifiable in humans since	Last indigenous case	Notifiable in animals since	Last case	Rabies status	Year
Austria	1947	-	1957	2006	Declared itself free from rabies[1]	2008
Belgium	<1999	1923	1883	1999	Declared itself free from rabies[1]	2001
Bulgaria	yes	-	-	-		
Cyprus	2004	<1976	yes	<1976	Rabies free	
Czech y	es	-	1999	2002	Declared itself free from rabies[1]	2005
Denmark	1964	-	1920	1982 (classica l rabies)		
Estonia	1946	1987	1950	2009		
Finland	1995	-	1922	1989	Declared itself free from rabies[1]	1991
France	yes	1923	yes	-	Declared itself free from rabies[1]	2001
Germany	yes	-	yes	2006	Rabies free	2008
Greece	yes	1970	1936	1987	Rabies free	
Hungary	1950	-	1928	-		
Ireland	1976	-	-	-	Declared itself free from rabies[1]	
Italy	1990	1968	1954	2008	Rabies free	1997
Latvia	1974	2003	1918	-		
Lithuania	1957	-	<1975	-		
Luxembourg	yes	-	-	-	Declared itself free from rabies[1]	2003
Malta	yes	-	-	-	Rabies free since 1911	
Netherlands	yes	-	yes (dogs)	-		
Poland	1919	-	1927	-		
Portugal	yes	-	1953	1961		
Romania	yes	-	theend of the 19th	2009		
Slovakia	yes	1990	1950	2006		
Slovenia	1949	1950	<1991[2]	1950		
Spain	1901	1975	1952	1978[3]	The mainland and islands are considered rabies free	
Sweden	<1975	1886	yes	1886	Rabies free since 1886	
United y	es O	1902	yes	1922	Declared itself free from rabies[1]	
Iceland	yes	-	-	-		
Liechtenstein	yes	-	-	-		
Norway	1975	1815	1965	1999[4]	Declared itself free from rabies (the mainland)[1]	
Switzerland	1952	1974	1952	1996	Declared itself free from rabies[1]	1998

1. According the criteria set up b y OIE; where a country with no new cases of ra bies during a t wo year period may declare itself free from rabies. The criteria exclude European Bat *Lyssavirus.*
2. In Slovenia, the year of independence, however, this disease was notifiable before 1991.
3. In Spain, the mainland and islands not Ceuta and Melilla.
4. In Norway, in the archipelago of Svalbard.

Appendix Table VT1. Notification of VTEC in humans (V=Voluntary, O=Other), animals and food, 2009

Country	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1950[1, 2]	no	1975
Belgium	< 1999 V	2005	2004
Bulgaria	yes	-	-
Cyprus	2005 (EHEC)	-	-
Czech Republic	yes	yes	-
Denmark	2000 + HUS (EHEC)	no	-
Estonia	1958 (EHEC)	2000	2000
Finland	1998	2004[3]	no[4]
France	1996 (HUS) V	-	-[5]
Germany	yes	-	yes
Greece	yes (EHEC)	-	-
Hungary	1998	no	-
Ireland	2004 (EHEC)	-	no
Italy	1990 V	no	1962
Latvia	1999	yes[6]	2004
Lithuania	2004	>30 years	-
Luxembourg	yes V	no	no
Malta	yes	-	-
Netherlands	yes	no	yes
Poland	2004	-	-
Portugal	-	-	-
Romania	yes	-	2007
Slovakia	yes	no	2000
Slovenia	1995	no	2003
Spain	1989[7] V	1994	1994
Sweden	2004[8]	1996[9]	no
United Kingdom	no O	no	no
Iceland	yes		
Liechtenstein	-		
Norway	1995	no[10]	no[10]
Switzerland	1999	no	-

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Austria, clinical cases are notifiable since 1996.
3. In Finland, only notifiable in cattle.
4. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
5. In France, the food business operators have to notify the competent authority when contaminated products are on the market.
6. In Latvia, only clinical cases notifiable.
7. In Spain, Microbiological information System.
8. In Sweden, VTEC O157 infection have been notifiable since 1996, since 2004 all clinical VTEC have been notifiable.
9. In Sw eden, infections w ith VTEC notifiable since 1996. Sinc e 1 999 findings of VTEC associate d w ith human cases of EHEC notifiable.
10. Notification required when further transmission to humans is suspected or has occurred.

Appendix Table YE1. Notification on* Yersinia *in humans (V=Voluntary, O=Other), animals and food, 2009

Country	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1,2]	no	1975
Belgium	<1999[3] V	1998	2004
Bulgaria	yes	-	-
Cyprus	2005[4]	-	-
Czech Republic	yes	no	-
Denmark	1979	no	-
Estonia	1982	no	2000
Finland	1995	no	no[5]
France	yes V	-	-
Germany	yes	-	yes
Greece	-	-	-
Hungary	1998	no	-
Ireland	2004	1992	no
Italy	1990 V	no	1962
Latvia	1988	yes[6]	yes
Lithuania	1985	>30 years	-
Luxembourg	yes	no	no
Malta	yes	-	-
Netherlands	-	yes	yes
Poland	2004	-	no
Portugal	-	no	-
Romania	yes	no	-
Slovakia	yes	no	2000
Slovenia	1977	no	2003
Spain	1989[7] V	1994	1994
Sweden	1996	no	no
United Kingdom	no O	no	no
Iceland	-	-	-
Liechtenstein	yes	-	-
Norway	1992	no	no
Switzerland	yes[8]	1966	-

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Austria, clinical cases are notifiable since 1996.
3. In Belgium, in the Flemish Community.
4. In Cyprus, notifiable since January 2005.
5. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
6. In Latvia, only clinical cases are notifiable.
7. In Spain, Microbiological Information System.
8. In Switzerland, only outbreaks are notifiable.

Appendix Table TR1. Diagnostic methods and monitoring programmes for Trichinella*, 2009*

Country	Humans Diagnostic methods	Animals Diagnostic methods	Animals - monitoring programmes Meat inspection at slaughter	Other monitoring
Austria	Serology (ELISA), Western Blot	Regulation (EC) No 2075/2005	Pigs, horses, farmed wild boar	Wild boar: monitoring scheme
Belgium	Serology (ELISA), histopathology	Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Other wildlife monitored when relevant
Bulgaria		Compression method	Pigs, horses, wild boar, bears, badgers	-
Cyprus	EU recommendations	Directive 77/96/EC (digestion method)	Pigs (started in 2004, 80% examined)	-
Czech Republic	-	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Other wildlife monitored when relevant
Denmark	Serology, histopathology	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs and horses slaughtered at export approved slaughterhouses, all wild boar	-
Estonia	Clinical symptoms, eosinophilia	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Other wildlife monitored when relevant
Finland	Serology, histopathology	Regulation (EC) No 2075/2005	Pigs, horses, wild boar, bears	Continuous wildlife monitoring programme covering foxes, raccoon dogs, mustelids, lynxes and wolves
France	Serology, histopathology	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Wild boar: sampling are carried out as a survey
Germany	Serology (ELISA), histopathology	Directive 77/96/EC (digestion or compression method) and PCR	Pigs, horses, wild boar	Other wildlife monitored when relevant
Greece	-	Directive 77/96/EC (digestion or compression method)	Pigs	-
Hungary	Serology (ELISA), histopathology, Western Blot	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Other wildlife monitored when relevant
Ireland	-	Pepsin digest method according to Regulation (EC) No 2075/2006	Pigs, horses, farmed wild boar	Wildlife monitoring programme covering foxes, badgers and rodents
Italy	-	Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Wildlife monitoring programme covering foxes, mustilids and othre carnivores including birds of prey
Latvia	Serology (ELISA)	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar and farmed game	Slaughtering at home is allowed only for personal consumption. In this case the owner is responsible for ensuring control
Lithuania	Serology (ELISA)	-	-	-
Luxembourg	-	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Foxes
Malta	-	Compression method	Horses	Pigs: random on the slaughter line
Netherlands	-	Directive 77/96/EC (digestion method)	Pigs, horses	
Poland	Serology and histopathology	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	-
Portugal	-	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Priority: wild boar, breeding pigs and pigs not raised under controlled housing condition
Romania	Serology (ELISA)	Pepsin digest method according to Regulation (EC) No 2075/2005. Home slaughtering is allowed only for personal consumption. In this case the owner is responsible for ensuring control	Pigs, horses, wild boar	-
Slovakia	Serology, histopathology	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Other wildlife monitored when relevant
Slovenia	Serology, histopathology	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar, bears	Other wildlife monitored when relevant. Testing of pigs slaughtered on the holding for private domestic consumption is not mandatory
Spain	Decision no. 2002/253/EC - serology, histopathology	Pepsin digest and compression method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar	Home slaughtering. Other wildlife monitored when relevant
Sweden	Serology (ELISA/IFL)	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, wild boar, bears	Survey of approx. 300 foxes annually, other wildlife monitored when relevant
United Kingdom	Histopathology	Pepsin digest method according to Regulation (EC) No 2075/2005	Pigs, horses, farmed wild boar	Foxes, approximately 400-700 annually
Norway	Serology and histopathology	Directive 77/96/EC (digestion or compression method)	Pigs, horses, wild boar, bears	Wildlife and farmed foxes occasionally
Switzerland	-	Directive 77/96/EC (digestion method)	Pigs, horses, wild boar	Survey of foxes in 2006-2007, other wildlife monitored when relevant

Appendix Table TR2. Notification of **Trichinella** ***in humans (V=Voluntary), animals and food, 2009***

Country	Notifiable in humans since	Notifiable in animals since		Notifiable in food since
Austria	1950	1994	Pigs, horses, wild boars	1994
Belgium	<1999[1] V	1998	-	2004
Bulgaria	yes	-	-	-
Cyprus	2005	yes	Pigs	-
Czech Republic	yes	yes	Pigs, horses, wild boars, other wildlife	-
Denmark	no	1920[2]	Pigs, horses, wild boars	-
Estonia	1945	2000	Pigs, horses, wild boars, other wildlife	2000
Finland	1995	1930	Pigs, horses, farmed and wild game	1930
France	2000 V	2006	Pigs, horses, wild boars	<1990
Germany	yes	yes	Pigs, horses, wild boars, other wildlife	yes
Greece	yes	1980	Pigs	1977
Hungary	1960	no	Pigs, horses, nutria, wild boars	1984
Ireland	2004	yes	Pigs, horses, wild boars, other wildlife	no
Italy	1990	1958 (pigs), 1994 (horses)	Pigs, horses, wild boars	1958
Latvia	1988	yes	Pigs, horses, wild boars and farmed game, other wildlife	-
Lithuania	1990	>30 years	-	-
Luxembourg	yes	1947	Pigs, horses, wild boars	-
Malta	yes	-	Pigs (random), horses	-
Netherlands	yes	yes	Pigs, horses, wild boars	-
Poland	1919	1928	Pigs, horses, wild boars	-
Portugal	yes	1953	Pigs	yes
Romania	yes	1913	Pigs, horses, wild boars, bears, other wildlife	> 50 years
Slovakia	yes	yes	All animals for human consumption	2000
Slovenia	1977	<1991[3]	Pigs, horses, wild boars, bears	2003
Spain	1982	1952	Pigs, wild boars	1952
Sweden	> 30 years	>50 years	Pigs, horses, wild boars, bears	>50 years
United Kingdom	yes V	Yes[4]	Pigs, horses	yes
Iceland	-	-	-	-
Liechtenstein	yes	-	-	-
Norway	1975	1965	Pigs, horses, wild boars, bears	1965
Switzerland	2009	1966	Pigs, horses	no

Note: Directive 64/433/EC and/or Directive 77/96/EC were no longer in force in 2006. Replaced by Regulation (EC) No 2075/2005.

1. In Belgium, the Flemish Community.
2. In Denmark, only clinical cases are notifiable.
3. In Slovenia, the year of independence. The disease was notifiable before 1991.
4. In the United Kingdom, notifiable only under the Specified Animal Pathogens Order 1998.

Appendix Table EH1 . Echinococcus *monitoring programmes and diagnostic methods in humans and/or animals, 2009*

Country	Type of data	Diagnostic methods	Monitoring, treatment etc.
Austria	Laboratory confirmed	Humans: ELISA, Western blot. Animals: Histopathology, ultrasound, X-ray, computed tomography, serology or combo serology DNA (PCR)	Foxes tested on request
Belgium	Laboratory confirmed	Humans: *E. granulosus*: ELISA and IHA, *E. multilocularis* ELISA Animals: visual examination of organs, microscopic examination of mucosal scrapings of the gut	Information campaign in wooded areas about consumption of berries
Bulgaria	-	-	-
Cyprus	-	-	Scheme to treat dogs and stray dogs with Pranziquantel
Czech Republic	Laboratory confirmed	animal: Microscopical diagnostic	A monitoring programme for *Echinococcus* in foxes was introduced in 2005. Samples are taken from foxes hunted for control of vaccination efficiency against Rabies.
Denmark	Laboratory confirmed	Humans: Abdominal CT Scan, serology, histopathology	-
Estonia	Laboratory confirmed	Histopathology, serology	-
Finland	Laboratory confirmed	Humans: Serology, histopatology. Animals: copro-ELISA, copro-PCR, PCR, visual examination of organs	Treatment required for dogs and cats imported for countries other than Sweden, Norway (other parts than Spitsbergen), United kingdom and Ireland and animals less than three months old entering from MS, recommended for hunting dogs before and after hunting season. Continuous surveillance for *Echinococcus* in foxes and raccoon dogs.
France	Voluntary reporting	Animals: Faeces: Flotation, PCR and sequencing, Intestines: Scrapping and sedimentation, Liver or lung: PCR and sequencing Humans : ELISA, Western blot, histopathology, X-ray	A survey on *Echinococcus multilocularis* in foxes. Faecal samples analysis.
Germany	Laboratory confirmed	Animals: microscopic examination of mucosal scrapings of the gut	Mostly sporadic testing, monitoring in some federal states
Greece	-	Humans: X-ray, echo and serological investigation	-
Hungary	Laboratory confirmed	Western blot	-
Ireland	-	-	-
Italy	-	-	-
Latvia	Laboratory confirmed/monthly	Serology	Macroscopic investigation on hydatic cysts at the slaughterhouse is a part of the meat inspection procedure. Treatment with an anti-helmintic drugs is recommended in the final hosts - dogs and cats.
Lithuania	Laboratory confirmed	Serology (ELISA and Western blot), Histopathology, imaging	-
Luxembourg	Laboratory confirmed	Foxes: Microscopical diagnostic and PCR in feces Other animals: Inspection at slaughterhouse	Foxes tested on request
Malta	-	-	-
Netherlands	Laboratory confirmed	Serology	-
Poland	Laboratory confirmed	Serology (ELISA and Western blot) and histopathology	-
Portugal	-		3 regions have a programme running where dogs are dewormed
Romania	Laboratory confirmed	Dogs: faeces - flotation and ELISA coproantigen; intestines - scrapping and sedimentation	Surveillance program for EH 1 in dogs was introduced since 2005 - ELISA coproantigen, after treatment. Treatment with an antihelminthic drugs is recommanded in the final parts (dogs).
Slovakia	Laboratory confirmed	Humans: Serology and histopathology	-
Slovenia	Laboratory confirmed	Humans: Serology, Rtg, CT Scan, MRI Animals: Macroscopic (visual) examination of organs and laboratory microscopic parasitological identification of the agent.	Visual examination of the slaughtered/killed animal and its organs, and palpation of the liver. Systematic dehelminthisation of dogs along with anti-rabies vaccination.
Spain	Laboratory confirmed, passive case finding	According to Decision 2119/98/EC, Decision 2002/253/EC and Decision 2002/243/EC	Control infection in animals and meat inspection
Sweden	Laboratory confirmed, passive case finding	Humans: Copro-ELISA, copro-PCR, PCT, visual examination of organs.	Since 2001, an annual investigation of 300-400 foxes. Anthelmintic treatment required for dogs imported from countries other than Finland and Norway
United Kingdom	Visual meat inspection - voluntary reporting	-	Treatment for imported dogs and cats. Regional deworming programme. Slaughterhouse testing Meat inspection - carcass condemnation
Norway	Laboratory confirmed	Humans: Serology, Histopathology. Animals: PCR, egg detection, histopathology	Anthelmintic treatment required for dogs imported from countries other than Finland and Sweden. Mandatory meat inspection for hydatid cysts, survey of *E. multilocularis* in foxes.
Switzerland	Animals: Laboratory confirmed Humans: Voluntary reporting	Animals: ELISA, PCR, morphology, microscopic examination	Research project with deworming baits in city foxes (2004-2010).

Appendix Table EH2. Notification of Echinococcus *in humans (V=Voluntary), animals and food, 2009*

Country	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	2004	1994	1994
Belgium	< 1999 V	1998	2004
Bulgaria	yes	-	-
Cyprus	1969	-	-
Czech Republic	yes	no	-
Denmark	no	yes	-
Estonia	1986	2000	2000
Finland	1995	1995[1]	1995[1]
France	yes V	no	-
Germany	yes	2004	-
Greece	yes	1980	-
Hungary	1960	no	1984
Ireland	2004	-	no
Italy	-	yes	1964
Latvia	1999	yes	yes
Lithuania	1990	yes	-
Luxemburg	yes	no	-
Malta	yes	-	-
Netherlands	no	yes	yes
Poland	1959/1997[2]	-	-
Portugal	yes	yes	-
Romania	yes	1942	-
Slovakia	yes	yes[3]	no
Slovenia	1977	<1991[4]	2003
Spain	1982	1994	1994
Sweden	2004	>30 years	>30 years
United Kingdom	yes V	1998[5]	no
Iceland	-	-	-
Liechtenstein	yes	-	-
Norway	2003	1985	1965[6]
Switzerland	no	1966	-

1. In Finland, notifiable also before 1995, but legislation changed in 1995.
2. In Poland, from 1959 registered together with other tapeworms, from 1997 reported separately.
3. In Slovakia, only clinical cases.
4. In Slovenia, the year of independence, however this disease was notifiable before 1991.
5. In the United Kingdom, notifiable only under the Specified Animal Pathogens Order 1998.
6. Mandatory meat inspection for hydatid cysts.

Appendix Table TO1. Notification of* Toxoplasma *in humans and animals, 2009

Country	Notifiable in humans since	Notifiable in animals since
Austria	no	no
Belgium	no info	no info
Bulgaria	yes	no info
Cyprus	yes	no info
Czech Republic	yes	no info
Denmark	no	no?
Estonia	yes	no info
Finland	yes	yes[1]
France	no info	no info
Germany	no info	yes[2]
Greece	no info	no info
Hungary	yes	no info
Ireland	yes	no info
Italy	yes	no info
Latvia	yes	yes
Lithuania	yes[3]	no info
Luxembourg	yes	no info
Malta	yes	no info
Netherlands	no info	no info
Poland	yes	yes
Portugal	no info	no info
Romania	yes	no info
Slovakia	yes	no info
Slovenia	yes	no info
Spain	yesV[4]	no info
Sweden	yes	no
United Kingdom	yes[5]	no info
Iceland	yes	
Liechtenstein		
Norway	no	?[6]
Switzerland	no	yes

1. In Finland *Toxoplasma gondii* is a notifiable disease in all animals except hares, rabbits androdents.
2. In Germany toxoplasmosis is notifiable in pigs, dogs and cats.
3. Every probable, suspected, or confirmed case is registered in personal healthcare institution according Health minister's order and is informed to territorial public healthcare institution where cases are registered. All detected cases are reported to the national level CCDPC and cases are registered in State register for communicable diseases.
4. Not compulsory but voluntary reporting from laboratories.
5. Toxoplasmosis is only notifiable in humans in Scotland. In the rest of the United Kingdom the human cases relate to voluntary laboratory reporting.
6. Toxoplasmosis in animals has been a List C disease according to the Animal Diseases Act since 1965.

Appendix Table QF1. Regulations, control and diagnostic methods for Q-fever, 2009

Country	Regulation (Monitoring or Surveys)	Type of sample (Frequency)	Control measures
Austria	-	Abortion material, blood samples	-
Belgium	-	-	-
Bulgaria	Existing Q-fever regulation for ruminants, for export/import	Abortion material, crude milk and manure	Govermental financial help for stockbreeders
Cyprus	-	-	-
Czech Republic	-	-	-
Denmark	Existing Q-fever regulation for ruminants	-	Govermental financial help for stockbreeders
Estonia	-	-	-
Finland	Existing Q-fever regulation for ruminants	Crude milk	-
France	-	-	-
Germany	Existing Q-fever regulation for ruminants	Abortion material and crude milk	-
Greece	-	-	-
Hungary	-	-	-
Ireland	-	-	-
Italy	Existing Q-fever regulation for ruminants	Abortion material, crude milk and manure	-
Latvia	-	-	-
Lithuania	-	-	-
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	Existing Q-fever regulation for ruminants, for dairy sheep and goats only	Abortion material, crude milk and manure	Vaccination/ breeding ban/ hygiene protocol started 2009
Poland	-	-	-
Portugal	-	-	-
Romania	Existing Q-fever regulation for ruminants	Abortion material	Govermental financial help for stockbreeders
Slovakia	-	-	-
Slovenia	Existing Q-fever regulation for ruminants, Monitoring programme in ruminants in 2009.	Abortion material, crude milk and manure Monitoring programme: blood	-
Spain	-	-	-
Sweden	-	-	-
United Kingdom	No statutory monitoring (no existing Q fever regulation). Voluntary scanning surveillance (clinical diagnostic sampes). National survey (sheep and goats) carried out in 2009	Abortion material, milk, serum	-
Norway	Existing Q-fever regulation for ruminants, for export/import	-	-
Switzerland	Existing Q-fever regulation for ruminants	Abortion material	-

1. RT-PCR: real-time PCR, FISH: Fluorescent in situ hybridization, IHC: Immuno Histo Chemistry.
2. CFT: Complement fixation test, IFA: Immunofluorescence assay tests, ELISA: Enzyme-Linked Immunosorbent Assay.

Diagnostic method		National Reference Laboratories	
Isolation and direct identification[1]	Serology[2]	Animal	Human
ICH, RT-PCR	CFT, ELISA (IDVET)	no	no
RT-PCR (Taqvet Kit LSI) and staining	CFT (virion-Serion), ELISA (LSI kit)	yes	-
Staining	IFA, CFT	yes	yes
Staining	IFA, ELISA	yes	yes
-	CFT (virion), ELISA (IDVET)	no	no
RT-PCR, gel-based isolation and staining (FISH)[3]	CFT (dogs, cats, pigs), ELISA (ruminants)	yes	-
-	-	no	no
Gel-based isolation (Adigene) and staining	ELISA	yes	yes
RT-PCR, gel-based isolation and staining	IFA, CFT, ELISA (LSI, IDVET, IDEXX)	yes	yes
RT-PCR, gel-based isolation and staining	CFT, ELISA (IDEXX)	yes	yes
RT-PCR, gel-based isolation and staining	CFT, ELISA (IDEXX)	yes	-
Gel-based isolation (Hum HM)	IFA (human), CFT (animal)	-	yes
-	-	-	-
Gel-based isolation	IFA (human), ELISA (CHEKIT)	yes	-
-	-	-	yes
-	-	yes	-
-	-	yes	-
-	-	-	-
RT-PCR and staining (IHC)	CFT, ELISA (IDEXX, LSI)	no	no
Gel-based isolation and staining	IFA, CFT, ELISA	yes	yes
Gel-based isolation	ELISA (IDEXX)	yes	-
-	ELISA (IDEXX)	yes	-
-	CFT	no	no
RT-PCR and gel-based isolation (Adigene)	CFT (virion-Serion), ELISA (IDEXX)	no	no
Conventional and RT-PCR, gel-based isolation and staining	IFA, CFT, ELISA	yes	yes
RT-PCR (Adiagene)	IFA (Q-focus for human), CFT (Behring Antigen), ELISA (Virion for human, IDEXX for animal)	yes	yes
RT-PCR and staining	CFT, ELISA (under evaluation)	yes	yes
-	ELISA (IDEXX)	yes	-
Gel-based isolation and staining	ELISA (IDEXX)	yes	-

3. Fluorescent in situ hybridization (FISH) with oligonucleotide probe targeting 16S rRNA; formalin-fixed placenta.

Appendix Table QF2. Notification of Q-fever in humans and animals and registration of occupational disease, 2009

Country	Notifiable in humans	Notifiable in animals	Occupational disease
Austria	no	no	no
Belgium	-	-	-
Bulgaria	yes	yes	yes
Cyprus	yes	-	-
Czech Republic	yes	yes	yes
Denmark	no	yes	yes
Estonia	-	-	-
Finland	yes	yes	-
France	-	1986	yes
Germany	yes	yes	yes
Greece	yes	yes	yes, also non confirmed
Hungary	yes	-	yes
Ireland	-	-	-
Italy	yes	yes	yes
Latvia	1997	1999	-
Lithuania	yes	yes	-
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	yes	2008	yes
Poland	yes	yes	yes
Portugal	yes	-	-
Romania	-	-	-
Slovakia	yes	-	yes
Slovenia[1]	yes	yes	yes
Spain	yes	yes	-
Sweden	yes	yes	-
United Kingdom	-	-	yes
Norway	-	-	-
Switzerland	yes, outbreaks	yes	-

1. In Slovenia, 1991 is the year of independence, however this disease was also notifiable before 1991.