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The Community Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents, Antimicrobial Resistance and Foodborne Outbreaks in the European Union in 2006

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European Food Safety Authority

European Centre for Disease Prevention and Control

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About EFSA

The European Food Safety Authority (EFSA) was established and funded by the European Community 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 fully protect consumers.

In close collaboration with national authorities and in open consultation with its stakeholders, EFSA provides objective scientific advice on all matters 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 Community 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, European Parliament and 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 case of a food crisis, are also part of EFSA's mandate, as laid down in the founding Regulation (EC) No 178/2002 of 28 January 2002.

About ECDC

The European Centre for Disease Prevention and Control (ECDC) was established in 2005. It is an EU agency with the aim to strengthen Europe's defences against infectious diseases. It is seated in Stockholm, Sweden.
According to the Article 3 of the http://www.ecdc.europa.eu/About_us/Key_Documents/ecdc_regulations.pdf founding Regulation (EC) No 851/2004 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 health knowledge, 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 collected from the Member States in accordance with Directive 2003/99/EC and for preparing the Community Summary Report from the results. Regarding the data from 2006, this Community Summary report was produced in collaboration with the European Centre for Disease Prevention and Control (ECDC) that provided for the information on zoonoses cases in humans. The Zoonoses Collaboration Centre (contracted by EFSA), National Food Institute, Technical University of Denmark assisted EFSA and ECDC in this task.

For more information about EFSA, please contact:

European Food Safety Authority
Largo N. Palli 5/A
I-43100 Parma
Italy

Tel: +39 0521 036 111
Fax: +39 0521 036 110
info@efsa.europa.eu
www.efsa.europa.eu

EXECUTIVE SUMMARY (2006)

Zoonoses are diseases or infections that are transmissible from animals to humans. The infection can be acquired directly from animals, or through ingestion of contaminated foodstuffs. The gravity of these diseases in humans can vary from mild symptoms to life threatening conditions.

In order to prevent these diseases from occurring, it is important to identify which animals and foodstuffs are the main sources of the infections. For this purpose and to follow the developments in the European Union (EU), information is collected and analysed from all EU Member States in order to help the Community to improve control measures in the food production chain aimed to protect human health.

In 2006, twenty-four Member States submitted information on the occurrence of zoonoses, zoonotic agents, antimicrobial resistance and food-borne outbreaks to the European Commission and the European Food Safety Authority (EFSA). Further information on zoonoses cases in humans was acquired from the European Centre for Disease Prevention and Control (ECDC). The information covered 17 diseases. Assisted by its Zoonoses Collaboration Centre, EFSA and ECDC jointly analysed the information and published the results in this annual Community Summary Report. In addition, six countries that were not EU Member States provided information on zoonoses for the report.

Although a small decrease in the cases was observed in 2006 as compared to 2005, campylobacteriosis remained the most frequently reported zoonotic disease in humans in EU with 175,561 reported confirmed cases in 2006. Salmonellosis was again the second most commonly recorded zoonosis accounting for 160,649 confirmed human cases. However, the incidence of salmonellosis has decreased in the EU over the past years, and in the last three years this decrease has been statistically significant.

In foodstuffs, the highest proportion of *Campylobacter* positive samples was reported for fresh poultry meat, where on average 35% samples were found positive. *Campylobacter* was also commonly found from live poultry, pigs and cattle. Of particular concern is the high level of resistance to ciprofloxacin observed in these *Campylobacter* findings, ranging from 30.6% to 56.7% of the isolates. Ciprofloxacin is an antibiotic commonly used to treat human campylobacteriosis, and this resistance limits the therapeutic options available and may lead to treatment failure.

Salmonella was most often found in fresh poultry and pig meat where proportions of positive samples on average of 5.6% and 1.0% were detected, respectively. However, the majority of the reported food-borne *Salmonella* outbreaks were related to eggs while meat was the second most common cause. In animal populations, *Salmonella* was most frequently detected in poultry flocks. The *Salmonella* prevalence in flocks of laying hens and their breeding flocks has decreased significantly at EU level, which possibly indicates the success of the control measures taken in the sector. No such trends were observed in flocks of broilers.

The number of listeriosis cases has significantly increased in EU over the 5 past years and in 2006 a total of 1,583 human cases were reported. Listeriosis is an important food-borne zoonosis due to the severity of the disease and high mortality related to it. In 2006, the reported mortality in connection with the food-borne listeriosis outbreaks was 14.2%. The *Listeria* bacteria were most often reported above the legal safety limit from ready-to-eat (RTE) fishery products, followed by cheeses and other RTE products.

Salmonella was once again the main cause of reported food-borne outbreaks in EU but for the first time, food-borne viruses were the second most frequent cause. The number of viral outbreaks is assumed to be severely underreported in the previous years.

The reported incidences of yersiniosis and VTEC infection have decreased in EU, but these diseases still accounted for 8,979 and 4,916 human cases in 2006, respectively. VTEC and *Yersinia* bacteria were reported mainly from cattle, pigs and products thereof.

The two parasitic zoonoses, trichinellosis and echinococcosis, caused 231 and 458 human cases each in EU Member States. In animals, these parasites were mainly isolated in wildlife.

At EU level, the occurrence of bovine tuberculosis slightly increased and that of bovine and sheep/goat brucellosis decreased in the Member States, which are not free of these diseases, compared to 2005. In humans 1,033 brucellosis cases were reported mainly by the non-free Member States.

No cases of rabies were reported in humans in 2006. In animals, the majority of infections are reported in the Baltic and some Eastern European MS.

Information on other zoonoses, such as Bovine Spongiform Encephalopathy (BSE), Avian Infulenza and Q fever, is also included in the report.

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1. INTRODUCTION

The framework of reporting

The Community system for monitoring and collection of information on zoonoses is based on the Zoonoses Directive 2003/99/EC[1], which obligates the European Union Member States to collect relevant and where applicable comparable data of zoonoses, zoonotic agents, antimicrobial resistance and foodborne outbreaks. In addition, Member States shall assess trends and sources of these agents and outbreaks in their territory, and transmit to the European Commission, every year, a report covering the data collected. The European Food Safety Authority (EFSA) is assigned the tasks of examining the data collected and publishing the Community Summary Report.

The Decision 2119/98/EC on setting up a network for the epidemiological surveillance and control of communicable diseases in the Community[2], as complemented by Decision 2000/96/EC on the diseases to be progressively covered by the network, established the data collection on human communicable diseases from the Member States. The Decisions foresee that data from the networks shall be used in the Community Summary Report on Zoonoses.

In this report the data related to the occurrence of zoonotic agents in animals, foodstuffs and feed as well as to antimicrobial resistance in these agents are collected in the framework of Directive 2003/99/EC. This applies also to information of foodborne outbreaks. The information concerning zoonoses cases in humans and related antimicrobial resistance is derived from the networks under Decision No 2119/98/EC.

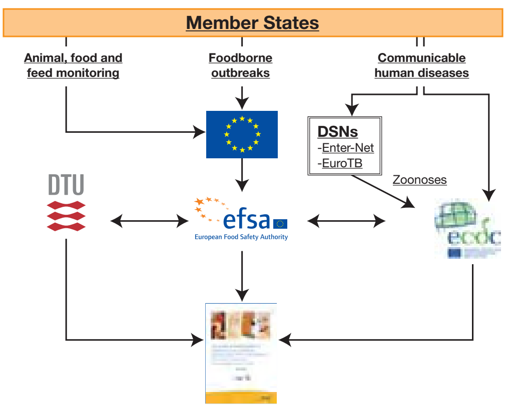
Since 2005, the European Centre for Disease Prevention and Control (ECDC) has provided the data on zoonotic infections in humans, as well as the analyses of these, for the Community Summary Report. The data used for analysis were derived from several disease networks; the new European Surveillance System (TESSy), which has been implemented and is maintained by ECDC, and two Dedicated Surveillance Networks (DSN): Enter-Net and Euro-TB.

This Community Summary Report 2006 was prepared in collaboration of EFSA and ECDC, which were assisted by EFSA's Zoonoses Collaboration Centre (ZCC, in the National Food Institute of the Technical University of Denmark).

When preparing the Community Summary Report, EFSA may take into consideration other data provided in the framework of Community legislation. In accordance with this, information of Transmissible Spongiform Encephalopathies (TSEs) and Avian Influenza (AI) is included in the Community Summary Report 2006. These data were kindly provided by the European Commission, and are based on their summary reports on these diseases in 2006.

The data flow for the 2006 Community Summary Report is shown in Figure IN1.

Figure IN1. Scheme of the data flow for the Community Summary Report, 2006



1 Directive 2003/99/EC of the European Parliament and of the Council of 17 November 2003 on the monitoring of zoonoses and zoonotic agents, amending Council Decision 90/424/EEC and repealing Council Directive 92/117/EEC (OJ L 325, 12.12,2003, p. 31)

2 Decision No 2119/98/EC of the European Parliament and of the Council setting up a network for the epidemiological surveillance and control of communicable diseases in the Community (OJ L 268, 3.10,1998, p.1)

Data received for 2006

In 2006, data were collected on a mandatory basis on the following 8 zoonotic agents: *Salmonella*, thermophilic *Campylobacter*, *Listeria monocytogenes*, verotoxigenic *E. coli*, *Mycobacterium bovis*, *Brucella*, *Trichinella* and *Echinococcus*. Furthermore, the mandatory reported data included antimicrobial resistance in *Salmonella* and *Campylobacter* isolates, foodborne outbreaks and susceptible animal populations. Additionally, based on the epidemiological situations in Member States (MS), data were reported on the following agents and zoonoses: *Yersinia*, rabies, *Toxoplasma*, *Cysticerci*, *Sarcocystis*, Q fever, *psittacosis* and *Leptospira* spp. Data on antimicrobial resistance in indicator *E. coli* and *Enterococci* isolates were also submitted. Furthermore, for the first time, MS provided data on certain other microbiological contaminants in foodstuffs: histamine, Staphylococcal enterotoxins and *Enterobacter sakazakii*, for which food safety criteria are set down in the Community legislation.

Twenty-four MS submitted national zoonoses reports concerning the year 2006. In addition, reports were submitted by four non-Member States (Bulgaria, Norway, Romania and Switzerland). For Bulgaria and Romania, this was the first national report on zoonoses submitted to the Commission. No national zoonoses report was received from Malta. From the Communicable Disease Networks, data on human zoonoses cases were received from all 25 MS and additionally from six non-MS, Bulgaria, Iceland, Lichtenstein, Norway, Romania and Switzerland.

It should be noted that Bulgaria and Romania were not yet EU MS in 2006, and therefore they are regarded as non-MS in this report.

The deadline for data submission was 31 May 2007. The majority of the national reports (21) were received within this deadline, and the remaining reports were submitted by mid June. Data were frozen in the zoonoses database as of 19 June 2007.

The draft report was sent to MS for consultation on 8 October 2007 and comments were collected by 29 November 2007. The utmost efforts were made to incorporate comments and data amendments within the available time frame. The final report was published online by EFSA on 4 December 2007.

The structure of the report

The Community Summary Report 2006 is divided into three levels. Level 1 consists of executive summary, an introduction to the reporting, the general conclusions and zoonoses or item specific summaries. Level 2 of the report presents a Community assessment of the specific zoonoses and other pathogens and indicators, as well as an overview of monitoring programmes implemented in the Community (Appendix 1) and a description of materials and methods (Appendix 2). Level 1 and 2 of the report are available in print and are disseminated to all European Community stakeholders. Level 3 of the report consists of an overview of all data submitted by the MS and is only available online and in the CD ROM attached to the print form.

Monitoring and surveillance schemes for most zoonotic agents, antimicrobial resistance and foodborne outbreaks covered in this report are not harmonised between MS, and findings presented in this report must, therefore, be interpreted with care. The data presented may not necessarily be derived from sampling plans that are statistically designed, and may not accurately represent the national situation on zoonoses. Results are generally not directly comparable between MS and sometimes not even between different years in a certain country.

Data presented in this report were chosen such 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 MS should be available to warrant presentation, leading to a table or a figure. However, for some data, such as data on antimicrobial resistance, fewer data have been accepted for analysis. Historical data and trends are presented, whenever possible.

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

2. SUMMARY

2.1. Main conclusions on the Community Summary Report on Zoonoses 2006

- Campylobacteriosis remains the most frequently reported zoonotic disease in humans in EU, even though a decrease in the incidence of cases was observed compared to 2005. The reported data indicate that broiler and other poultry meat are important sources of these infections. The occurrence of *Campylobacter* remained at high levels in broiler meat and broiler flocks in most MS and no apparent EU trend was observed.

- High to extremely high levels of resistance to ciprofloxacin, an antimicrobial commonly used for treating cases of human campylobacteriosis, were reported in *Campylobacter* isolates from broiler meat as well as from poultry, pigs and cattle. This resistance is likely to limit the therapeutic options for and effectiveness of the treatment of human campylobacteriosis cases.

- The number of listeriosis cases in humans has increased in EU. Listeriosis is an important food-borne zoonosis due to the severity and high mortality associated with the disease. The bacterium was most often reported above the legal safety limit from ready-to-eat (RTE) fishery products, followed by cheeses and other RTE products.

- Salmonellosis remained the second most commonly reported human zoonoses in spite of a decrease in incidence over the last three years in EU. The reported data supported the notion that the major sources of human *Salmonella* infections are eggs, and meat from pigs and poultry.

- There was a significant decreasing trend over the past years in *Salmonella* prevalence in flocks of laying hens and their breeding flocks at the EU level in those MS that implemented control programmes. No significant EU trends were observed in occurrence of *Salmonella* in eggs, broiler meat or flocks of broilers. Non-compliance with the EU *Salmonella* criteria was mainly detected in products of poultry and other meat.

- *Salmonella* was once again the main cause of reported foodborne outbreaks in EU, and eggs and meat were the most common food vehicles implicated in these outbreaks. For the first time, viruses were the second most frequently reported cause of foodborne outbreaks. Together 50 deaths due to the foodborne outbreaks were reported by the MS, *Listeria* outbreaks accounting for the highest mortality.

- The reported incidences of yersiniosis and VTEC infection have decreased in EU. VTEC and *Yersinia* bacteria were reported mainly from cattle, pigs and products thereof, but the available information does not allow for any in depth analyses of the sources of human infections.

- The two parasitic zoonoses, trichinellosis and echinococcosis, were rarely detected in MS. Bulgaria and Romania, however, reported substantial numbers of findings indicating that these diseases are still relevant in these countries. In animals, these parasites were mainly isolated in wildlife.

- At EU level, the occurrence of bovine tuberculosis slightly increased and that of bovine and ovine/caprine brucellosis decreased in the non-free MS compared to 2005. Significant decreasing trends were observed in the proportion of positive herds for bovine tuberculosis and bovine brucellosis in the Community co-financed MS.

- No cases of rabies were reported in humans in 2006. In animals, the majority of infections are reported in the Baltic and some Eastern European MS.

2.2. Zoonoses and item specific summaries

Salmonella

Humans

In 2006, a total of 160,649 confirmed cases of human salmonellosis (TESSy) were reported in the EU. The EU incidence was 34.6 cases per 100,000 population, ranging from none to 235.9 cases per 100,000 population. Germany accounted for 32.7% of all reported cases, whereas incidence was greatest in the Czech Republic.

In 2006, there was a 7.6% decrease in incidence from 2005, and this was part of a significant, decreasing trend over the past three years. As in previous years, *S.* Enteritidis and *S.* Typhimurium were the most frequently reported serovars.

The highest numbers of reported human cases were for age groups 0-4 years and 5-14 years. A seasonal peak in the number of cases during the late summer and autumn was generally observed in all MS, and *S.* Enteritidis demonstrates a much more prominent peak than the other serovars. In 2006, the proportion of cases reported as imported decreased to 8.0% from 8.3% in 2005. Data on the origin of cases (domestic/imported) were provided by 18 MS and varied considerably between MS.

Foodstuffs
A wide range of foodstuffs was tested for *Salmonella*, but the majority of samples were from various types of meat and products thereof. As in previous years, MS reported *Salmonella* findings most frequently from investigations of poultry meat, followed by those of pig meat. The highest proportions of positive samples were also observed in investigations of these food categories. The Nordic countries reported the lowest levels of *Salmonella* positive samples in poultry, pig and bovine meat samples.

The average proportion of *Salmonella* positive samples in fresh broiler meat was 5.6% in EU, but also some very high *Salmonella* frequencies (up to 67.6%) were reported by MS. The *Salmonella* frequency in fresh turkey meat is generally slightly higher than in broiler meat, on average 6.4%, even though the reported range of positive samples was smaller (0-14.3%). *Salmonella* positive samples were found in moderate proportions in pig meat (on average 1.0%, range 0-11.5%). Most MS reported very low (< 1.0%) proportions of positive samples in bovine meat, even though a few MS reported higher frequencies (up to 7.5%). These findings are in line with the reported data from 2004 and 2005.

For those MS reporting data on table eggs, no major changes were observed in the proportion of *Salmonella* positive samples compared to previous years. The average *Salmonella* frequency was 0.8% (range 0.1-7.1%). Very few positive findings of *Salmonella* were made from milk, cheese and other dairy products and from fruits and vegetables. Also, fish, fishery products and live bivalve molluscs were reported occasionally to contain *Salmonella*, all with proportion of positives below 1%.

A new set of Community *Salmonella* criteria came into force in 2006, and most violations against these criteria were observed from products of meat origin, especially from those of poultry meat.

Animals
Salmonella findings were reported in various animal species, including farm, pet and zoo animals and wildlife. However, the most frequent findings were made from poultry flocks. Most of the MS implement control programmes for *Salmonella* in laying hens and broilers apart from the mandatory control of breeding flocks of *Gallus gallus*. Some MS have also a control programme for pigs.

The mandatory control program for *Salmonella* in breeding flocks of *Gallus gallus* ensures relatively comparable data within the Community. Overall, in EU 2.2% of the tested parent-breeding flocks for laying hen production and 5.2% of parent-breeding flocks for broilers were found infected with *Salmonella* in 2006. In the parent breeding flocks for laying hens, there was a decreasing trend in the *Salmonella* spp. EU mean prevalence over the past three years and only few MS reported findings of *S.* Enteritidis and *S.* Typhimurium. However, in the breeding flocks for broilers, there was an increase in the EU mean prevalence of *Salmonella* spp. and that of *S.* Enteritidis and *S.* Typhimurium over the last years, mainly due to results of one large MS.

In laying hen flocks, 4.4% (0-31.2%) of the tested flocks were infected with *Salmonella* in the routine monitoring, while 3.4% (0.2-66%) of the tested broiler flocks were found positive. There was significant decrease in the EU mean *Salmonella* spp. prevalence in laying hen flocks over the past three years in MS that implemented control programmes, but no significant trend were observed in broiler flocks. Of the tested turkey flocks, 5.0% (0-14.7%) were *Salmonella* positive and in flocks of ducks and geese, 44.4% to 10.4% of the flocks were reported infected.

Few MS have active monitoring of *Salmonella* in pigs and cattle. Seven countries reported prevalence from 0-58.8% in pig herds and slaughter batches, for cattle the reported prevalence in animals varied from 0-7.3%.

Feedingstuffs
Information on *Salmonella* in feedingstuffs was received from the majority of the MS. The very low occurrence (1.9%) of *Salmonella* in fishmeal continued in EU, whereas higher levels were reported from meat and bone

meal (2.3%). The highest levels of *Salmonella* positive samples were found in oil seeds and products thereof (2.5%). In compound feedingstuffs, *Salmonella* was isolated in 0-9.4% of the samples tested. As in 2005, *S.* Enteritidis and *S.* Typhimurium were detected in several types of feedingstuffs, but they were not the dominant serovars encountered.

***Salmonella* serovars and phage types**

As in previous years, *S.* Enteritidis and *S.* Typhimurium were the most commonly reported serovars in humans, accounting for 62% and 13% of the reported cases, respectively (TESSy data). All other serovars each caused 1% or less of the reported human cases. The most common phage types in human cases were PT4 and DT104 for *S.* Enteritidis and *S.* Typhimurium, respectively.

In the majority of the MS *S.* Enteritidis was the most common serovar in broiler meat. *S.* Enteritidis was also the predominating serovar in table eggs, laying hens and broilers in EU. *S.* Typhimurium was the predominant serovar isolated from pigs and pig meat, followed by *S.* Derby. In cattle, the main serovars were *S.* Typhimurium, *S.* Goldcoast and *S.* Dublin. In feedingstuffs, the most frequently reported serovars were *S.* Mbandaka, *S.* Senftenberg and *S.* Agona. The most frequently reported *S.* Enteritidis and *S.* Typhimurium phage types in broiler meat and farm animals were PT4 and DT104 and DT 139, respectively.

Antimicrobial resistance

The majority of *S.* Enteritidis isolates from humans were fully sensitive to all antimicrobials tested. Compared to 2005, there was an increase in resistance to nalidixic acid, sulphonamids and ampicillin to 14.8%, 8.0% and 8.1%, respectively. The resistance to ciprofloxacin remained at low level (0.6%) in EU. From the *S.* Typhimurium isolates 39.7% were resistant to more than 4 of the antimicrobials tested, and there was an increased in resistance to sulphonamids and streptomycin to 59.7% and 51.9%, respectively. The resistance to ciprofloxacin in *S.* Typhimurium isolates was 0.7%.

Nalidixic acid is an indicator for increasing resistance to fluoroquinolones (e.g. ciprofloxacin), which are antimicrobials regarded as critically important for treatment of human cases. In *Salmonella* isolates from broiler meat, high proportion resistance (50.8%) was observed to nalidixic acid and the resistance to ciprofloxacin was 4.6% in EU. In isolates from pig meat these resistance levels were clearly lower (3.8% and 0.7%, respectively).

In animals, the nalidixic acid and ciprofloxacin resistance was the highest in isolates from fowl (*Gallus gallus*). The reported proportions of resistance at EU level were 27.5% and 0.9% for *S.* Enteritidis and 12.3% and 0.9% for *S.* Typhimurium, respectively. Among *S.* Typhimurium isolates from broilers, pigs and cattle resistance to ampicillin, streptomycin, sulphonamide and tetracycline was most frequently observed (generally at levels of 30% - 70%), which pattern resembled that of *S.* Typhimurium isolates from humans.

Campylobacter

Humans

In 2006, a total of 175,561 confirmed cases of campylobacteriosis were reported from 21 MS. The EU incidence was 46.1 per 100,000 population ranging from 0.3 – 220.2. There was a drop in the incidence compared to 2005, which is primarily explained by decreases in the number of reported cases in the Czech Republic and Germany. No common trend within the MS was evident. As in earlier years, the most commonly reported species to cause infection was *C. jejuni* followed by *C. coli.*

The highest incidence of reported human cases was for the age group 0-4 years. A seasonal peak in the number of cases during June-August was observed, and the proportion of cases reported as imported was 8.5% in the 19 MS providing the information.

Foodstuffs

The occurrence of *Campylobacter* in foodstuffs was highest in broiler meat, where on average 34.6% (range 1.9%-66.3%) of samples tested positive. No significant EU trend was apparent in the occurrence *Campylobacter* in broiler meat. Moderate to high levels of *Campylobacter* were also reported in other poultry meat. In fresh pig and bovine meat, the proportions of positive samples were considerably lower; typically less than 5% were positive. In other foodstuffs, *Campylobacter* were occasionally isolated at low to very low frequencies.

Animals

More MS reported information on *Campylobacter* prevalence in animals than in previous years. In broiler flocks, the reported prevalence was 20.3% at EU level ranging from 0 to 83.2%. The observed prevalence in pigs and cattle were often high, as well, at the levels of 0.9%-73.8% and 0%-59.7%, respectively. In general, *Campylobacter* was only found at low frequencies in other animal categories. There was no significant EU trend in *Campylobacter* prevalence in broiler flocks over the years. The most commonly isolated species from animals was *C. jejuni*, except from pigs where *C. coli* predominated.

Antimicrobial resistance

Amongst *Campylobacter* isolates from human cases, resistance to ciprofloxacin, nalidixic acid and tetracycline were common in EU, 45.0%, 37.6% and 29.1%, respectively. This pattern of resistance resembled the occurrence of resistance in isolates from animals and food of animal origin.

In *Campylobacter* isolates from poultry meat, high level of resistance to ciprofloxacin (30.6%) was observed. The resistance to this substance was also high to very high in isolates from fowl (*Gallus gallus*), pigs, cattle, at levels of 31.6% to 56.7% in EU. In addition resistance to tetracycline was very common. Resistance to ciprofloxacin in *Campylobacter* is of concern, as animals and food constitute an important reservoir for *Campylobacter* infections in humans. Ciprofloxacin resistance may limit the treatment options for human infections.

Listeria monocytogenes

Humans

A total of 1,583 confirmed cases of listeriosis were reported from the 25 MS in 2006. The EU incidence was 0.3 per 100,000. The highest incidences were observed in Denmark, Finland and Luxembourg. More listeriosis cases were reported in 2006 than in the two previous years, primarily due to an increased number of cases from the Czech Republic and France. A significant increasing trend over the past five years was observed in listeriosis incidence at the EU level. Listeriosis mainly occurred among adults and elderly people, with 56% of cases occurring in individuals above 65 years of age. Human listeriosis cases were distributed evenly throughout the year, with a slight peak occurring in December.

Foodstuffs

In 2006, a large number of investigations from foodstuffs were reported by 23 MS. The proportion of the samples exceeding the legal safety criterion of 100 *L. monocytogenes* colony forming units (cfu) per gram was most often observed in ready-to-eat (RTE) fishery products (1.7%), followed by cheeses (0.1%-0.6%), other RTE products (0.1%-0.4%) and RTE meat products (0.1%) at the EU level.

Animals

In 2006, 13 MS reported data on *L. monocytogenes* in animals, and the bacterium was reported from several farm animal species, mainly from the ruminants.

Verotoxigenic *Escherichia coli* (VTEC)

Humans

In 2006, a total of 4,916 confirmed human VTEC cases (TESSy) were reported from 22 MS. This is an increase compared to 2005, primarily due to cases from the Czech Republic, who accounts for more than 30% of the reported cases in 2006. The EU incidence was 1.1 per 100,000 population, and there has been a statistically significant decreasing trend in the incidence since 2004. The most commonly identified VTEC serogroup was O157. Overall, more than one half of the reported VTEC cases occurred in 0-4 year old children. Five MS and Norway reported together 124 haemolytic uremic syndrome (HUS) cases, which were mainly associated with VTEC O157 infections. There was a marked seasonality in human VTEC cases with most cases being reported during the summer and autumn.

Foodstuffs

VTEC was detected, mainly at low frequencies, in bovine meat (0-7.2% positive), pig meat (0-19.7%) and sheep meat (0.7-11.1%) as well as raw cow milk, and cheeses made of unpasteurised milk (0-16.2%). The serogroup O157 was most often isolated from fresh bovine meat with rates up to 3.6%. The information available on the serogroups was sparse, however other serogroups than O157 isolated from human cases were also found from meat and dairy products.

Animals

VTEC was found in several animal species, including cattle, pig, poultry, goats and sheep, rabbits and cats by the reporting 14 MS. The majority of positive samples were isolated from cattle where the proportion of positive animals ranged from 0% to 13.7% and most of the O157 serogoup findings were reported for cattle. The serogroup data confirm that bovine animals are a reservoir for human pathogenic VTEC strains, including VTEC O157.

Tuberculosis due to Mycobacterium bovis

Humans
No information on *Mycobacterium bovis* cases in 2006 was available.

Animals
Eleven MS, two non-MS and 11 provinces in Italy were Officially Tuberculosis Free (OTF) in 2006. Amongst these, only Belgium, France and Germany reported some positive cattle herds in 2006. The occurrence of bovine tuberculosis among cattle herds in the 13 non-OTF MS reporting was 0.66%, and there was a slight general increase in the proportion of existing herds positive in the non-free MS. Amongst the co-financed non-OTF MS, a significant general decreasing trend was observed in the overall occurrence of bovine tuberculosis. A few findings of *M. bovis* in other domestic animals, wildlife and zoo animals were reported by several MS indicating that some of these animal species can serve as a reservoir of bovine tuberculosis.

Brucella

Humans
In 2006, a total of 1,033 brucellosis cases were reported in EU. The EU incidence was 0.20 cases per 100,000 population. The highest incidences were recorded by the MS who are not officially free of bovine and ovine/caprine brucellosis. In Greece and Spain there was a significant decreasing trend in the number of cases over the past five years. In EU, the highest incidence of brucellosis was noted for 25-64 year old persons. A peak in the reported cases was observed in spring and summer.

Foodstuffs
Data on the occurrence of *Brucella* in milk and cheese were provided by 2 MS, and positive findings were only reported in raw cow milk (0-0.8%).

Animals
In 2006, 12 MS, Great Britain, 48 provinces and one region in Italy as well as the Azores in Portugal were officially free of brucellosis in cattle (OBF) as well as in sheep and goat (ObmF). Hungary, Ireland, Slovakia, Slovenia, Northern Ireland, as well as 64 départements in France and the Canary Island in Spain were ObmF, only.

With the exception of two infected herds, *Brucella* was not detected in cattle, sheep or goat herds in any OBF/ObmF MSs or in the non-officially free MS that were not co-financed by the Community in 2006. The proportion of existing cattle herds positive to bovine brucellosis in the non-free MS was 0.22% and that of caprine/ovine brucellosis in sheep and goat herds 1.8%. There was a general decrease in both these figures compared to 2005. This decreasing trend was statistically significant for bovine brucellosis in the co-financed non-free MS. *Brucella* spp. was also reported sporadically in other species of domestic animals and in wildlife and zoo animals.

Yersinia

Humans
Twenty MS reported a total of 8,979 confirmed cases of yersiniosis, and the overall EU incidence was 2.1 per 100,000 population. This represents a 5.8% decrease from 2005, but the trend was not statistically significant in EU over the past five years. Most reported cases occurred in age groups 0-4 and 5-14 years. The majority of cases were reported as domestic.

Foodstuffs
Six MS reported on *Y. enterocolitica* findings from meat and milk. The highest proportion of *Y. enterocolitica* positive samples was from pig meat, up to 26%. Positive findings were also made at low levels from cow milk, bovine meat and poultry meat. Little information with regard to human pathogenicity of the isolated strains was provided, but one human pathogenic serotype was recorded from pig meat.

Animals
Y. enterocolitica findings were reported from several farm animal species in EU. Generally very low to low proportions of positive samples were detected, but one MS reported a very high prevalence in pigs (75%). Human pathogenic *Y. enterocolitica* strains were found in pigs, cattle, sheep, goats, solipeds and dogs.

Trichinella

Humans
In 2006, eight MS reported 231 cases of trichinellosis with an EU incidence of 0.04 per 100,000 population. This is a 32% increase compared to 2005, and is mainly due to *Trichinella* outbreaks in Poland, Germany and Spain. Over the past five years, no significant trends in *Trichinella* infections in EU were observed. Bulgaria and Romania accounted for the highest number of reported cases.

Animals
Positive findings of *Trichinella* in pigs or farmed wild boar were not reported by the majority of MS. Only Italy, Poland and Spain found *Trichinella* in domestic pigs at a very low prevalence (>0,001%), while Bulgaria and Romania reported much higher proportion of positive samples. Substantially more *Trichinella* positive samples were observed in the wildlife population especially in carnivorous wildlife species, bears and wild boars, indicating that the wildlife serves as a reservoir of the parasite.

Echinococcus

Humans
Twenty-three MS reported 458 human cases of echinococcosis in 2006, which is a 50% increase compared to 2005, mainly due to increased number of cases reported by Austria, Germany, Latvia, Poland and Spain. The EU incidence was 0.1 in 100,000 population. No statistically significant five-year trends were observed. *E. granulosus* accounted for 2/3 of the cases with a verified species. Most diagnosed cases were in adults more than 25 years old, which is to be expected since clinical signs take 10-15 years to develop. Bulgaria reported cases for the first time in 2006, and with a total of 543 cases.

Animals
In domestic animals, most of the positive findings of *Echinococcus* were reported from the Mediterranean MS and some central European MS. The observed prevalence was low and no significant trends in the prevalence of *Echinococcus* were detected in cattle, sheep or goats in EU.

E. multilocularis was commonly detected in foxes in five MS, mainly in central Europe. Further, *E. multilocularis* was reported in voles from the archipelago of Svalbard (Norway), in cattle from Italy and in dogs from France. *E. granulosus* was recorded from domestic animals, reindeer and wolves.

Toxoplasma

Humans
As in 2005, no data on human cases were available.

Animals
Findings of *Toxoplasma* were reported from cattle, goats, sheep, pigs, dogs, cats and a few wild animals. The majority of samples collected were based on clinical suspicion.

Rabies

Humans
In 2006, no human rabies cases were reported.

Animals
Fourteen MS and two non-MS reported classical rabies virus in various animal species. The majority of rabies cases in domestic and wild animals was reported by the Baltic and some Eastern European MS, where foxes and raccoon dogs accounts for more than 75% of the positive samples. Only five MS reported findings of European bat *Lyssavirus* in bats.

Transmissible Spongiform Encephalopathies (TSEs)

The information deriving from the Commission's Report on Monitoring and Testing of Ruminants for the Presence of Transmissible Spongiform Encephalopathy (TSE) in the EU in 2006 indicates that 320 bovine animals tested positive for bovine spongiform encephalopathies (BSE) in the MS. No BSE cases were found in sheep or goats.

Avian Influenza

The data on Avian Influenza (AI) is obtained from the Annual Reports on the EU surveillance for AI in Poultry and Wild Birds during 2006 published by the European Commission. AI virus subtypes H5 and H7 were detected in 91 poultry holdings in EU, most often from ducks and geese. These virus subtypes are able to mutate into highly pathogenic virus types, which have a potential to infect also humans. In wild birds, MS reported 590 cases of Highly Pathogenic Avian Influenza H5 type. The majority of these findings were from swans.

Cysticerci and *Sarcocystis*

Data on cysticercus (*Tania saginata*) was provided by three MS and *Sarcocystis* was only provided by Luxembourg. Overall, 0.3% of the carcasses were found infected with *Cysticercus* and very few (0,002%) with *Sarcocystis*.

Q fever

Nine MS provided information about *Coxiella burnetii* in animals in 2006. The majority of samples was taken due to clinical suspicion or after abortion. The majority of positive samples originated from cattle (81%) and in total, 6.9% of the samples were positive.

Other zoonoses

Two MS reported information on psittacosis (zoonotic clamydiosis) and *Leptospira* spp. findings in animals.

Foodborne Outbreaks

In 2006, 22 MS reported 5,710 foodborne outbreaks involving a total of 53,568 people, resulting in 5,525 hospitalisations (10.3%) and 50 deaths (0.1%). Three non-Member States: Norway, Romania and Switzerland, reported additional 97 outbreaks involving 1,461 persons. The number of deaths (55) caused by foodborne outbreaks more than doubled from 2005 to 2006, which was mainly due to a large *L. monocytogenes* outbreak in the Czech Republic. As in previous years, the most common agent responsible for foodborne outbreaks in 2006 was *Salmonella*, but for the first time foodborne viruses were the second most commonly reported causative agent overtaking *Campylobacter.*

Salmonella was the causative agent of 53.9% of all reported outbreaks, involving 22,705 persons, of which 14.0% were hospitalised and 23 died. *S.* Enteritidis and *S.* Typhimurium were the predominant serotypes, but in outbreaks caused by *S.* Group D and *S.* Enteritidis relatively large proportions of cases required hospitalisation (30.4% and 19.6% respectively). Private homes and restaurants were the most commonly reported location of exposure to *Salmonella*, but travel abroad was also often associated with *Salmonella* outbreaks. Eggs and meat were the most common sources implicated in outbreaks.

Foodborne viruses caused 10.2% of all reported outbreaks and affected 13,345 people, of whom 4.1% were admitted to hospital and three died. Caliciviruses were the most common source of non-bacterial foodborne outbreaks and the causative agent in 6.3% (362) of all reported outbreaks in 2006. Since 2005, the number of reported outbreaks caused by viruses has increased by 88.3%; however it may be that the numbers previously have been significantly underestimated.

Campylobacter was the causative agent in 6.9% of all reported outbreaks, involving 1,304 persons, of which 5% were hospitalised. Meat was the most commonly reported source for *Campylobacter* outbreaks. On average, *Listeria* was the most severe causative agent in the outbreaks in 2006. Nine outbreaks affected 120 people, of which 74.2% (89) was hospitalised and 17 people died. Soft cheese, mushrooms and dairy products were identified as vehicles of the *Listeria* outbreaks.

Also outbreaks caused by other bacteria, bacterial toxins, parasites and other toxins were reported by the MS.

Antimicrobial resistance in *E. coli* indicators

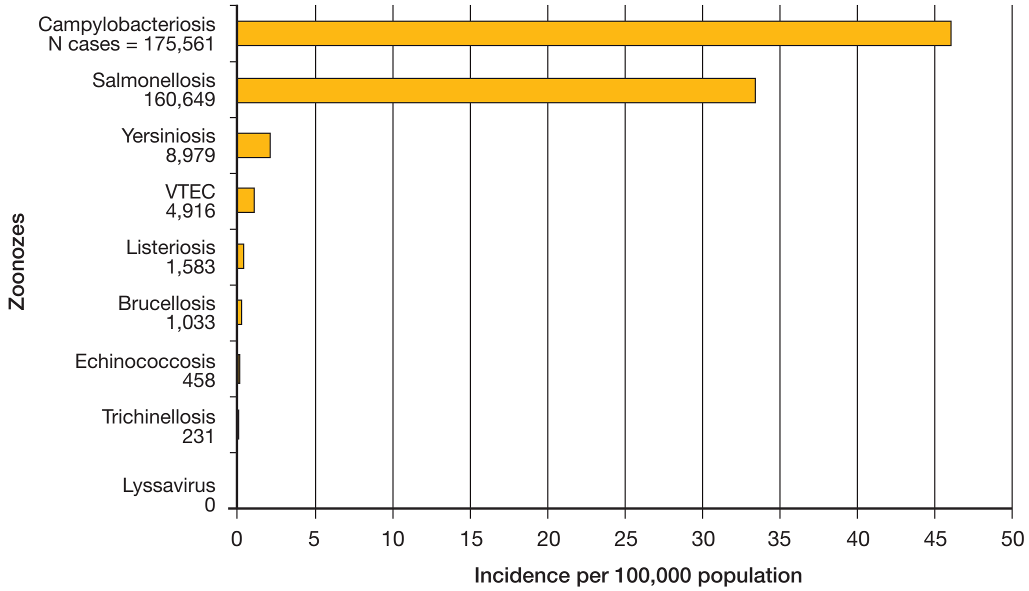
In *E. coli* isolates from animals, resistance to tetracycline, nalidixic acid and ampicillin was the most common. In EU, the highest levels of resistance to ciprofloxacin and nalidixic acid were found in isolates from fowl (*Gallus gallus*). The reported percentage resistant isolates were 17.4% and 37.8%, respectively. A marked difference in the prevalence of resistance between the Nordic countries and the other European countries was evident.

The reporting of antimicrobial resistance in *E. coli* documents a widespread occurrence of antimicrobial resistance in indicator bacteria from food animals in the MS. This constitutes a reservoir of resistance from which resistant bacteria can be transferred to humans, or resistance determinants can be transferred to zoonotic bacteria.

Animal populations

In 2006, 24 MS and two non-MS reported data on animal populations within the four most important animal species: cattle, pigs, sheep and "*Gallus gallus*" fowl. Most of the countries reported data on the total number of livestock, while fewer reported data on the specific subgroups within the categories. On community level the majority of the reported *Gallus gallus* population was reported as broilers (77%), and the largest population of *Gallus gallus* was, as in 2005, reported by Poland. Approximately 49% of the cattle population was situated in France, Germany and the United Kingdom, and 76% of the pig population was reported from Denmark, France, Germany, Poland and Spain. At EU level, fattening pigs accounted for approximately two thirds of the total population. The majority of the sheep population (69%) was situated in Spain and the United Kingdom.

Figure SU1. The reported incidences of the zoonoses in humans, 2006



The importance of a zoonosis as a human disease is not dependant 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*, *Trichinella* and *Echinococcus*, compared to the number of human campylobacteriosis, these infections are considered important due to the severity of the illness and higher case fatality rate.

2.3. Focus of the year – Strategies to control *Campylobacter* in broilers in the EU

In 2006, thermotolerant *Campylobacter* spp. were again the most common zoonotic bacteria associated with human gastrointestinal disease in the EU. Data were reported on the occurrence of *Campylobacter* in foods and animals; however, the comparability between MS, as well as within MS is biased because of differences in sampling and methods for analyses. Nevertheless, it is evident that *Campylobacter* is present in foodstuffs and animal populations and it constitutes a public health burden in most European countries. Consequently, some MS have implemented control strategies aimed at reducing the occurrence of *Campylobacter* in broilers, in order to reduce the number of human campylobacteriosis cases.

Directing control strategies against broilers and broiler meat seems reasonable since several scientific papers have identified broilers and especially fresh, chilled broiler meat as one of the most important sources of human campylobacteriosis. Furthermore, data reported in framework of the annual zoonoses reports indicate that animals (domestic cattle, pigs and poultry) are also frequent carriers of the bacteria. However, after slaughter and processing, broiler meat seems to be an important vehicle of *Campylobacter*, as the proportion of samples positive for *Campylobacter* is relatively high in broiler meat (up to 69.7%) compared to pork (<5%) and bovine meat (2.5% or less). Other sources, such as untreated drinking water and unpasteurised milk, are also known sources associated with human *Campylobacter* infections.

Based on a questionnaire survey carried out by ZCC, sixteen MS and one non-MS provided data on whether they have implemented a *Campylobacter* control strategy, at any point in the food chain from farmer to consumer (Table 1). Thus, countries were asked to report control strategies implemented not only at farm level, but also at slaughter and processing (good hygiene practices) and at the consumer level, e.g. information campaigns. Of these countries, six MS and one non-MS reported to have a strategy in place. In these cases, the measures taken were specified within predetermined categories (Table 2). The implementation of control strategies has primarily taken place since 2000, with the exception of Sweden, who started implementing their strategy already in 1991. The control strategies are mandatory in Finland, Sweden and Norway. Comparing incidences of human campylobacteriosis in countries with and without a control strategy does not provide any clear evidence that the implemented strategies have an impact on the human health. However, Denmark, Iceland and Norway have all observed reductions in the number of human cases following the implementation of the control strategies.

Table SU1. Overview of countries reporting data on Campylobacter strategies, 2006

	Total number of countries reporting	Countries
Information on control strategies	17	**MS:** AT, BE, DK, EE, FI, FR, DE, IE, IT, LT, LU, PL, SI, ES, SE, GB **Non-MS:** NO

In general, the implemented control strategies are similar at farm level, whereas at the slaughter and at retail and consumer level they are rather differently constructed. Some of the specific components in the strategies are shown in Table 2.

All implemented control strategies include specific biosecurity measures at broiler farms concerning personal hygiene, and cleaning of buildings and the surrounding environment. Only Spain and Norway report treatment of the animal drinking water, to ensure quality and safety. This is achieved by chlorination or UV treatment, respectively.

In contrast to the uniformity of measures implemented at the farms, the measures implemented at the slaughterhouse vary to a greater extent, with the only common denominator being that none of the reporting countries use any chemical decontaminants during slaughter process. The Regulation No 853/2004 of the European Parliament and of the Council provides a legal basis to permit the use of a substance other than potable water to remove surface contamination from products of animal origin, but no specific chemicals has yet been approved for decontamination of fresh meat. Sweden and the United Kingdom apply similar measures at the slaughterhouse, to decrease the amount of faecal contamination during defeathering and/or evisceration (improved Good Hygiene Practices, GHP). In addition, British HACCP based principles require the removal of carcasses with visible faecal contamination. Approximately half of the reporting countries practise logistic slaughter (DK, FI, LT), i.e. slaughtering *Campylobacter* positive flocks at the end of the day. Furthermore, several countries practice channelling of meat from *Campylobacter* positive broilers to freezing (DK, NO) or heat treatment (LT, ES, NO). Other measures implemented at the abattoir include improved GHP and removal of faecal contamination (Table 2).

At retail, labels describing safe food handling and cooking are used on voluntary basis in the UK. In a few of other countries, the manufactures put general labels on the meat informing the consumer of the need for thorough cooking prior to consumption. About half of countries with a control strategy practice some kind of consumer education concerning safe food handling, (including information campaigns at the beginning of the barbecue season, etc.). However the impact of these campaigns is difficult to measure.

Since the implementation of control strategies, Denmark, Sweden and Norway have experienced decreases in the *Campylobacter* prevalence in broilers. In Finland and Lithuania, low prevalences occurred prior to the implementation of a strategy, therefore further reduction might be difficult to achieve. Data on the prevalence are not available for ES and UK. Also, the proportion of positive broiler meat samples at retail has decreased in Denmark, Sweden and the United Kingdom following strategy implementation. Reported data are not available for the other MS.

Table SU2. Specific measures within countries with Campylobacter control strategies, 2006[1]

	DK	FI	LT	ES	SE	UK	NO
Year of implementation	**2003**	**2004**	**2004**	**N.S.**	**1991**	**2003[2]**	**2001**
Mandatory (+/-)	-	+	-	-	+	-	+
Control measures							
Farm							
Biosecurity	√	√	√	√	√	√	√
- Personal hygiene	√	√	√	√	√	√	√
- Buildings	√	√	√	√	√	√	√
- Environment	√	√	√	√	√	√	√
Treatment of drinking water	÷	÷	÷	√	÷	÷	√
Feed additives	√	÷	√	N.S.	÷	÷	÷
Abattoir							
Logistic slaughter	√	√	√	÷	÷	÷	÷
Freezing of meat from positive flocks	√	÷	÷	N.S.	÷	÷	√
Heat treatment of meat from positive flocks	÷	÷	√	√	÷	÷	√
Improved GHP[3]	÷	÷	√	√	√	√	√
Removal of faecal contamination	÷	√	√	N.S.	÷	√	√
Use of chemicals	÷	÷	÷	N.S.	÷	÷	÷
Retail							
Labelling	÷	÷	÷	÷	÷	√	÷
Leak-proof packaging	√ / ÷	÷	√	÷	√	√	√ / ÷
Consumers							
Education	√	÷	√	√	÷	√	÷

Note: N.S. - not stated in questionnaire, √: is included in the strategy; ÷ : is not included in the strategy
1. The table is solely based on information provided by countries.
2. General food hygiene initiatives have been ongoing since 2001
3. GHP - Good Hygiene Practice

Some MS that have not implemented a specific control strategy did, however, report the use of some control measures. For example, biosecurity measures on the farms including personal hygiene, cleaning of buildings and the surrounding environment have been implemented in Belgium, Estonia, Ireland and Italy. Furthermore, Ireland and Slovenia reported to use feed additives (Slovenia: probiotics and acid preservatives) at the farm level. Unfortunately, the reported data on broiler prevalence from these countries are not sufficient to draw any clear conclusions.

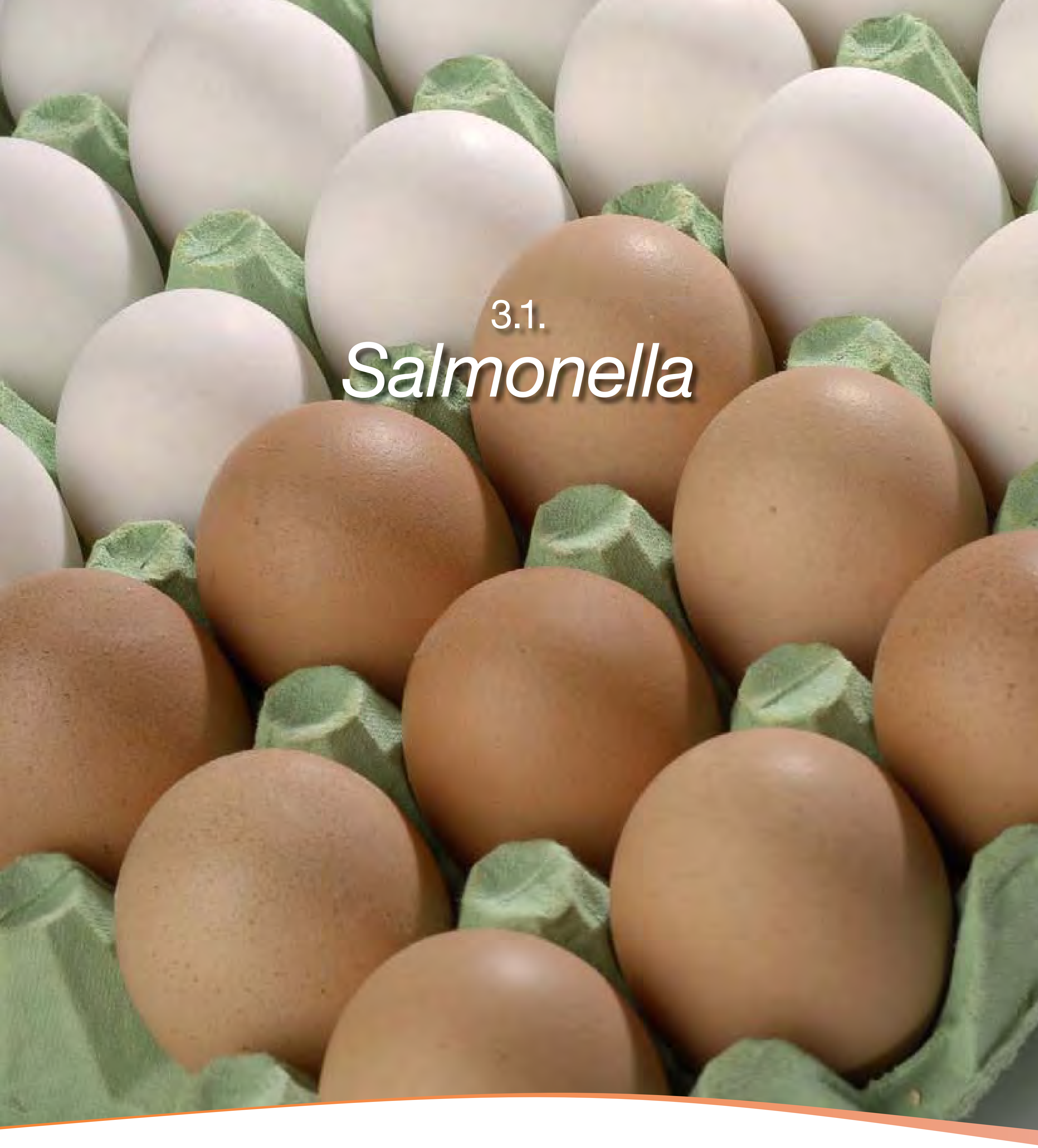
At the slaughterhouse, Belgium and Ireland reported to have a zero tolerance for faecal contamination on carcasses, and Estonia has included logistic slaughter of positive flocks, heat treatment of meat from positive flocks, improved GHP and removal of faecal contamination in their principals of GHP at the abattoir. These measures are similar to what has been implemented in several countries with an official national strategy. The proportion of positive broiler meat samples at retail in Belgium fluctuated over the period 2002-2006; while data reported for Estonian broiler meat at retail in 2006 have show low proportions of positive samples.

To educate consumers, campaigns were carried out in Belgium and Ireland before summer holidays and in December (2005 and 2006), respectively. The effect of such educating campaigns is difficult to measure.

The implemented control programmes include different measures, but based on the available information, none of the programmes seem to be superior to the others. According to the FAO/WHO Risk Assessment of *Campylobacter* spp. in Broiler Chickens (*in press*), the human risk for acquiring campylobacteriosis could be reduced by reducing flock prevalence and/or numbers of *Campylobacter* on meat. Low levels of *Campylobacter* contamination on meat going to retail calls for initiatives to reduce the contamination level, while high levels of contamination calls for initiatives to reduce the *Campylobacter* prevalence in broilers. This conclusion emphasises the importance of both quantitative and qualitative analyses in relation to choosing the most efficient measures for control programmes.

Developing control programmes, every MS will encounter obstacles specific for the particular MS or the geographical location. For example, the Southern European MS will have to deal with higher prevalence/levels of contamination in the primary production than Northern European MS, simply because of the differences in seasonal variations.

In general, countries with a strategy to control *Campylobacter* in broilers have not experienced significant drops in the human campylobacteriosis incidence; however, there are some indications of decreasing trends. Furthermore, decreases in prevalence of *Campylobacter* in the broiler flocks and in the proportions of positive broiler meat samples at retail have also been reported by the countries. It is difficult to evaluate the true impact of implemented control strategies on human health within MS, since a number of other factors influence the reported number of campylobacteriosis cases. First of all, broilers and poultry in general are not the only source of human infections, and therefore cases would occur even if *Campylobacter* were eradicated from the poultry industry. Nonetheless, the burden of human disease due to *Campylobacter* may be reduced markedly. Secondly, several strategies are voluntary, leaving the level of compliance uncertain. Finally, national control programmes only affect the poultry produced domestically, while import and export of meat will inevitably affect the overall *Campylobacter* status of retail meat within a country. This emphasizes the importance of working towards harmonised control strategies at Community level.



3.1. *Salmonella*

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 subspecies 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 2,400 serovars of zoonotic *Salmonella* exist and the prevalence of the different serovars changes over time.

Human salmonellosis is usually characterised by acute onset of fever, abdominal pain, nausea, and sometimes vomiting. 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.

There are numerous foodborne sources of *Salmonella* including a wide range of domestic and wild animals and a variety of foodstuffs covering both food of animal and plant origin. 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, or because of inadequate cooking or cross contamination of ready-to-eat food. The organism may also be transmitted through direct contact with infected animals or faecally contaminated environments and humans.

Overall, in the EU *S.* Enteritidis and *S.* Typhimurium are the serovars most frequently associated with human illness. Human *S.* Enteritidis cases are most commonly associated with consumption of contaminated eggs and broiler meat, while *S.* Typhimurium cases most often are associated with 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 and sheep, goats and poultry usually show no signs of infection.

Table SA1 presents the countries reporting data for 2006.

Table SA1. Overview of countries reporting data for Salmonella

	Total number of MS reporting	Countries
Human	26	**MS:** All **Non-MS:** BG, IC, LI, RO, CH and NO
Food	24	**MS:** All except CY, MT **Non-MS:** BG, CH and NO
Animals	23	**MS**: All MS except CY, LU, MT **Non-MS**: BG, RO, CH and NO
Feedingstuffs	22	**MS:** All except CZ, CY, MT **Non-MS:** NO
Sero- and phage types	23	**MS:** All except CY, MT **Non-MS:** BG, CH and NO
Antimicrobial resistance	21	**MS:** All except CY, LT, MT, PT **Non-MS:** LI, RO and NO

3.1.1. Salmonellosis in humans

In 2006, a total of 165,023 confirmed cases of human salmonellosis were reported via TESSy (The European Surveillance System) from 31 countries: 25 EU MS and six non-MS. The number of human salmonellosis cases in the EU reported via BSN (Basic Surveillance Network) has decreased since 2004; from 196,042 (or 42.2/100,000) in 2004 to 173,879 confirmed cases (or 38.2/100,000) in 2005 and to 160,649 (or 34.6/100,000) in 2006. This represents a 7.6% decrease from 2005 and 18.1% decrease from 2004 in EU MS, despite contributions from MS that had not reported earlier (Greece in 2005, Slovenia in 2005 and Luxembourg in 2004). While this Community trend is statistically significant over the past three years, it is not significant over the past five years.

The Czech Republic reported 8,674 fewer cases in 2006 than in 2005 and Poland reported 2,546 fewer cases compared to 2005, thereby accounting for 85% of the difference between the total confirmed cases in the past two years. Only nine MS reported a decrease in *Salmonella* incidence in 2006, while the other MS experienced only little change in incidence from the year prior. Germany accounted for 32.7% of all reported cases as they did in 2005 (Table SA2).

The Figure SA1 illustrates the geographical distribution of the reported incidences in EU. The different sensitivities of the reporting systems of the MS may have influenced these figures.

Within each reporting MS, statistically significant and decreasing trends (2002-2006) were observed in Austria, Germany, Slovakia, Spain and Poland (Figure SA2). Lithuania is the only MS with a significant increasing trend over the past four years. More than 96% of all specimens were reported as confirmed, similar to 2005 when 97.4% were confirmed. Only data from laboratory confirmed cases were used for the trend analysis.

Figure SA1. Salmonellosis incidence in humans in the European Community, 2006 (per 100,000 population)

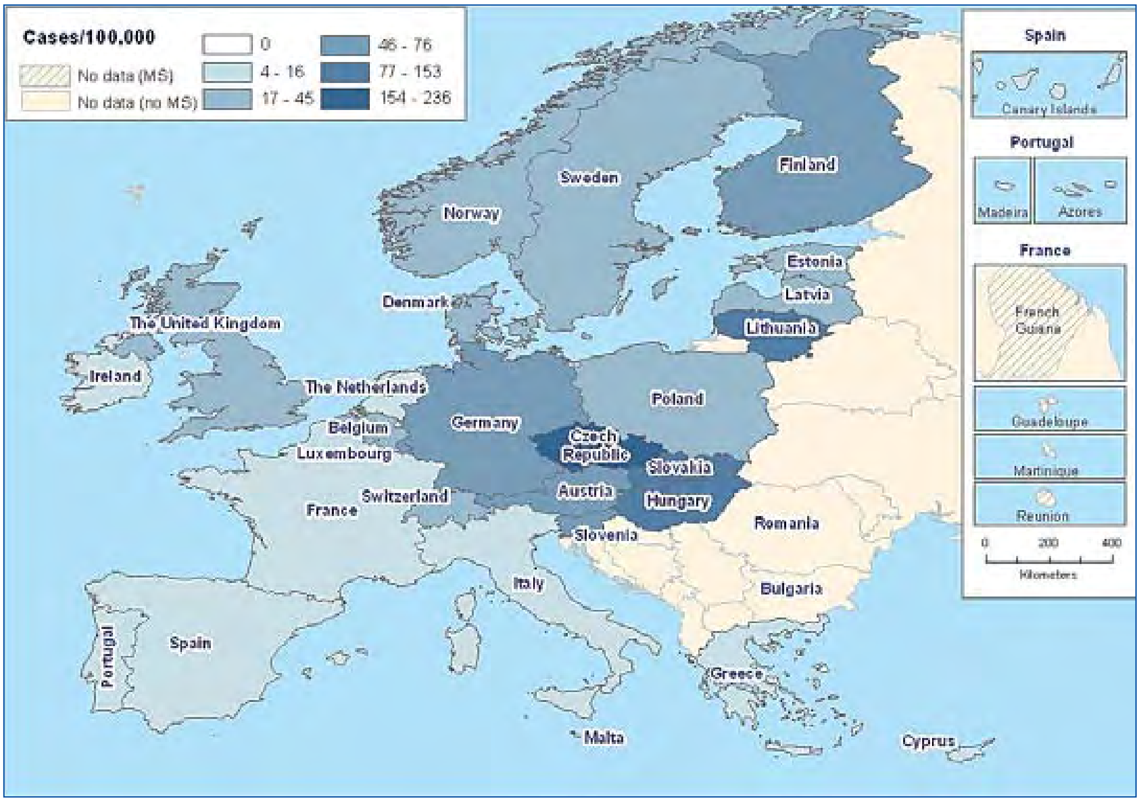
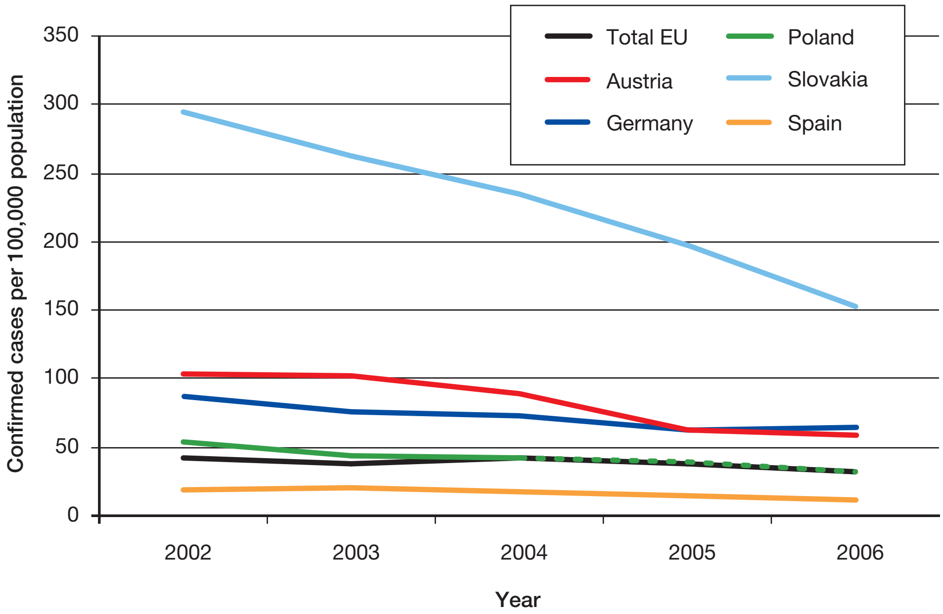


Table SA2. Reported salmonellosis cases in humans indicating: Type of report/total number of cases/confirmed cases/incidence reported to BSN in 2006, total number reported through Enter-net in 2006, number of cases 2002-2005 by all countries[1]

Country	2006					2005	2004	2003	2002
	Report Type[2]	Cases	Con-firmed Cases	Cases/ 100,000	Enter-net				
Austria	C	4,787	4,787	57.9	5,300	5,164	7,286	8,251	8,322
Belgium	C	3,630	0	0	3,630	4,916	9,545	12,894	9,753
Cyprus	C	99	99	12.9	79	59	89	73	117
Czech Republic	C	25,102	24,186	235.9	24,521	32,860	30,724	-	-
Denmark	C	1,662	1,662	30.6	1,696	1,798	1,538	1,713	2,075
Estonia	C	453	453	33.7	453	312	135	184	337
Finland	C	2,574	2,574	49.0	2,578	2,478	2,248	2,290	2,357
France	C	6,339	6,339	10.1	5,897	5,877	6,352	6,199	6,575
Germany	C	52,575	52,575	63.8	2,703	52,245	59,947	63,044	72,377
Greece	C	912	825	7.4	920	545	1,493	837	460
Hungary	C	9,752	9,389	93.2	6,240	7,820	7,557	-	-
Ireland	C	422	420	9.9	430	348	416	449	369
Italy	C	5,164	5,164	8.8	3,412	5,004	6,696	6,352	10,744
Latvia	C	866	781	34.0	785	639	520	799	927
Lithuania	A	3,557	3,479	102.2	3,597	2,348	1,854	1,161	-
Luxembourg	C	308	308	67.0	300	211	-	421	528
Malta	C	63	63	15.6	109	66	79	-	-
Netherlands	C	1,667	1,667	10.2	1,632	1,388	1,520	2,142	1,588
Poland	A	13,362	12,502	32.8	-	15,048	15,958	16,617	20,688
Portugal	C	415	387	3.7	406	468	691	720	330
Slovakia	C	8,784	8,242	152.9	8,990	10,766	12,667	14,153	15,854
Slovenia	C	1,519	1,519	75.8	310	1,519	3,247	3,980	-
Spain	C	5,117	5,117	11.7	4,659	6,048	7,109	8,558	7,968
Sweden	C	4,056	4,056	44.8	4,075	3,168	3,562	3,794	4,508
United Kingdom	C	14,055	14,055	23.3	14,468	12,784	14,809	18,069	16,547
EU Total		**167,240**	**160,649**	**34.6**	**97,190**	**173,879**	**196,042**	**172,700**	**182,424**
Bulgaria	A	1,056	0	0	289	-	-	-	-
Iceland	C	116	116	38.7	-	86	-	-	-
Liechtenstein	C	14	14	40.1	-	-	-	-	-
Norway	C	1,813	1,813	39.1	1,835	1,482	1,567	1,539	1,495
Romania	A	645	645	3.0	449	-	-	-	-
Switzerland	C	1,786	1,786	23.9	1,786	1,877	1,910	2,233	2,509

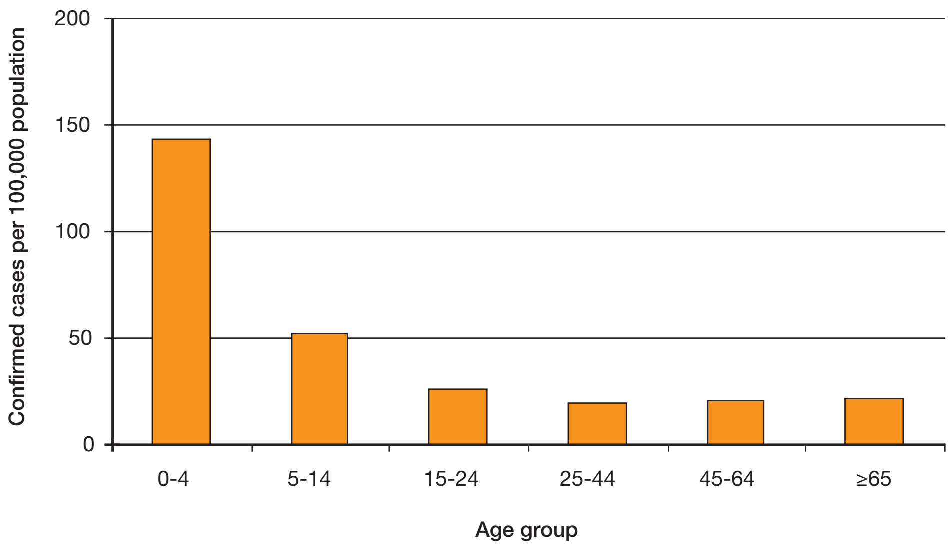
1. Number of confirmed cases for 2005 and number of total cases for 2002-2004
2. A: aggregated data report; C: case-based report; 0:0 cases reported

Figure SA2. Incidence of confirmed cases of human salmonellosis in EU and MS with significant linear trend, TESSy data 2002 - 2006



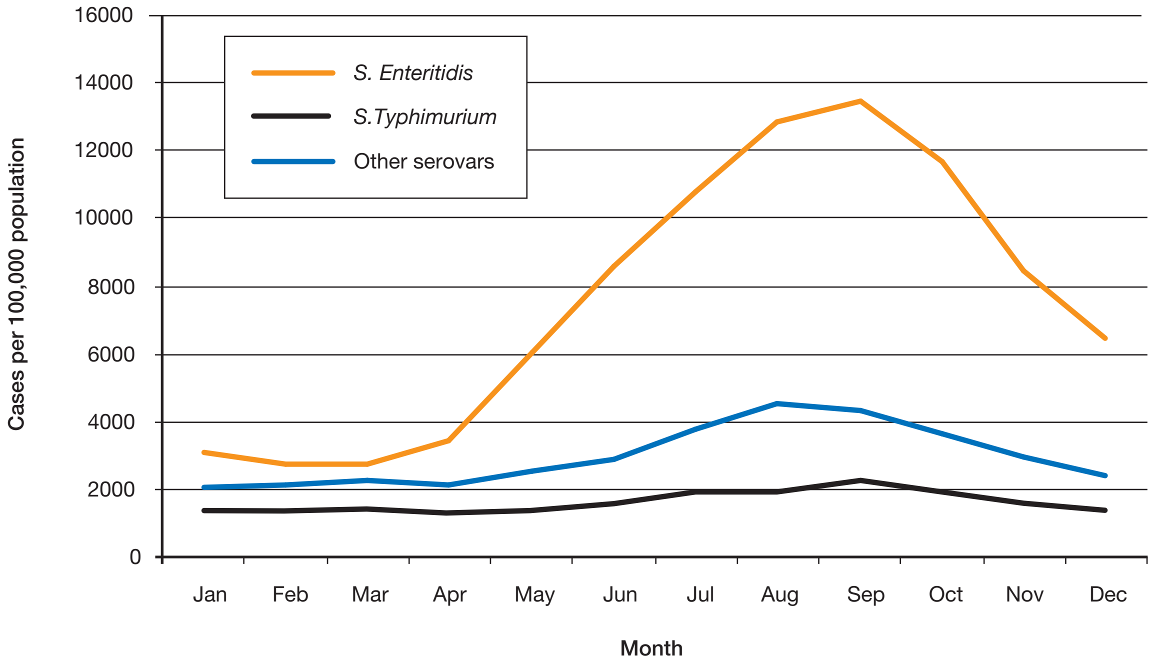
The age distribution of *Salmonella* cases in 2006 closely parallels what was seen in 2005, yet with fewer cases belonging to an unknown age group. The risk for infection is highest in the age group four years of age and younger (represented by confirmed cases/100,000) and is almost three times that of the next highest risk age group (ages five to 14) and five to seven times higher than for those aged 15 and older (Figure SA3).

Figure SA3. Incidence of reported confirmed cases of human salmonellosis in reporting MS and relative frequency of age group, TESSy data, 2006



A peak in the number of reported cases occurs in the summer and autumn, with a rapid decline into the winter months. This pattern supports the influences of temperature and behaviour (i.e. food consumption habits such as barbequing) on S*almonella* incidence. This seasonal variability has been observed in earlier reports, yet when further analyzing specific serovar case counts per month *S*. Enteritidis demonstrates a much more prominent summer/autumn peak than other serovars. This increase in cases over time demonstrates a statistically significant linear trend, while the slight mid year rise in *S.* Typhimurium and other serovar case counts do not Figure SA4.

Figure SA4. Incidence of reported confirmed salmonellosis cases in humans by month and serotype, TESSy data for reporting MS, 2006



Imported cases (cases acquired outside the MS)

The proportion of *Salmonella* cases that were reported as domestically acquired in the MS rose from 49.6% in 2005 to 63.5% in 2006. The proportion of imported cases or those acquired while travelling abroad decreased from 8.3% to 8.0% in 2006. The Nordic countries (Finland, Norway and Sweden) and Iceland reported the highest proportion of imported cases of *Salmonella*. The number of cases with unknown location of origin correspondingly decreased from 42.5% to 28.6% (Table SA3). This more complete classification by reporting countries represents an enhanced quality of data. However, it should be noted that data on imported/domestic cases are often incomplete and may not provide a true picture of the distribution of the two categories.

Table SA3. Reported confirmed salmonellosis cases in humans by reporting countries and origin of case (imported/domestic) in EU, 2006

Country	Domestic (%)	Imported (%)	Unknown (%)	Total (n)
Austria	0	0.1	99.9	4,787
Belgium	-	-	0	0
Cyprus	99.0	1.0	0	99
Czech Republic	99.1	0.9	0	24,186
Denmark	1.6	11.9	86.6	1,662
Estonia	94.0	6.0	0	453
Finland	15.4	78.7	5.9	2,574
France	0.0	8.1	91.9	6,339
Germany	89.5	10.5	0	52,575
Greece	-	-	100.0	825
Hungary	99.8	0.2	0	9,389
Ireland	11.4	14.4	74.2	422
Italy	0.0	0.0	100.0	5,164
Latvia	98.7	1.3	0	781
Lithuania	98.7	1.3	0.0	3,479
Luxembourg	46.1	8.4	45.5	308
Malta	100	0	0	63
Netherlands	88.9	11.1	0	1,667
Poland	-	-	100	12,502
Portugal	100	0.0	0	387
Slovakia	99.5	0.5	0	8,242
Slovenia	0	0	100	1,519
Spain	100	0	0	5,117
Sweden	24.9	73.1	2.0	4,056
United Kingdom	0	2.6	97.4	14,055
EU Total	**63.5**	**8.0**	**28.6**	**160,651**
Iceland	12.9	78.4	8.6	116
Liechtenstein	0	14.3	85.7	14
Norway	21.3	74.2	4.5	1,813
Romania	-	-	100	645

Human *Salmonella* serovars and phage types

As in previous years, the two most common *Salmonella* serovars in 2006 were *S.* Enteritidis and *S.* Typhimurium, representing 75% of all known types, compared to 82% in 2005. Significantly more serovars were reported via TESSy in 2006 compared to earlier years, mainly as a function of Germany's contributions to this data. In spite of this difference, the top ten serovars were not dissimilar to former reports. *S.* Hadar was reported less frequently in 2006 than in 2005, with other serovars representing less than one percent in 2006. A rise or fall on this list is dependent upon whether a large outbreak of a particular strain was identified during the year. Serovar 4,5,12:I:- is closely related to a *S.* Typhimurium, and this serovar has demonstrated a rise in frequency according to Enter-net data. Unnamed serovars are soon due to receive a formal name as their sequences are fully known and to be identified as unique *Salmonella* subspecies (Table SA4).

Table SA4. Reported confirmed salmonellosis cases in humans by serovar (10 most frequent serovars), TESSy and Enter-net data for reporting MS, 2005 – 2006

2006						2005		
Top Ten TESSy			Top Ten Enter-net			Top Ten Enter-net 2005		
Serovar	**N**	**%**	**Serovar**	**N**	**%**	**Serovar**	**N**	**%**
Enteritidis	90,362	62.5	Enteritidis	20,572	59.6	Enteritidis	69,290	69.1
Typhimurium	18,685	12.9	Typhimurium	5,762	16.7	Typhimurium	12,828	12.8
Infantis	1,246	0.9	Virchow	571	1.7	Hadar	2,064	2.1
Virchow	1,056	0.7	4,5,12:I:-	509	1.5	Virchow	1,026	1.0
Newport	730	0.5	Infantis	412	1.2	Infantis	887	0.8
Hadar	713	0.5	Newport	403	1.2	Agona	606	0.6
Stanley	522	<0.5	Hadar	291	0.8	Newport	599	0.6
Derby	477	<0.5	UNNAMED	291	0.8	Stanley	535	0.5
Agona	367	<0.5	Stanley	250	0.7	Bovismorbificans	533	0.5
Kentucky	357	<0.5	Derby	202	0.6	Derby	481	0.5

S. spp. reported through the TESSy 2006, N=17,359 (12%)

In 2006, there are two sources of *Salmonella* serovar data (Table SA4). TESSy data represents uploaded case based and aggregated data that has been approved by each MS, while Enter-net data may come directly from Reference Laboratories or from MS's epidemiologists. More *Salmonella* cases were reported via TESSy than Enter-net in 2006 due in large part to a discrepancy in the proportion of cases reported by Germany (many fewer cases were reported by this country to Enter-net). While the Enter-net pathway has long been the mainstay of *Salmonella* case reporting in Europe, TESSy offers the advantage of less variability with respect to reporting source and will therefore serve as the preferred reporting venue for Europe in the the future.

The most frequent phage type of *S.* Enteritidis in 2006 was PT4, which was also the most frequent phage type reported in 2005 (Table SA5). The top seven most common types were also unchanged from 2005 to 2006. Of the *S.* Typhimurium phage types, DT104 also remained the most prevalent, while significant variation in phage types constituting less than 10% of all known types.

Table SA5. Reported confirmed salmonellosis cases in humans by phage type for S. Enteritidis and S. Typhimurium, TESSy and Enter-net data for reporting MS, 2006

Top Ten TESSy						Top Ten Enter-net					
S. Enteritidis (N=7,866)			*S.* Typhimurium (N=1,601)			*S.* Enteritidis (N=20,572)			*S.* Typhimurium (N=5,762)		
Phage type	**N**	**% Pos**	**Phage type**	**N**	**% Pos**	**Phage type**	**N**	**% Pos**	**Phage type**	**N**	**% Pos**
4	2,384	30.3	104	459	28.7	4	4,108	20.0	104	776	13.5
1	1,537	19.5	120	163	10.2	8	2,296	11.2	120	381	6.6
8	1,129	14.4	193	141	8.8	1	2,166	10.5	193	266	4.6
21	664	8.4	8	95	5.9	21	1,766	8.6	46	266	4.6
14B	547	7.0	104B	76	4.7	6	762	3.7	RDNC	223	3.9
6	315	4.0	1	51	3.2	14B	739	3.6	104B	163	2.8
6A	235	3.0	56	50	3.1	6A	481	2.3	560	121	2.1
13A	118	1.5	RDNC	44	2.7	RDNC	210	1.0	NT	117	2.0
56	93	1.2	135	44	2.7	13A	184	0.9	U302	116	2.0
11	85	1.1	12	41	2.6	3	113	0.5	41	111	1.9

3.1.2. *Salmonella* in food

Most of the MS and non-MS provided data on *Salmonella* in various foodstuffs (Table SA6). In the following analyses only results based on more than 25 samples tested are considered. Results from industry own-control and HACCP sampling are excluded. Details on the monitoring schemes applied in the MS are summarised in Appendix .

Table SA6. Overview of countries reporting data for Salmonella in food, 2006

	Total number of MS reporting	Countries
Broiler meat	21	**MS:** All except CY, MT, NL, ES **Non-MS:** RO, CH
Turkey meat	16	**MS:** AT, CZ, DK, EE, FI, FR, DE, GR, HU, IE, IT, LV, LU, PL, PT, SK, SE
Table eggs	17	**MS:** AT, EE, DE, GR, HU, IE, IT, LV, LT, LU, NL, PL, PT, SK, SI, ES, SE
Pig meat	17	**MS:** AT, BE, CZ, DK, EE, FI, DE, GR, HU, IE, IT,LV, LU, NL, PL, PT, ES, SE **Non-MS:** NO
Bovine meat	16	**MS:** AT, BE, CZ, DK, EE, FI, DE, HU, IE, IT, LU, NL, PL, PT, SK, ES, SE **Non-MS:** NO, RO
Cheese, cow milk	14	**MS:** AT, CZ, EE, DE, HU, IE, IT, LV, NL, PL, PT, SK, SI, ES **Non-MS:** BG
Fruit and vegetables	15	**MS:** AT, CZ, EE, DE, HU, IE, IT, LV, LT, NL, PL, PT, SK, SE, ES
Fish	9	**MS:** AT, EE, DE, IE, IT, LV, PL, SK, ES, SE

Broiler meat and products thereof

A number of MS have applied monitoring schemes for *Salmonella* in broilers (Appendix). In 2006, around 45,000 samples of broiler meat and products thereof were collected and tested in 22 MS and two non-MS. The type of products sampled varied and the analysis were either performed on single samples or on a batch of samples. Compared to recent years there is an increased agreement on analysis of 25 gram of sample.

Table SA7. Salmonella in fresh broiler meat[1], 2006

	Sampling unit	Amount of sample	N	% Pos
At slaughter				
Belgium, with skin	Single	1g	69	1.4
Belgium	Single	25g	6,432	9.4
Denmark	Batch	25g/50g[3]	775	1.9
Estonia[2]	Batch	25g	52	0
Estonia	Single	25g	52	0
Latvia	Batch	25g	1,081	6.9
Spain	Single	25g	93	15.1
Sweden	Single	25g	3,369	0.1
At processing/cutting plant				
Belgium, with skin	Single	1g	293	13.3
Estonia	Batch	25g	90	5.6
Finland	Single	25g	752	0
Greece	Single	25g	805	2.6
Ireland, surveillance	Single	Varies	5,955	1.0
Ireland, monitoring	Single	Varies	174	3.4
Slovenia	Single	25g	172	0.0
Spain	Single	25g	120	4.2
Sweden	Single	25g	1,047	0.0
At retail				
Belgium, skinned meat	Single	25g	40	2.5
Belgium, with skin	Single	25g	40	7.5
Estonia	Single	10g	68	10.3
Spain	Single	25g	294	3.4
United Kingdom	Single	25g	854	7.1
United Kingdom	Single	25g	860	3.6
Sampling level not stated				
Austria	Single	25g	717	5.7
Austria	Single	10g	59	1.7
Czech Republic	Batch	25g	3,358	2
Estonia	Single	25g	32	0
Germany	Single	25g	1,402	9.7
Hungary	Single	25g	136	67.6
Italy	Batch	25g	415	3.1
Italy	Single	25g	847	3.5
Latvia	Batch	10g	60	23.3
Lithuania	Batch	25g	107	10.3
Luxembourg	Single	25g	91	6.6
Poland	Batch	25g	1,638	13
Poland	Single	25g	470	55.5
Portugal	Single	25g	40	0
Slovakia	Batch	25g	324	6.5
Sweden	Single	25g	74	0
EU Total			**33,257**	**5.6**
Romania	Single	25g	8,137	0.4
Switzerland	Batch	25g	440	0

1. Data are only presented for sample size >25
2. In Estonia, samples from import meat included
3. In Denmark, prior to packaging, 5 subsamples pooled in 25 g for *Ante Mortem (AM)* positive flocks and in 50 g for *AM* negative flocks

Most of the countries providing data on *Salmonella* in fresh broiler meat in 2006, reported substantial numbers of positive samples. At slaughter, the proportions of positive samples ranged from 0% to 15.1%. At processing plants, *Salmonella* was detected in none to 13.3% of the samples. For those MS reporting regularly results at processing stage, the proportion of *Salmonella* positive samples is comparable to that of 2005 for Belgium, Finland and Sweden, and decreased in Estonia, Spain and Ireland (Tables SA7 and SA8). At retail, the proportion of positive samples varied between 2.5% and 10.3%. This range is comparable to 2005 (Table SA8). Several MS (AT, BE, CZ, DE and PL) carry out substantial sampling on broiler meat, but do not state the stage of sampling in the food chain. In this group, the proportion of positive samples varied between none to 67.6%.

Data on the occurrence of *Salmonella* in fresh broiler meat at different stages of the production line, in MS that have applied such programmes and have reported consistently from 2002-2006, are presented in Table SA8 and Figure SA5. Denmark, Finland, Ireland, Sweden and Norway have had programmes for the control of *Salmonella* in live broilers for a number of years. Of these countries Sweden, Finland and Norway have reported very low levels of *Salmonella* over more than the last five years (Table SA8). In 2006, Ireland also reached a low level.

Table SA8. Salmonella in fresh broiler meat (unless otherwise stated) at slaughter, processing level and retail, in countries with a monitoring/control programme[1], 2002-2006

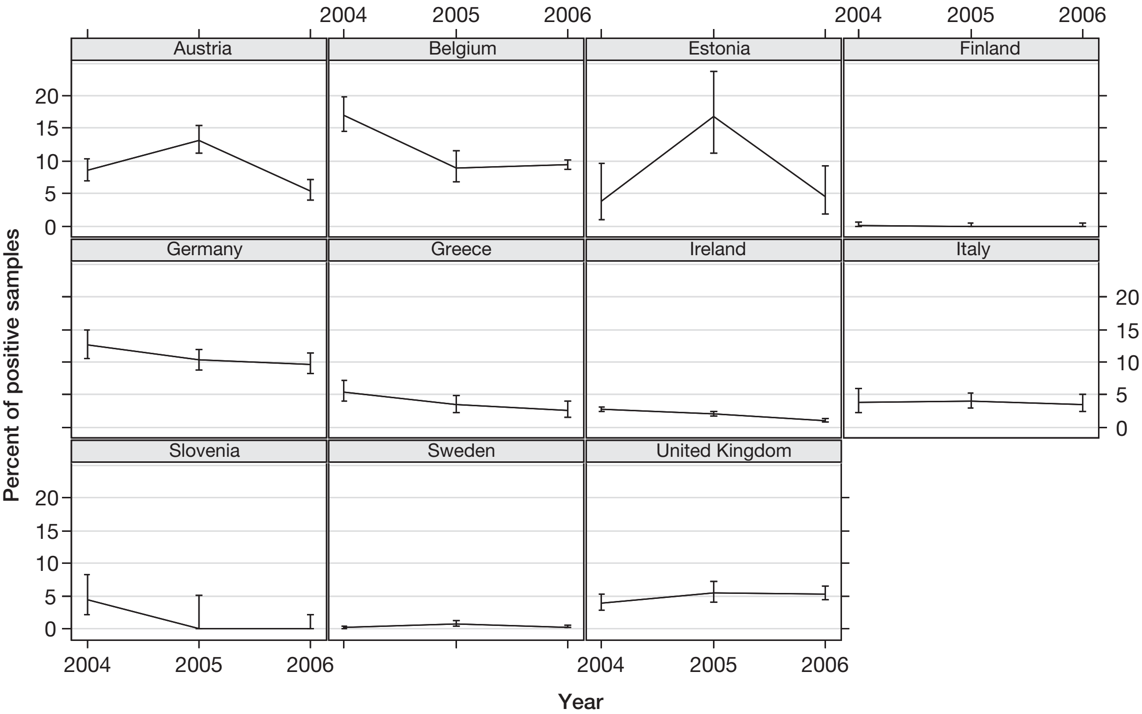
	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
At slaughter										
Belgium[2]	6432	9.4	228	5.7	-	-	189	17.5	171	9.4
Denmark[3]	775	1.9	1,174	2.3	1,472	1.6	1,552	5.0	1,667	5.5
Estonia	52	0	56	8.9	62	3.2	-	-	-	-
Latvia[3]	1,081	6.9	39	5.1	70	7.1	-	-	-	-
Spain[6]	93	15	203	13.8	151	8.6	30	6.7	241	3.7
Sweden[2,4]	3,369	0.1	3,506	0	3,730	0.1	4,209	0	4,466	0.1
Norway[3,4,6]	5,420	<0.1	6,056	<0.1	7,239	<0.1	7,183	0	6,959	0
At processing/cutting plant										
Belgium[2]	293	13.3	260	14.2	1,832	8.7	1,485	14.2	1,383	16.7
Estonia	90	5.6	93	21.5	42	4.8	-	-	-	-
Finland[5]	752	0	772	0	777	0.1	1,034	0.1	946	0.2
Ireland[5]	6,129	0.9	7,485	2.2	6,955	2.7	1,869	4.3	3,222	4.9
Spain[6]	120	4.2	146	5.5	141	2.1	168	18.5	313	6.7
Sweden[5]	1,047	0	1,014	0	1,025	0	1,130	0	1,146	0
At retail										
Belgium[7]	40	7.5	46	2.2	126	13.5	101	2	88	2.3
Greece	-	-	33	18.2	25	0	207	6.3	47	34
Latvia[3]	-	-	96	11.5	345	7.3	-	-	-	-
Spain	294	3.4	400	3.8	495	9.7	320	15	441	9.3
Sweden	-	-	196	4.1	197	2	195	1	421	10.4
EU Total	**20,567**	**4.1**	**15,747**	**2.1**	**15,543**	**3.1**	**12,489**	**4.0**	**13,169**	**4.5**

Note: Data from 2002-2003 is on poultry meat
1. Data are only presented for sample size ≥25
2. Belgium: Carcass (presence in 1g until 2005 and in 25 g in 2006), Sweden: Carcass (presence in 1g, 2002 and 2003)
3. Batch based sampling
4. Neck skin (presence in > 10g)
5. Crushed meat (presence in 25 g), Ireland only 2003
6. Meat from unspecified poultry
7. Meat with skin

Member State specific trends over the last 3 years are presented in Figure SA5a. Even though no statistical significance testing was carried out for the MS specific trends, there appears to be a decreasing trend in the proportion of positive samples for *Salmonella* spp. in Belgium, Germany, Greece, Ireland and Slovenia.

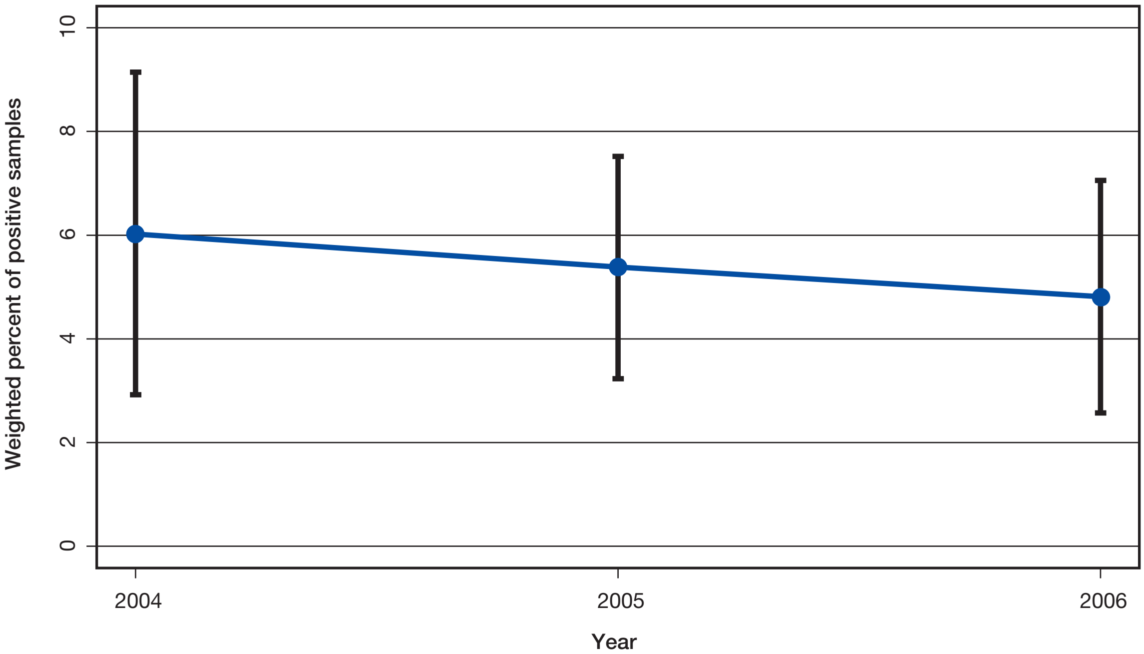
At the EU level, the weighted mean proportion of positive samples decreased in this group of 11 MS that reported consistently over the last three years (Figure SA5 b). This decrease was, however, not statistically significant when tested by logistic regression. See Appendix 1 and notes to Figure SA5 for descriptions of statistics.

Figure SA5a. Salmonella in fresh broiler meat[1], proportion of positives and 95% CI[2] in selected MS[3], 2004-2006



1. Combined data (samples taken at slaughter, at processing/cutting plant or at retail) have been used to estimate the percentage of *Salmonella* positive fresh broiler meat samples. Batch based data excluded
2. Vertical bars indicate exact binomial 95% confidence intervals
3. Include only MS with data from all three years

Figure SA5b. Salmonella in fresh broiler meat, weighted[1] mean proportion of positives and 95% CI in 11 MS[2], 2004-2006



1. Weighted proportion was based only on MS with data for the three years. Weight was the reciprocal of the ratio between the number of tested samples per MS per year, and the broiler population size per MS. Batch based data excluded.
2. Includes only MS with data from all three years: AT, BE, EE, FI, DE, GR, IE, IT, SI, SE, UK

In 2006, data for non-ready-to-eat (non-RTE) broiler meat products were reported from 11 MS and one non-MS. The proportions of *Salmonella* positive samples ranged from none to 40%. The highest level based on single sample testing was reported by Austria (5.5%). Significant surveys from Italy, Poland, Romania and Hungary lack information on sampling stage. As expected, fewer positive samples were obtained from ready-to-eat (RTE) broiler products, however *Salmonella* was detected at a relatively high level in small Austrian, Cyprus, Spanish and Estonian investigations of this type products (Table SA9).

Table SA9. Salmonella in broiler meat preparation and product samples[1], 2006

		Sampling unit	Amount of sample	N	% Pos
NON-READY-TO-EAT					
At processing plant					
Greece	Meat product	Single	25g	477	0.8
Ireland[2]	Meat product	-	-	2,136	0.7
At retail					
Greece	Meat product	Single	25g	39	0
Sampling level not stated					
Austria	Meat product	Single	25g	128	5.5
Belgium	Meat product	Single	1g	141	2.1
Estonia	Meat product	Single	10g	29	3.4
Hungary	Meat product	Batch	10g	641	26.8
	Minced meat	Batch	10g	90	40.0
Italy	Meat product	Single	25g	100	1
	Meat preparation	Single	25g	148	1.4
Latvia	Meat product	Batch	10g	76	6.6
Lithuania	Meat product	Batch	10g	154	10.4
Poland	Meat product	Batch	25g	226	16.4
Poland	Minced meat	Batch	25g	2,121	7.3
Slovakia	Meat product	Batch	10g	154	0.6
	Meat product	Single	25g	100	0
EU Total				**6,760**	**6.7**
Romania	Meat product	Single	25g	1,635	1.5
	Minced meat	Single	25g	181	0
READY-TO-EAT					
At processing plant					
Ireland[2]	Meat product	Single	25g	3,536	0.1
Spain	Meat product	Single	25g	38	5.3
At retail					
Estonia	Meat product	Single	10g	56	6.6
Ireland	Meat product	Single	25g	1,185	0
Spain	Meat product	Single	25g	104	0.9
Sampling level not stated					
Austria	Meat product	Single	25g	246	5.0
Cyprus	Meat product	Batch	-	33	3.0
Hungary	Meat preparation	Batch	25g	515	0.8
Italy	Meat product	Single	25g	46	0
Poland	Meat product	Batch	25g	339	0
Slovakia	Meat product	Batch	25g	93	0
EU Total				**6,191**	**0.4**
Romania	Meat product	Single	25g	1,104	0

1. Data are only presented for sample size ≥25
2. For Ireland, the investigation with largest sample size is presented

Turkey meat and products thereof

The percentage of positive samples in fresh turkey meat based on single samples varied from none to 14.3% positive samples. None of five reports on ready-to-eat products (RTE) revealed positive samples (Table SA10).

Table SA10. Salmonella in fresh turkey meat samples[1], 2006

		Sample unit	Amount of sample	N	% Pos
Cutting and processing plant					
Finland	Fresh meat	Single	25g	356	0
Slovenia	Fresh meat	Single	25g	56	0
Ireland	Fresh meat	Single	Varies	387	3.1
	Meat product, RTE	Single	25g	731	0
Slovenia	Fresh meat	Single	25g	56	0
Retail					
Ireland	Meat product, RTE	Single	25g	167	0
Sampling level not stated					
Austria	Fresh meat	Single	10g	35	14.3
	Fresh meat	Single	25g	59	13.6
Denmark	Fresh meat	Batch	25g	32	0
France	Mechanical separated meat	Batch	100g	40	35
Germany	Fresh meat	Single	25g	562	10.5
Hungary	Fresh meat	Single	25g	114	13.2
	Fresh meat	Single	10g	156	3.8
	RTE	Batch	25g	79	0
Italy	Fresh meat	Single	25g	131	5.3
	Fresh meat	Batch	25g	244	13.1
Poland	Fresh meat	Batch	25g	1,824	5.3
	RTE	Batch	25g	243	0
	Minced meat	Batch	25g	1,799	11.3
Slovakia	Fresh	Batch	25g	41	0
	Minced meat	Single	25g	29	0
EU Total				**7,141**	**6.4**
Romania	Fresh meat	Single	25g	92	3.3
	Meat product, RTE	Single	25g	42	0
	Mechanical separated meat	Single	25g	74	0

1. Studies pooled, when considered acceptable, RTE: Ready to eat

Other poultry meat

Ireland found 1.9% of the investigated samples of fresh duck meat positive, compared to 39.0% in 2005 (the process level of the meat was not specified in 2005). In Germany 14.7% of the samples of fresh duck meat were positive in 2006, compared to 17.5% in 2005. Please refer to Level 3 for further information.

Eggs and egg products

In 2006, several MS and one non-MS reported data from investigations of table eggs. In general, *Salmonella* was found in fresh eggs, raw material at processing and at retail, at levels similar to previous years. Findings of *Salmonella* in table egg samples reported in 2006 are presented in Table SA11. The findings based on single sampling testing ranged from 0% to 7.1%. Additionally, the United Kingdom reported on a survey of imported table eggs and the estimated proportion *Salmonella* positive samples was 3.3% in the survey (N=1,744 pools of 6 eggs).

Control of *Salmonella* in the table egg sector is mainly and most effectively done by monitoring and controlling for *Salmonella* in live hens in laying flocks. These programmes are described in Appendix Tables SA5 and SA6.

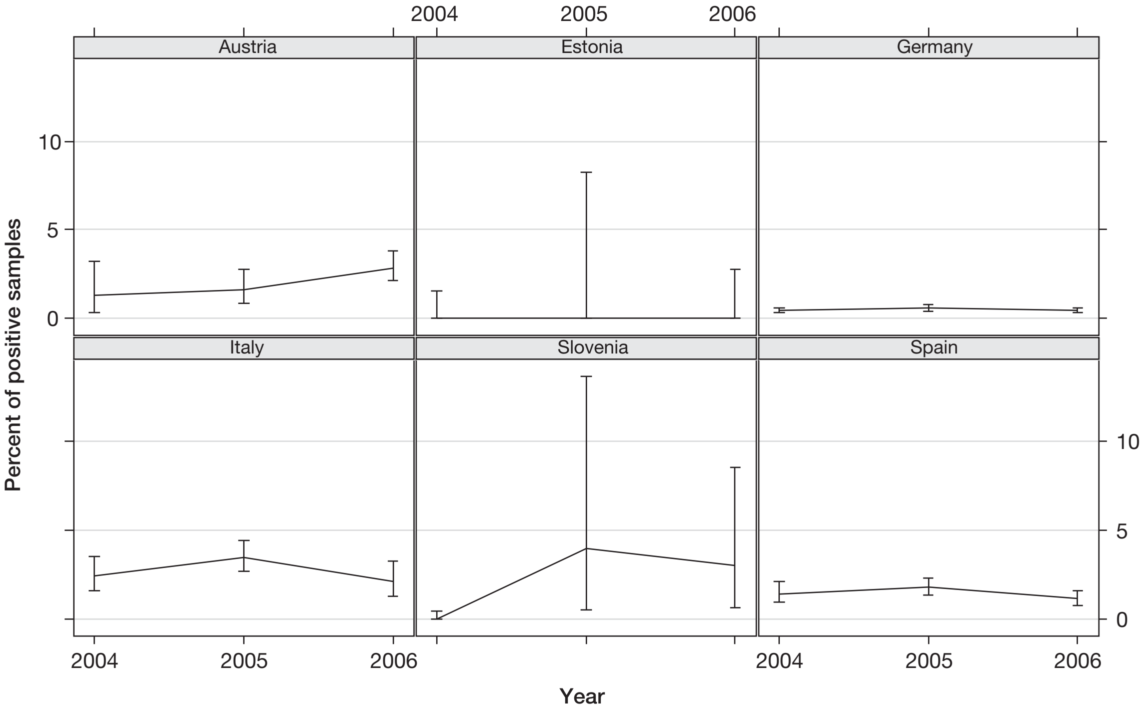
Table SA11. Salmonella in table egg samples[1], 2006

	Sample unit	Amount of sample	N	% Pos
At packing centre				
Austria	Single	25g	1,385	3.0
Estonia	Single	25g	132	0
Germany	Single	25g	646	0
Greece	Batch	25g	197	1.0
Italy	Batch	25g	169	1.8
	Single	25g	251	0.4
Lithuania	Batch	25g	42	7.1
Poland	Batch	25g	902	0.8
Slovakia	Batch	25g	143	1.4
Spain	Single	25g	2,956	1.1
Romania	Single	25g	1,295	0.2
At retail				
Austria	Single	25g	299	2.0
Germany[2]	Single	25g	3,419	0.8
Greece	Batch	25g	37	0
Hungary	Batch	25g	54	0
Italy	Batch	25g	70	2.9
	Single	25g	320	3.8
Luxemborg	Single	25g	184	1.1
Netherlands	Batch	25g	3,223	0.1
Poland	Batch	25g	741	1.6
Slovakia	Batch	25g	160	4.4
Slovenia	Single	25g	100	3.0
Sweden	Single	25g	28	0
Romania	Single	25g	204	0.5
Stage not indicated				
Germany[2]	Single	25g	12,026	0.36
Italy	Single	25g	293	1.1
Portugal	Single	-	996	0.1
EU Total			**28,773**	**0.8**

1. Data are only presented for sample sizes ≥ 25g
2. Four studies pooled

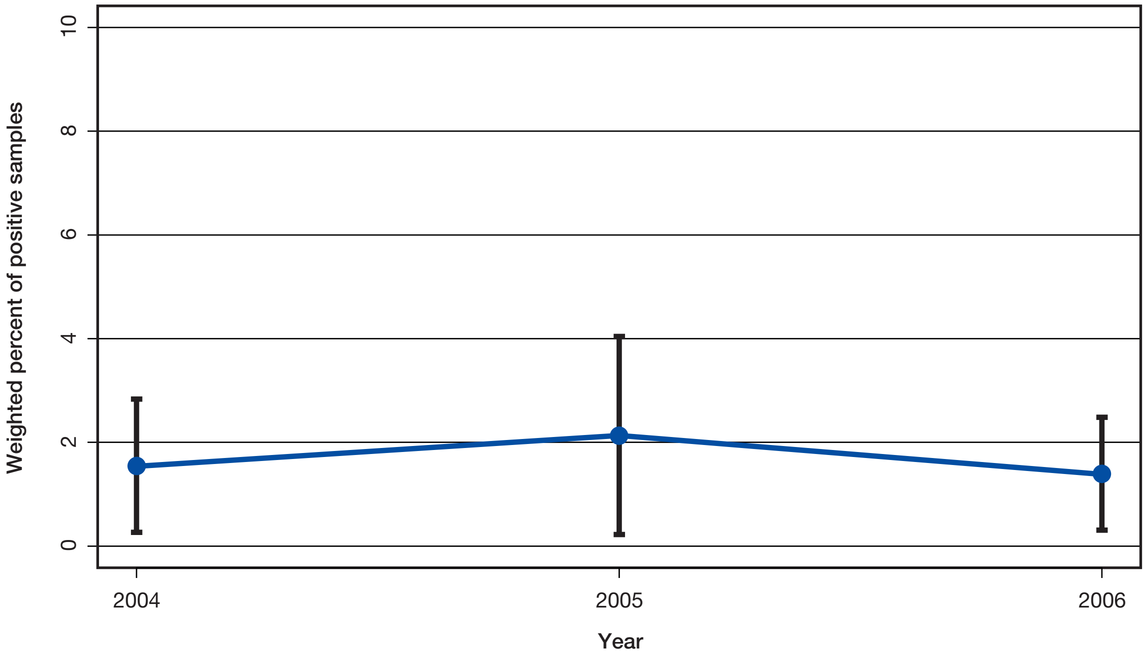
MS specific trends in reported proportion of *Salmonella* positive samples of table eggs are presented in Figure SA6a, for those MS reporting consistently over the last three years. No apparent trends were observed in these MS and small sample sizes in some MS resulted in wide confidence intervals. There was no significant trend at the EU level in the weighted mean proportion of positive samples from these six MS (tested by logistic regression, Figure SA6b). See Appendix 1 and notes to Figure SA6 for descriptions of statistics.

Figure SA6 a. Salmonella in table eggs[1], proportion of positives and 95% CI[2] in selected MS[3], 2004-2006



1. Combined data (samples taken at all stages) have been used to estimate the percentage of *Salmonella* positive table egg samples. Batch based data excluded
2. Vertical bars indicate exact binomial 95% confidence intervals
3. Includes only MS with data from all three years

Figure SA6 b. Salmonella in table eggs, weighted[1] mean proportion of positives and 95% CI, in 6 reporting MS[2], 2004-2006



1. Weight was the reciprocal of the ratio between the number of tested Samples per MS per year» and the number of laying hens per MS. Number of laying hens per MS were based on the population data reported for 2006, and supplemented with EUROSTAT data from 2005 (AT and IT).
2. Includes only MS with data from all three years: AT, EE, DE, IT, SI, ES.

Eleven MS (AT, BE, EE, DE, GR, HU, IE, IT, PL, SK, ES) and one non-MS (RO) tested raw materials for egg products and recorded proportions positives samples ranging from 0 to 14.3%. The only MS reporting more than 1.5% of positive samples were Austria and Hungary (14.3% and 11.0%, respectively). The practice of channelling eggs from *Salmonella*-positive flocks to the egg product industry may have influenced the results from different countries.

Pig meat and products thereof

In 2006, monitoring programmes for *Salmonella* in pig meat were in place in several MS, and are described in Appendix Table SA18. Many of the monitoring programmes are based on sampling at the slaughterhouse and meat cutting plants. A number of different samples are collected, such as surface swabs and meat samples. Results of investigations of fresh pig meat carried out in 2006 are summarised in Table SA12. *Salmonella* positive samples were found in moderate proportions of pig meat, up to 13%. Six of the 20 reporting countries found no positive samples, which is more than in fresh broiler meat (Table SA7). In Table SA13, data reported in the period 2002-2006 on the occurrence of *Salmonella* in pig meat are summarised for countries that have monitoring programmes. Denmark, Finland, Norway and Sweden have consistently reported very low levels of *Salmonella* contamination. From 2004 the Czech Republic, Estonia, and Slovenia also reported very low levels of *Salmonella* contamination of fresh pig meat Table SA13).

Table SA12. Salmonella in fresh pig meat samples[1], 2006

	Description	Sample unit	Amount of sample / swabbing area	N	% Pos
At slaughter					
Denmark[2]	Carcass swab	Batch	300 cm^2	27,892	0.9
Estonia	Carcass swab	Single	1400 cm^2	683	0.1
Finland	Fattening pigs, carcass swab	Single	1400 cm^2	3,322	0
	Sows, carcass swab	Single	1400 cm^2	3,132	0
Slovenia	Carcass swab	Single		35	0
Spain		Single	25g	297	6.4
Sweden	Carcass swab	Single	1400 cm^2	5,918	0
Norway	Carcass	Single	1400 cm^2	3,122	0
At processing/cutting plant					
Estonia	Cutting plant	Single	25g	347	0
Finland	Cutting plant	Single	25g	2,311	0
Ireland	Processing plant	-	Varies	2,908	1.7
Slovenia	Cutting plant	Single	25g	159	0
Spain	Processing plant	Single	25g	88	0
At retail					
Austria	Fresh meat	Single	25g	96	0
Spain	Fresh meat	Single	25g	227	11.5
Level of sampling not stated					
Austria	Fresh meat	Single	25g	33	3
Belgium	Fresh meat	Single	25g	328	2.4
Czech Republic	Fresh meat	Batch	400 cm^2	4,077	0.2
Estonia	Fresh meat	Single	25g	107	0.9
Germany	Fresh meat	Single	25g	2,101	3.0
Hungary	Fresh meat	Single	25g	168	4.8
Italy	Fresh meat	Single	25g	1,880	3.8
Poland	Mechanical separated meat	Single	25g	131	13.0
Portugal	Fresh meat	Single	25g	1,122	5.5
Slovakia	Fresh meat	Batch	25g	536	0.4
Sweden	Fresh meat	Single	25g	432	0
EU Total				**58,330**	**1.0**
Romania	Fresh meat	Single	25g	8,419	0.2

1. Data are only presented for sample size ≥25
2. In Denmark, prevalence of *Salmonella* in single swab samples is estimated from results of pooled analysis of five swabs.

Table SA13. Salmonella in fresh pig meat in countries, which run a monitoring/surveillance programme, 2002-2006

	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Pigs (sample based data) - carcass swabs - at slaughterhouse										
Belgium[1]	-	-	442	9.3	374	12.3	287	14.6	298	15.4
Denmark[2]	27,892	1.9	30,730	1	33,890	1.3	34,250	1.4	36,690	1.4
Estonia	683	0.1	671	0	648	0	-	-	-	-
Finland	6,454	0	6,609	0	6,576	<0.1	6,186	<0.1	6,260	<0.1
Sweden	3,151	0	5,764	<0.1	594	0	6,281	0	6,420	<0.1
Spain	297	6.4								
Norway	3,122	0	3,157	0	2,456	0	2,947	0	2,615	0
Fresh pig meat at cutting plants										
Belgium[1]	328	2.4	307	7.2	374	12.3	278	6.1	224	11.2
Czech Republic[3]	4,077	0.2	2,445	1.9	-	-				
Estonia	351	0	457	0	442	0.2	-	-	-	-
Finland[1]	2,311	0	3,226	0	3,092	0	2,826	0.1	1,840	0.1
Slovenia[1]	159	0	113	0	188	0	-	-	-	-
Spain	88	0	263	4.9	-	-				
Sweden[6]	-	-	4,119	0	4,474	0	4,411	0	4,478	0
Pig meat at retail										
Belgium[4]	-	-	155	6.5	166	12.7	181	9.4	184	13.0
Latvia[5]	-	-	47	0	30	0	-	-	-	-
Sweden[6]	-	-	1,052	0.3	1,262	0	1,272	0.4	1,125	1.9
Spain	227	11.5								
EU Total	**46,018**	**1.3**	**56,400**	**0.8**	**52,110**	**1.0**	**55,972**	**1.0**	**57,519.0**	**1.0**

1. No level stated
2. In Denmark, the majority of samples are tested as 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 pooled analysis.
3. In Czech Republic, batch data
4. In Belgium, minced meat
5. In Latvia, fresh meat
6. In Sweden, data include samples from cattle and pigs

Overall, 16 MS and Romania provided information on *Salmonella* in non ready-to-eat products of pig meat origin (Table SA14a). Five of these reported results with no positive findings, while the other MS recorded findings of 0.1-4.8%. The highest proportion of positive samples was reported by Italy in minced meat. Table SA14b presents the results from ready-to-eat products of pig meat origin from 11 MS and Romania. Four MS reported positive findings at levels above 1.0%.

Table SA14a. Salmonella in non-ready-to eat pig minced meat, meat preparation and product samples[1], 2006

	Description	Sample unit	Amount of sample / swabbing area	N	% Pos
At retail					
Spain	Meat product	Single	25g	367	3.3
At processing plant					
Ireland	Meat product	Single	Varies	3,509	1.3
Slovenia	Meat product	Single	25g	159	0
Spain	Meat product	Single	25g	713	2.2
Stage of sampling not stated					
Austria[2]	Meat preparation	Single	25g	90	2.2
Czech Republic	Minced meat	Batch	25g	26	0
Estonia	Meat preparation	Single	10g	110	0.9
Germany[2]	Minced meat	Single	25g	1,261	3.8
	Meat preparation	Single	25g	1,055	4.0
Hungary	Minced meat	Single	25g	2,777	2.7
	Minced meat	Single	10g	360	4.7
Italy	Meat product	Single	25g	1,094	2.9
Italy[2]	Meat preparation	Single	25g	1,509	2.8
	Minced meat	Single	25g	562	4.8
Luxembourg	Meat preparation	Single	25g	49	0
Netherlands	Minced meat	Single	25g	69	2.9
	Meat preparation	Single	25g	76	2.6
Poland	Meat product	Single	25g	4,672	0.5
Poland[2]	Meat preparation	Single	25g	2,116	0.7
	Minced meat	Single	25g	7,524	0.2
Portugal	Meat preparation	Single	25g	186	2.7
Slovakia	Meat preparation	Batch	25g	199	0.5
	Minced meat	Batch	25g	151	0
Sweden	Meat product	Single	25g	339	0
EU Total				**28,973**	**1.4**
Romania	Meat preparation	Single	25g	123	0
	Meat product	Single	25g	1,038	0.1
	Minced meat	Single	25g	1,080	1.5

1. Data are only presented for sample size ≥25
2. Data from two studies are pooled

Table SA14b. Salmonella in ready-to-eat pig minced meat, meat preparation and product samples[1], 2006

	Description	Sample unit	Amount of sample / swabbing area	N	% Pos
At processing plant					
Ireland	Meat product	Single	varies	5,444	0
At retail					
Ireland	Meat product	Single	25g	927	0.1
Stage of sampling not stated					
Belgium	Minced meat	Single	25g	83	1.2
Czech Republic	Meat product	Batch	25g	35	0
Estonia	Meat product	Single	25g	26	0
Germany	Meat product	Single	25g	1,143	0.4
Hungary	Meat product	Batch	25g	2,584	0.1
Italy	Meat preparation	Single	25g	384	3.4
	Meat product	Single	25g	2,407	0.8
	Minced meat	Single	25g	1,059	1.6
Netherlands	Meat product	Single	25g	313	2.9
Poland	Meat product	Batch	25g	4,607	0.6
	Meat preparation	Batch	25g	552	0.4
Portugal	Meat product	Single	25g	249	2
Slovakia	Meat product	Single	25g	2,678	0
EU Total				**22,491**	**0.5**
Romania	Meat product	Single	100g	80	2.5
	Meat preparation	Single	25g	123	0
	Meat product	Single	25g	8,845	0

1. Data are only presented for sample size ≥25

Bovine meat and products thereof

Monitoring programmes similar to the ones in place for pig meat also exist for bovine meat in some MS (Appendix Table SA21). Overall, 16 MS, and two non-MS provided information on *Salmonella* in fresh bovine meat in 2006. The proportion of positive samples was very low (< 1.0%) in most reporting countries. However, from Spain several studies were reported showing proportions from 0.7% to 7.5% with the highest proportions among samples originating from slaughterhouses. From Hungary and Poland proportions of 2.0% and 1.1% were reported, respectively (Table SA15). Data have been summarised for MS with monitoring and surveillance programmes in the period 2002-2006 (Table SA16). In general, the reported proportions of positive findings in bovine meat were very low throughout the period 2002-2006. In 2006, all countries with monitoring or surveillance programmes reported proportions below 0.5%.

Table SA15. Salmonella in fresh bovine meat samples[1], 2006

	Description	Sample unit	Amount of sample / swabbing area	N	% Pos
At slaughter					
Belgium	Carcass	Single	1,600 cm^2	69	0
Czech Republic	-	Batch	400 cm^2	3,466	0.2
Denmark[2]	Carcass	Batch	300 cm^2	8,155	0.2
Estonia	-	Single	25g	226	0
	Carcass	Swab	1,400 cm^2	320	0.3
Finland	Carcass	Swab	1,400 cm^2	3,237	0.1
Slovenia	Carcass	Swab	300 cm^2	44	0
Spain	-	Single	25g	67	7.5
Sweden	Carcass	Single	1,400 cm^2	3,510	<0.1
Norway	Carcass	Swab	1,400 cm^2	2,035	0
At processing/cutting plant					
Estonia	Cutting plant	Single	25g	78	0
Finland	Cutting plant	Single	25g	2,261	0
Ireland	Processing plant	Single	Varies	21,618	0.2
Slovenia	Cutting plant	Single	25g	155	0
Spain	Processing plant	Single	25g	99	3.0
At retail					
Belgium	Carpaccio	Single	25g	110	0
Spain	-	Single	25g	153	0.7
Level of sampling not stated					
Czech Republic	-	Batch	400 cm^2	3,466	0.2
Estonia	-	Single	25g	115	1.7
Germany	-	Single	25g	638	0.3
Hungary	-	Single	25g	202	2
Italy	-	Single	25g	2,254	0.4
Luxemburg	-	Single	25g	98	1
Poland	-	Batch	25g	1,731	1.1
Portugal	-	Single	Unknown	1,142	0
Slovakia	-	Single	25g	236	0
EU Total				**53,450**	**0.2**
Romania	-	Single	25g	3,133	0.2

1. Data are only presented for sample size ≥25
2. In Denmark, prevalence of *Salmonella* in single swab samples is estimated from results of pooled analysis.

Table SA16. Salmonella in fresh bovine meat in countries with a monitoring/surveillance programme, 2002-2006

	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Bovine meat sampled at slaughterhouse (sample based) - carcass swabs										
Belgium	69	0	-	-	-	-	-	-	-	-
Czech Republic	3,466	0.2	-	-	-	-	-	-	-	-
Denmark[1]	8,155	0.2	9,550	0.6	10,695	0.5	11,660	0.4	12,700	0.2
Estonia	320	0.3	388	0	371	0	-	-	-	-
Finland	3,237	0.1	3,218	0	3,251	0	3,406	<0.1	3,146	<0.1
Slovenia	44	0	-	-						
Sweden	3,510	<0.1	3,297	<0.1	3,475	0	3,220	<0.1	3,121	0
Norway	2,035	0	2,076	0	2,136	0	2,600	0	2,419	0
Bovine meat sampled at slaughterhouse and cutting plants										
Estonia[2]	226	0	343	0.6	310	4	-	-	-	-
Estonia[3]	78	0	85	0	60	0	-	-	-	-
Finland[3]	2,261	0	2,370	0	2,485	<0.1	2,404	0.1	1,948	0.4
Slovenia[3]	155	0	107	0	-	-	-	-	-	-
Sweden[3, 4]	3,898	<0.1	4,119	0	4,474	0	4,411	0	4,478	0
Bovine meat sampled at retail										
Belgium[5]	-	-	171	0.6	98	0	207	0.5	2,041	2.9
EU Total	**25,419**	**0.1**	**23,648**	**0.3**	**25,219**	**0.3**	**25,308**	**0.2**	**27434**	**0.3**

1. In Denmark, the majority of samples are tested as pools of 5 carcass swabs. At small slaughterhouses, carcass samples are tested individually. Prevalence of *Salmonella* in single swab samples is estimated from results of pooled analysis.
2. At slaughterhouse
3. At cutting plants
4. In Sweden, samples collected from both pig and bovine meat. Approximately 40% is estimated to be scrapings collected from beef. In 2006, *S.* Typhimurium was isolated from one sample originating from beef.
5. Samples from minced meat

Data for *Salmonella* findings in minced meat, meat preparations and meat products of bovine meat origin, ready-to-eat and non-ready-to-eat, are summarised in Table SA17. *Salmonella* was isolated from non-ready-to-eat products in several MS, but generally, in low proportions (<2%). An increased number of MS reported data from ready-to-eat products compared to earlier years. Positive findings were reported by Germany, Ireland, Poland and Spain.

Table SA17. Salmonella in bovine minced meat, meat preparation and product samples[1], 2006

	Description	Sample unit	Amount of sample /swabbing area	N	% Pos
NON-READY-TO-EAT					
At processing plant					
Ireland	Meat product	Single	Varies	11,832	0.2
	Minced meat	Single	25g	26	0
At retail					
Austria	Meat preparation	Single	25g	112	0
Level of sampling not stated					
Belgium	Minced meat	Single	25g	75	1.3
Germany	Minced meat	Single	25g	178	1.1
	Meat preparation	Single	25g	30	6.7
Hungary	Minced meat	Batch	10g	163	1.2
Italy	Minced meat	Single	25g	1,132	1.1
	Meat preparation	Single	25g	667	0.4
	Meat products	Single	25g	202	2.5
The Netherlands	Minced meat	Single	25g	596	1.7
	Meat preparation	Single	25g	53	3.8
	Meat preparation	Single	25g	983	0.7
	Meat products	Single	25g	309	1
Poland	Minced meat	Batch	25g	3,095	0.6
	Meat preparation	Batch	25g	246	0.4
	Meat products	Batch	25g	685	1.6
Slovakia	Meat preparation	Single	25g	41	0
EU Total				**20,425**	**0.5**
Romania	Minced meat	Single	25g	910	0.2
	Meat preparation	Single	25g	486	0.4
	Meat products	Single	25g	314	0
READY-TO-EAT					
At processing plant					
Ireland	Meat products	Single	Varies	1,951	0.1
Spain	Meat products	Single	25 g	246	0.5
At retail					
Belgium	Minced meat	Single	25g	35	0
	Meat preparations	Single	25g	124	0
Ireland	Meat products	Single	25 g	481	0
Spain	Meat products	Single	25 g	96	3.2
Level of sampling not stated					
Austria	Minced meat	Single	25g	34	0
Germany	Minced meat	Single	25 g	681	0.9
	Meat product	Single	25 g	190	0.5
	Fermented sausages	Single	25g	69	0
Hungary	Meat products	Single	25g	63	0
Italy	Meat product	Single	25 g	57	0
	Meat preparation	Single	25 g	85	0
Poland	Minced meat	Batch	25g	298	1.7
	Meat products	Batch	25g	26	0
	Meat preparations	Batch	25g	314	0.3
EU Total				**4,750**	**0.4**
Romania	Minced meat	Single	25g	72	0
	Meat products	Single	25g	1,106	0

1. Data are only presented for sample size ≥25

Milk and dairy products

As in previous years, very few positive findings of *Salmonella* in cow milk were reported in 2006. Data from investigations of raw milk intended for direct human consumption were reported by 10 MS. Sample sizes ranged from 13 to 1,125. *Salmonella* was detected in 0.4% (N=437) of samples from Hungary and in 1.4% (N=1,125) of samples from Italy. Thirteen MS reported data from investigations of pasteurised milk with sample sizes ranging from three to 1,098 samples. None of these samples were found positive.

A large number of dairy products were also investigated. Twelve MS reported no findings in butter, 10 MS reported no findings in cream and five MS reported no findings in dairy desserts. Among 16 MS only Italy reported positive findings (0.3%) of ice-cream and among 12 MS only Ireland reported positive samples of milk powder (0.02%).

Data on *Salmonella* in cheese was reported from investigations on cheeses made from pasteurised, raw or low heat-treated milk, from cow, goat and sheep (Table SA18). The number of investigated samples varied considerably and in general, very few findings of *Salmonella* were reported. *Salmonella* positive samples from soft or semi-soft cheeses were reported from two investigations of cheese made from raw or low heat treated cow milk (Austria 1.0% and Germany 2.0%) and from two investigations of cheese made from pasteurised cow milk (Italy and Poland 0.1%, both).

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

Table SA18. Salmonella in cheeses[1], 2006

		Sample unit	Amount of sample	N	% Pos
Made from pasteurised milk from cows					
Austria	Soft and semi-soft	Single	25g	387	0
Belgium	Soft and semi-soft, at farm	Single	25g	24	0
	Soft and semi-soft, at processing	Single	25g	52	0
	Soft and semi-soft, at retail	Single	25g	114	0
Czech Republic	Hard	Batch	25g	299	0
	Soft and semi-soft	Batch	25g	205	0
Germany	Cheeses, other than soft and semi-soft	Single	25g	2,941	0
Hungary	Soft and semi-soft	Batch	25g	401	0
Italy	Soft and semi-soft	Batch	25g	743	0.1
	Soft and semi-soft	Single	25g	388	0
Netherlands	Soft and semi-soft	Single	25g	789	0
Poland	Soft and semi-soft	Batch	25g	1,814	0.1
Slovakia	Soft and semi-soft	Single	25g	735	0
Romania	Soft and semi-soft	Single	25g	4,692	0
Switzerland	Soft and semi-soft	Single	25g	116	0
Made from raw or low heat treated milk from cows					
Austria	Soft and semi-soft	Single	25g	101	1.0
Belgium	Soft and semi-soft , at farm	Single	25g	194	0
	Unspecified	Single	25g	98	0
Germany	Cheeses, other than soft and semi-soft	Single	25g	100	2.0
Hungary	Soft and semi-soft	Batch	25g	64	0
Italy	Soft and semi-soft	Single	25g	266	0
	Soft and semi-soft	Batch	25g	315	0
Poland	Soft and semi-soft	Batch	25g	299	0
Slovakia	Soft and semi-soft	Batch	25g	42	0
Romania	Soft and semi-soft	Single	25g	757	0
Made from pasteurised milk from sheep					
Austria	Soft and semi-soft	Single	25g	31	0
Italy	Soft and semi-soft	Batch	25g	73	0
	Soft and semi-soft	Single	25g	493	0
Slovakia	Soft and semi-soft	Batch	25g	66	0
Romania	Soft and semi-soft	Single	25g	214	0
Made from raw or low heat treated milk from sheep					
Italy	Soft and semi-soft	Single	25g	106	0
Poland	Soft and semi-soft	Batch	25g	24	0
Slovakia	Soft and semi-soft	Batch	25g	824	0
Romania	Soft and semi-soft	Single	25g	480	0
Made from pasteurised milk from goats,					
Austria	Soft and semi-soft	Single	25g	39	0
Italy	Soft and semi-soft	Single	25g	52	0
Netherlands	Soft and semi-soft	Single	25g	95	0
Romania	Soft and semi-soft	Single	25g	214	0
Made from raw or low heat treated milk from goats					
Italy	Soft and semi-soft	Single	25g	53	0
Portugal	Soft and semi-soft	Batch	25g	25	0
EU Total				**12,252**	**0.05**
Romania	Soft and semi-soft	Single	25g	480	0

1. Data are only presented for sample size ≥25

Vegetables, fruits and herbs

In 2006, an increased number of countries reported data on investigations of different kind of plant products, which may reflect the increased attention in this area following several international *Salmonella* outbreaks caused by these type of foodstuffs, e.g. lettuce and basil. In total, 18 MS reported data with sample sizes ranging from one to 3,490. In Table SA19, results from investigations of more than 25 samples are summarised. *Salmonella* was not detected in very few MS and generally at very low levels, only Slovakia reported moderate levels of *Salmonella* in dried herbs.

In addition, several MS (HU, NL, PL, SI) reported on investigations of sprouted seeds, with no positive findings. However, Austria did isolate *Salmonella* (8 *S.* Mbandaka, 4 *S.* Bere) from sprouted seeds in a small investigation including only 20 samples.

Table SA19. Salmonella in vegetables, fruits and herbs[1], 2006

	Description	Sample unit	Amount of sample	N	% Pos
Vegetables					
Austria	-	Single	25g	95	0
Belgium	Pre-cut, RTE	Single	25g	87	0
	Leafy vegetables	Single	25g	55	0
Greece	Product, canned	Batch	25g	41	0
Ireland	Several[2]	Single	25g	182	0
Italy	Fresh	Single	25g	147	0
	Cooked	Single	25g	87	0
Slovenia	Non pre-cut	Single	25g	80	0
Spain		Single	25g	896	0.3
Fruits					
Belgium	Dried product	Single	25g	81	0
	Non pre-cut[3]	Single	25g	38	0
Ireland	Several	Single	25g	73	0
Fruits and vegetables					
Austria	Pre-cut	Single	25g	42	0
Germany	Pre-cut	Single	25g	609	0
Hungary	Pre-cut, RTE	Batch	25g	121	0
Italy	Pre-cut, RTE	Batch	25g	32	0
Ireland	At processing plants	Single	Not stated	3,490	0
Netherlands	Pre-cut	Single	25g	917	0.2
Portugal	Pre-cut, RTE	Batch	25g	62	0
Slovakia	Products	Batch	25g	49	0
Sweden	-	Single	25g	233	0.4
Herbs and spices					
Austria	-	Single	25g	71	1.4
Ireland	-	Single	25g	26	0
Slovakia	Dried, non-irradiated	Batch	25g	27	14.8
Slovenia	Dried	Single	25g	30	0
EU Total				**7,571**	**0.14**

1. Place of sampling is at retail/not specified if not otherwise stated, data only presented for sample size ≥25
2. In Ireland, data include three reports from pre cuts, products and unspecified samples
3. In Belgium, samples represent small red fruits

Fish and fishery products

Findings of *Salmonella* in fish were reported by nine MS. Only very few positive samples were reported ranging from 0% to 0.3%

Five MS (BE, GR, IE, IT, ES) and one non-MS (NO) reported investigations on live bivalve molluscs. *Salmonella* positive findings were reported by Italy 0.5% (N=4,442), Greece 0.9% (N=112) and Spain 0.6 % (N=4,640).

Other foodstuffs

In 2006, only few findings of *Salmonella* were reported from other foodstuffs from investigations of more than 25 samples. Five MS (EE, FR, DE, IT, NL) and two non-MS (NO, RO) tested samples of meat from sheep. Estonia reported 1 positive of 32 samples (3.1%), France 10 positives of 1,350 samples (0.7%) and Norway found 1 positive of 2,538 samples (0.04%).

Bakery products were tested by seven MS (CZ, EE, GR, IE, NL, SK, ES). The Netherlands (N=1,615), the Czech Republic (N=270) and Spain (N=1,179) reported 0.1%, 2.2%, and 0.8% samples positive for *Salmonella*, respectively.

For detailed information please refer to Level 3.

Compliance with microbial criteria

The *Salmonella* criteria laid down in Community Regulation 2073/2005 applied from 1 January 2006. The Regulation prescribes specific rules for sampling and testing, and set limits for presence of *Salmonella* in specific food categories. The food safety *Salmonella* criteria apply for products placed on the market during their shelf-life. Table SA20 summarizes the reported findings related to the food categories included in the Regulation. This information derives mainly from officials controls since HACCP and own check data is omitted due to difficulties in interpretation of the data.

Table SA20. Compliance with the Salmonella criteria laid down by EU Regulation 2073/2005, 2006[1]

Food categories	Total single samples			Total batches		
	Sample size	Units tested	% non compliant	Sample size	Units tested	% non compliant
1.4 Minced meat and meat preparations to be eaten raw	10 or 25g	5,162	2.6	25g	1,229	0.7
1.5 Minced meat and meat preparations from poultry to be eaten cooked	10 or 25g	995	3.2	10g, 25g or not stated	3,637	14.4
1.6 Minced meat and meat preparations from other species to be eaten cooked	10 or 25g	7,021	2.8	10 or 25g	15,805	0.5
1.7 Mechanically separated meat	10 or 25g	401	2.5	10g, 25g or not stated	1,584	10.3
1.8 Meat products intended to be eaten raw	25g	1,914	0	-	-	-
1.9 Meat products intended to be eaten cooked	10g, 25g or not stated	8,895	0.7	10 or 25g	3,432	5
1.10 Gelatine and collagen	25g	2	0	25g	431	0
1.11 Cheeses, butter and cream made from raw or low-heat-treated milk	25g	2,004	0.2	25g	3,437	0
1.12 Milk- and whey powder	25g or not stated	5,691	0	25g	1,171	0
1.13 Ice-cream	25 and 50g	14,013	0	25g	1,284	0.1
1.14 Egg products	25g or not stated	4,063	0.2	25g	288	0.7
1.15 RTE foods containing raw egg	25g or not stated	123	3.3	25g	1	0
1.16 Cooked crustaceans and molluscan shellfish	25g	432	0.5	25g	116	0
1.17 Live bivalve molluscs and live echinoderms, tunicates and gastropods	25g	3,473	0.4	25g	1,736	0.6
1.18 Sprouted seeds (RTE)	25g	60	0	25g	116	0
1.19 Pre-cut fruit and vegetables (RTE)	25g	111	0	25g	258	0
1.2 Unpasteurised fruits and vegetables	25g	4	0	25g	2	0
1.22 Dried infant formulae and dried dietary foods for medical purposes[2]	25g	821	0	25g	28	0

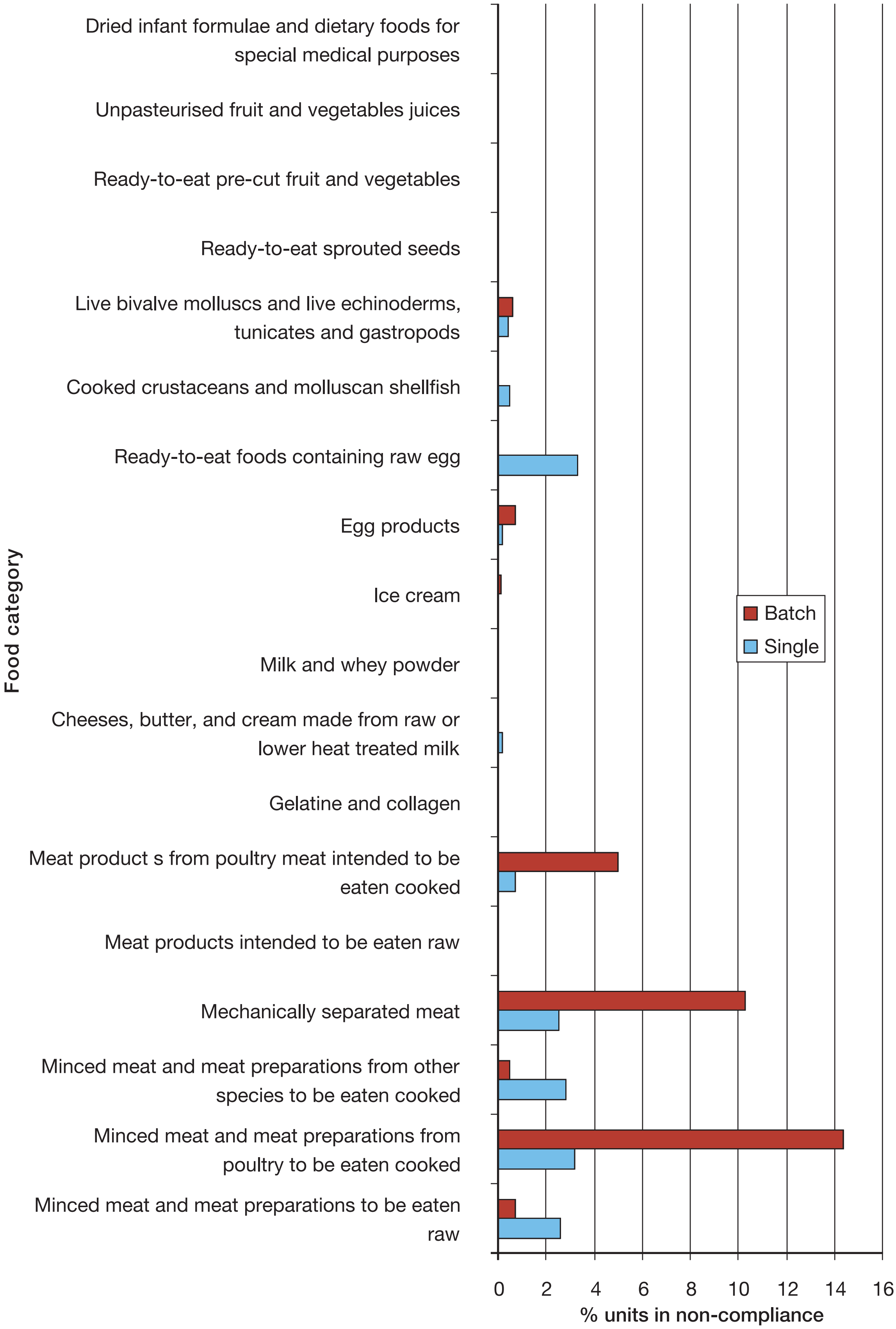
1. Including also sample units <25. Excluding data from Bulgaria, Romania, HACCP and own checks. RTE: ready to eat products.
2. Indented for infants below six month of age

According to the Community criteria, *Salmonella* must be absent in samples of
- Minced meat, meat products and meat preparations intended to be eaten raw (in 25g) or cooked (in 10g)
- Mechanically separated meat (in 10g)
- Gelatine and collagen (in 25g)
- Cheeses, butter and cream made from raw or low-heat-treated milk, as well as milk- and whey powder (in 25g)
- Ice-cream (in 25g)
- Egg products and ready-to-eat foods containing raw egg (in 25g or 25ml)
- Live and cooked crustaceans and molluscan shellfish (in 25g)
- RTE pre-cut or unpasteurised fruits and vegetables, as well as juice (in 25g)
- Dried infant formulae and dried dietary foods for medical purposes (in 25g)

The highest levels of non-compliance occurred in products of meat origin containing raw meat. This was the case especially in minced meat and meat preparations from poultry, intended to be eaten cooked (3.5% and 14.4% for single samples and bathes, respectively) and mechanically separated meat (2.5% and 10.3%, respectively). Generally, the non-compliance was most often observed in products of poultry meat origin. A particular risk for human health is the *Salmonella* findings from meat categories intended to be eaten raw, out of which 0.7 % of the batches and 2.6% of the samples contained *Salmonella* (Figure SA7). In the other criteria categories, the level of non-compliance was very low, and only samples of ready-to-eat foods containing raw egg exceeded 1%.

MS did not always use the sample sizes (e.g. 10g or 25g) indicated in the Regulation in the testing of the samples. This hampered the analyses of the data because not using the stipulated sample size means that the samples were not rightly tested against the criterion.

Figure SA7. Proportion of samples[1] in non-compliance with the EU Salmonella criteria, 2006



1. Based on single and batch data, including sample units ≥25. Excluding HACPP and own check samples

3.1.3 Salmonella in animals

Many MS have *Salmonella* control or surveillance programmes in place for a number of farm animal species, see Appendix 2 for further descriptions. An overview of the countries that reported data on *Salmonella* in animals for 2006 is presented in Table SA21.

Table SA21. Overview of countries reporting data for Salmonella in animals, 2006

	Total number of MS reporting	Countries
Gallus gallus		
Breeding flocks	22	**MS:** All MS except CY, LU, MT **Non-MS:** NO
Laying hens	22	**MS:** All MS except CY, LT, MT **Non-MS**: CH, NO
Broilers	19	**MS:** AT, BE, DK, EE, FI, FR, DE, GR, HU, IT, LV, NL, PL, PT, SK, SI, ES, SE, UK **Non-MS:** CH, NO
Turkeys	18	**MS:** AT, BE, DK, EE, FI, DE, GR, HU, IE, IT, LV, NL, PL, PT, SK, SI, SE, UK **Non-MS**: NO
Ducks	14	**MS:** AT, BE, DK, DE, GR, HU, IE, IT, LV, PL, PT, SK, SE, UK **Non-MS**: NO
Geese	11	**MS:** AT, BE, DK, EE, DE, HU, IT, LV, PL, SK, SE
Other poultry	15	**MS:** AT, BE, CZ, EE, DE, GR, HU, IE, LV, PL, PT, SK, SI, SE, UK **Non-MS:** NO
Pigs	21	**MS:** All except CY, MT, ES, FR **Non-MS:** BG, RO, NO
Cattle	18	**MS:** AT, CZ, EE, FI, DE, GR, HU, IE, IT, LV, LT, LU, PL, PT, SK, SI, SE, UK **Non-MS:** BG, RO, NO
Other animals	19	**MS:** AT, BE, CZ, DK, EE, FI, DE, GR, HU, IE, IT, LV, LU, NL, PL, PT, SK, SE, UK **Non-MS**: BG, NO

Monitoring of breeding flocks of *Gallus gallus* and flocks of laying hens and broilers

According to the Regulation 2160/2003 (and previously under the Directive 92/117/ECC), MS are obliged to run control programmes for *S.* Enteritidis and *S.* Typhimurium in breeding flocks of *Gallus gallus*. The flocks must be sampled for *Salmonella* at several stages of rearing and production. This means, that flocks can be found positive at different stages and ages e.g. as day-old chicks, before movement to production, or during the laying period.

The following results from sampling of breeding flocks, for both the meat and egg-production line and laying hens, were reported at the flock level. Thus, all sampling results from day-old chicks to production animals are considered and pooled. A flock is reported positive if one or more of these samples have been found positive.

The prevalence of *Salmonella* spp. and *S*. Typhimurium/*S*. Enteritidis in *Gallus gallus* breeding flocks in the EU and non-MS in 2006 is presented in Figure SA8 and Figure SA9.

Figure SA8. Prevalence of Salmonella spp. in Gallus gallus breeding flocks, 2006

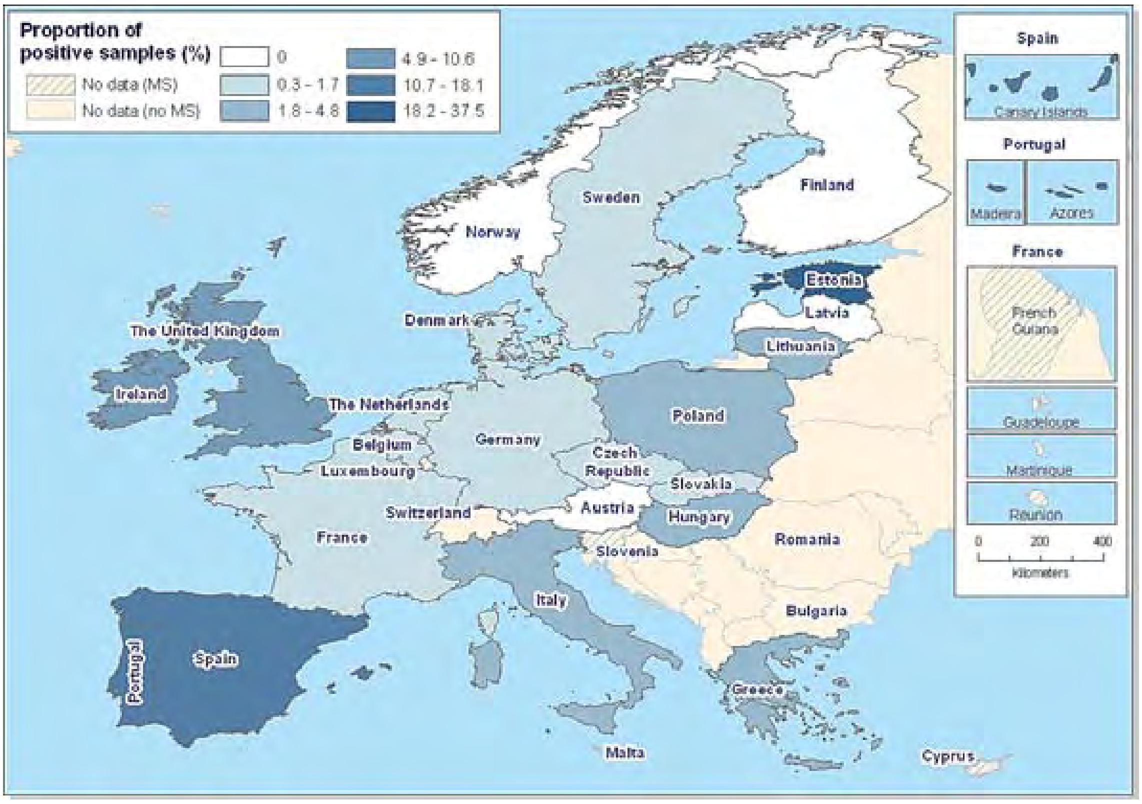
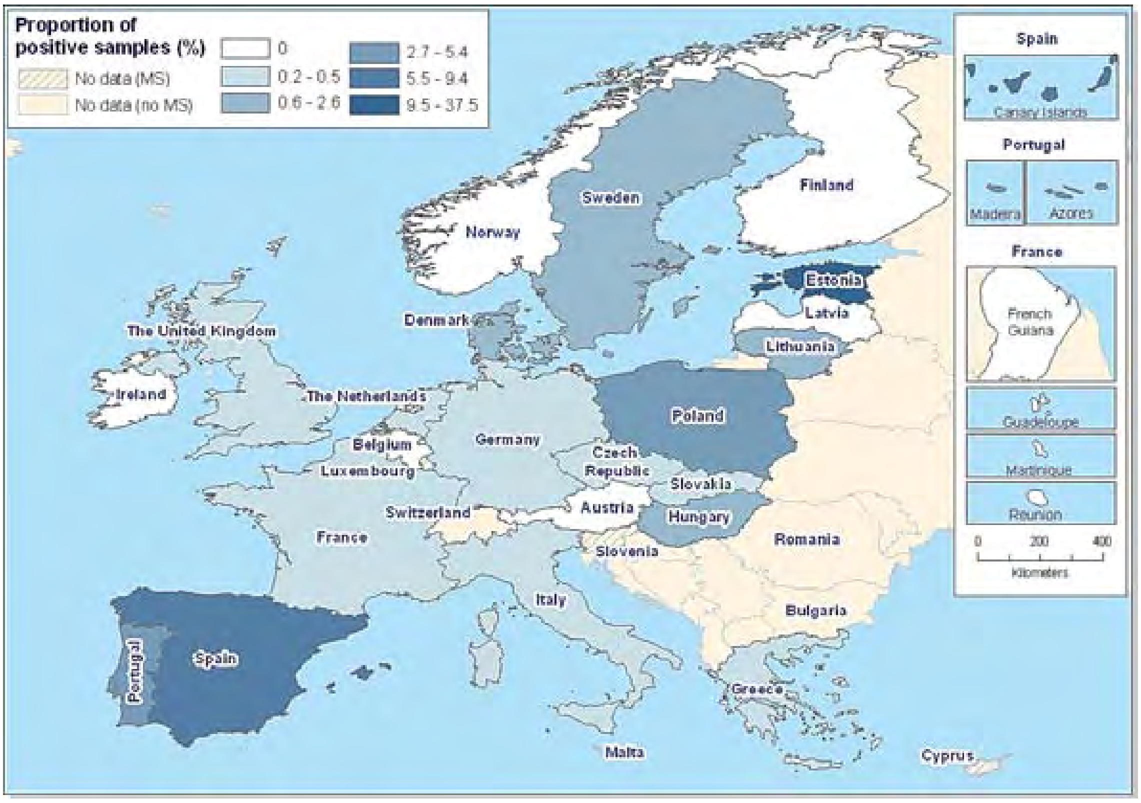


Figure SA9. Prevalence of S. Typhimurium and/or S. Enteritidis in Gallus gallus breeding flocks, 2006



Laying hen production line

Elite-breeding flocks and grandparent-breeding flocks

In 2006, the Czech Republic and the Netherlands reported results from sampling of elite-breeding flocks, whereof no flocks were found *Salmonella* positive. Five MS (CZ, FI, FR, SI and UK) tested grand-parent-breeding flocks with no positive findings.

Parent-breeding flocks

In total, 2.2% of tested parent-breeding flocks were found infected. Fourteen MS reported no infected parent-breeding flocks for laying hen production, while four MS reported prevalences from 1.5% to 5.8%. Hungary and Italy reported positive findings in unspecified parent-breeding flocks, and Portugal reported *Salmonella* positive batches (Table SA22). Most isolates were specified as *S.* Enteritidis, except in the United Kingdom, where all the *Salmonella* isolates were other serovars.

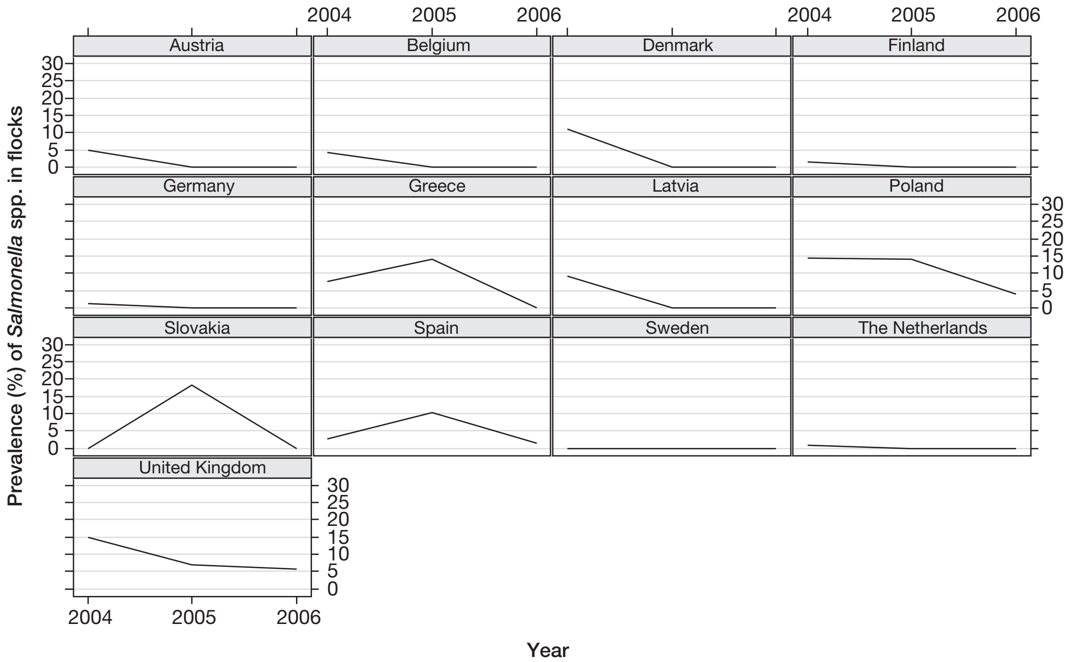
Table SA22. Salmonella in parent-breeding flocks for laying hen production, Gallus gallus (all age groups[1], flock based data) in countries running control programmes in accordance to the Zoonosis Directive 2003/99/EC, 2004-2006

Country	2006				2005				2004			
	N	% Pos	% S. Ent	% S. Typ	N	% Pos	% S. Ent	% S. Typ	N	% Pos	% S. Ent	% S. Typ
Austria	14	0	0	0	36	0	0	0	20	5	5	0
Belgium	35	0	0	0	68	0	0	0	95	4.2	-	-
Czech Republic	27	0	0	0	-	-	-	-	42	33.3	33.3	0
Denmark	28	0	0	0	25	0	0	0	18	11.1	0	0
Finland	39	0	0	0	93	0	0	0	67	1.5	0	1.5
France	133	0	0	0	164	0	0	0	140	0	-	-
Germany	89	0	0	0	22	0	0	0	89	1.1	0	1.1
Greece	30	0	0	0	141	14.2	7.8	0.7	118	7.6	5.9	0
Hungary[2]	-	-	-	-	-	-	-	-	199	1	1	0
Ireland	10	0	0	0	30	0	0	0	-	-	-	-
Italy[2]	-	-	-	-	11	0	-	-	144	11.1	-	-
Latvia	9	0	0	0	9	0	0	0	22	9.1	9.1	0
Lithuania[3]	1,174	3.2	3.2	0	-	-	-	-	-	-	-	-
Netherlands	175	0	0	0	405	0	0	0	282	0.7	0.4	0.4
Poland[4]	1,080	4.1	3.1	0.4	412	13.9	5.2	1.7	518	14.3	7.5	0
Portugal[5]	-	-	-	-	12	16.7	16.7	0	-	-	-	-
Slovakia	327	0	0	0	11	18	18	0	52	0	0	0
Slovenia	5	0	0	0	-	-	-	-	-	-	-	-
Spain	131	1.5	0	0	48	10.4	0	0	192	2.6	-	-
Sweden	74	0	0	0	38	0	0	0	26	0	0	0
United Kingdom[6]	69	5.8	0	0	88	6.8	0	0	87	14.9	-	-
EU Total[7]	**2,275**	**2.2**			**1,613**	**6.1**			**2,111**	**6.9**		
Norway[5]	70	0	0	0	65	0	0	0	27	0	0	0

1. Sampling results from both the rearing and laying period have been used to estimate the percent prevalence of positive flocks (flocks that were found positive at any point of their lifespan)
2. Reported collated data from breeding flocks for egg and meat production line for 2006. Hungary: 940 flocks tested and 0.7% positive, Italy: 388 tested flocks and 4.1% positive for *Salmonella* spp. and 0.5% for *S.*Enteritidis
3. Sample based data
4. In 2006, total numer of breeding flocks was 925
5. Portugal reported for 2006: 19 tested batches and 10.5% positive
6. Holding based data, collated data from breeding flocks for egg and meat production line for 2005 and 2006
7. EU-total does not include data from Lithuania

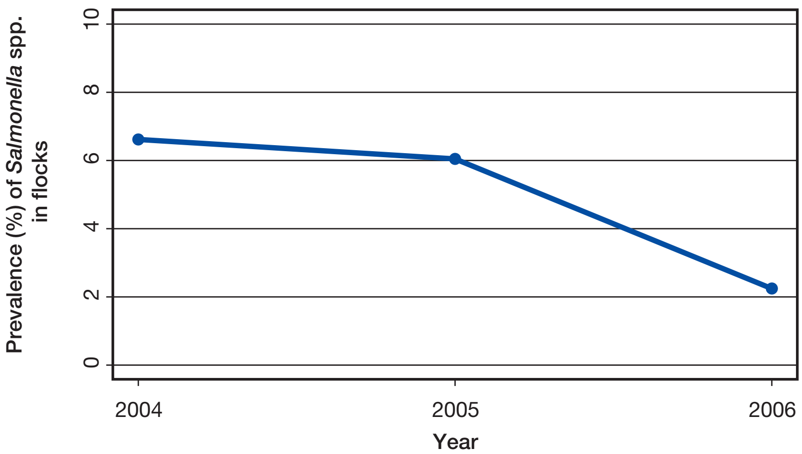
The improvement of *Salmonella* status in parent-breeding flocks observed from 2004 to 2005 continued in 2006, and reduced prevalences were observed for all reporting MS (Table SA22). MS specific trends, for 2004-2006, of prevalence of *Salmonella* spp. and *S*. Enteritidis/ *S*. Typhimurium in parent breeding flocks for egg production in 2004-2006 are illustrated in Figures SA10a and SA10c. In most MS, there was a decreasing trend over the 3 years. Accordingly, the EU level prevalence of *Salmonella* spp. and *S*. Enteritidis/ *S*. Typhimurium decreased (Figure SA10b and Figure SA10d).

Figure SA10a. Salmonella spp. in parent-breeding flocks for egg production (all age groups[1], flock based data), prevalence in MS running a control programme, 2004 – 2006[2]



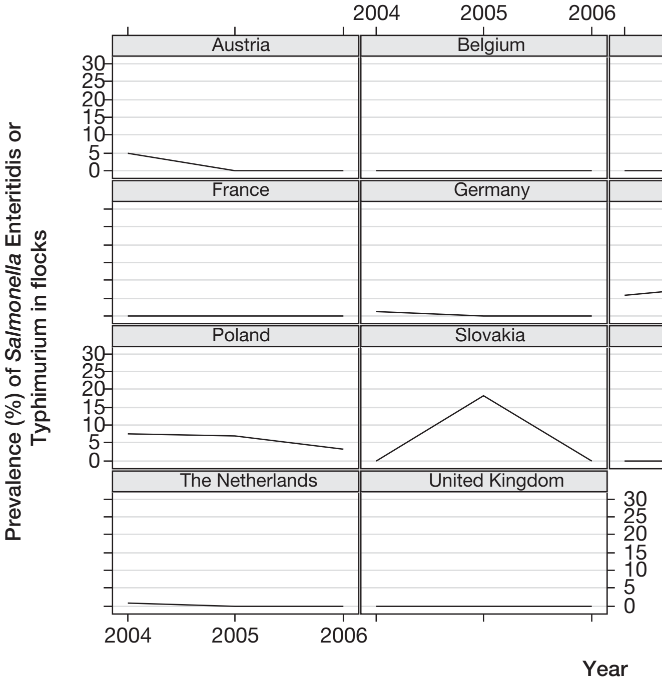
1. Combined data (day-old chicks, rearing and production) have been used to estimate the prevalence of flocks that were found positive at any point in their lifespan
2. Include only MS with data from all three years

Figure SA10b. Salmonella spp. in parent-breeding flocks for egg production (all age groups[1], flock based data), overall prevalence in 13 MS running a control programme, 2004 – 2006[2]



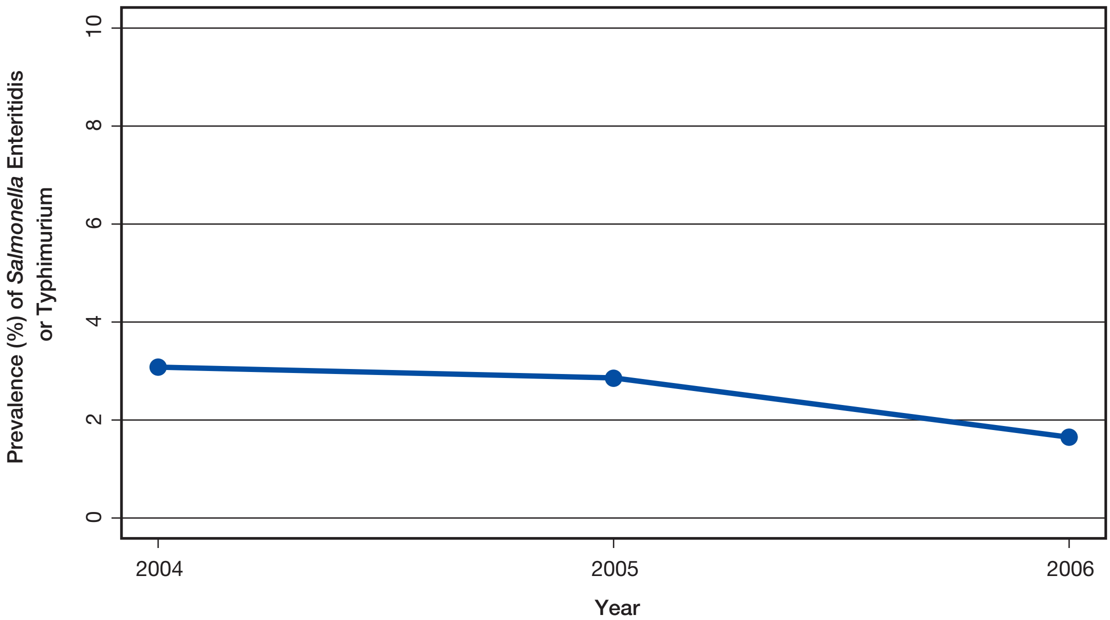
1. Combined data (day-old chicks, rearing and production) have been used to estimate the prevalence of flocks that were found positive at any point in their lifespan
2. Includes only MS with data from all three years: AT, BE, DK, FI, DE, GR, LV, PO, SI, ES, SE, NL, UK

Figure SA10c. Salmonella Enteritidis and/or S. Typhimurium in parent-breeding flocks for egg production (all age groups[1], flock based data), prevalence in MS running a control programme[2], 2004 – 2006



1. Combined data (day-old chicks, rearing and production) have been used to estimate the prevalence of flocks that were found positive at any point in their lifespan
2. Includes only MS with data from all three years

Figure SA10d. Salmonella Enteritidis and/or S. Typhimurium in parent-breeding flocks for egg production (all age groups[1], flock based data), overall prevalence in 14 MS running a control programme[2], 2004 – 2006



1. Combined data (day-old chicks, rearing and production) have been used to estimate the prevalence of flocks that were found positive at any point in their lifespan
2. Includes only MS with data from all three years: AU, BE, DK, FI, FR, DE, GR, LV, PO, SI, ES, SE, NL, UK

Laying hen flocks

A total of 4.4% of the tested laying hen flocks were found infected during 2006 in EU. Finland and the Czech Republic reported no positive flocks. Among the MS with positive flocks the observed proportions varied from 0.1% to 31.2%. The overall occurrence of *Salmonella* was slightly higher than the two previous years. However, Belgium and Greece that reported a high occurrence in 2004 has significantly reduced the proportion of positive flocks (Table SA23). When compared to the results of the EU-wide *Salmonella* baseline in laying hens, it is interesting to notice that many MS reported substantially lower prevalence. For example the Czech Republic had the highest holding prevalence in the baseline study (65.6%). The test (sample and bacteriological method) used in the baseline survey may have a better sensitivity thant the routine tests of control programmes of MS and/or the epidemiological situation may be improved.

Table SA23. Salmonella in laying hen flocks (all age groups[1], flock based data), 2004-2006

Country	2006				2005				2004			
	N	% Pos	% *S. Ent*	% *S. Typ*	N	% Pos	% *S. Ent*	% *S. Typ*	N	% Pos	% *S. Ent*	% *S. Typ*
Austria	4,359	2.0	1.1	0.2	4,735	1.4	0.9	0.1	2,649	1.5	0.8	0
Belgium	897	3.7	0	0	979	4.9	-	-	265	27.2	-	-
Cyprus	-	-	-	-	-	-	-	-	75	12	4	0
Czech Republic[2]	281	0	0	0	-	-	-	-	270	6.7	6.7	0
Denmark	854	0.4	0.1	0.1	913	1.4	1.3	0	1,009	0.6	0.3	0.1
Estonia	25	4.0	4.0	0	-	-	-	-	-	-	-	-
Finland[3]	749	0	0	0	817	<0.1	0	<0.1	815	<0.1	0	<0.1
France[4]	3,099	2.5	2.0	0.5	5,456	1.6	1.5	0	5,935	1.7	1.6	0.4
Germany	2,764	1.4	0.4	0.4	5,331	3.1	2.2	0.2	4,916	2.3	1.1	0.4
Greece	81	3.7	3.7	0	-	-	-	-	90	32.2	14.4	2.2
Hungary	417	2.2	2.2	0	-	-	-	-	-	-	-	-
Ireland	340	0.3	0	0.3	217	2.8	1.4	0	355	0.8	0.8	0
Italy	1,030	7.5	1.1	0.7	699	8.6	0.7	1.1	-	-	-	-
Lithuania	926	3.0	-	-	981	1	0.9	0	1,392	0.4	0.2	-
Luxembourg	-	-	-	-	-	-	-	-	44	0	-	-
Netherlands	5,008	2.0	1.9	0.1	4,117	3.5	1.8	0.2	3,148	3.7	-	-
Poland	2,737	9.9	4.1	0.6	2,869	8.8	-	0.1	3,114	8.6	-	-
Slovakia	1,298	2.2	2	0	309	13.3	-	0.6	219	4.6	-	-
Slovenia	205	1.5	0.5	0	130	6.2	5.4	0	167	2.4	-	-
Spain[5]	1,125	31.2	11.9	1.2	-	-	-	-	50	28	20	0
Sweden	913	0.1	0	0.1	1,109	0.1	0.1	0	909	0.2	0	0.2
EU TOTAL	**27,108**	**4.8**			**28,662**	**3.2**			**25,422**	**3.2**		
Norway[2, 6]	641	0	0	0	732	0	0	0	1,090	0	0	0
Switzerland	1,828	0.2	0.2	0	1,631	0.5	0.5	0	-	-	-	-

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 of the lifespan of a flock
2. Holding based data for Czech Republic (2004) and Norway (2004-2006)
3. The exact number of flocks is not known. This figure is extrapolated from the number of samplings (2004-2006)
4. France only test for *S.* Enteritidis and *S.* Typhimurium
5. Spain implemented a more sensitive control programme in 2005, thus data from 2004 is not comparable to 2005 and 2006 data
6. Include 254 rearing flocks

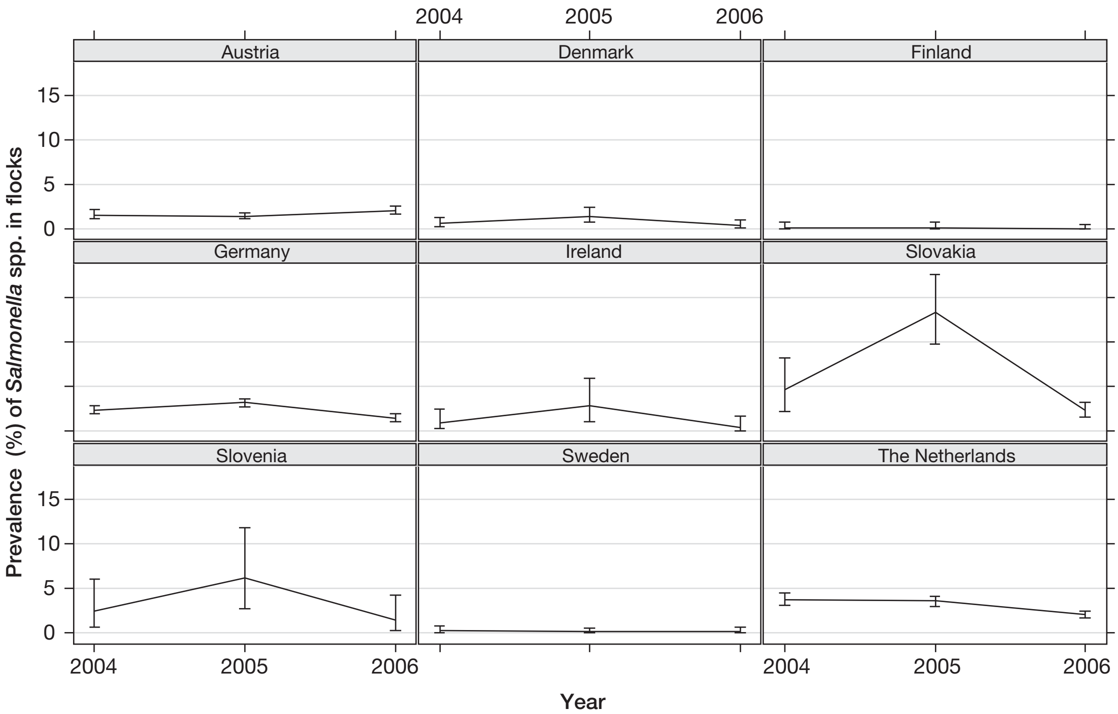
Among the specified isolates, *S*. Enteritidis was the dominating serovar in most reporting MS, followed by *S*. Typhimurium.

Of 16 MS reporting data from both breeding and production flocks, 14 MS that reported no infected breeding flocks had also low *Salmonella* occurrences in rearing and production flocks (below 4%). In the UK, positive flocks were detected among both breeding and production flocks, while a proportion of positive laying hen flock could not be estimated.

MS specific trends in *Salmonella* spp. and *S*. Enteritidis/ *S.* Typhimurium prevalence in laying hen flocks over the years 2004-2006 are shown in Figures SA11a and SA11c, respectively. There appears to be a decreasing trend over these years in the *Salmonella* spp. prevalence in Germany and the Netherlands. In Denmark, Ireland, Slovakia, and Slovenia, prevalence decreased in from 2005 to 2006. In Ireland decreasing trend was observed in the *S*. Enteritidis/ *S*. Typhimurium prevalence, while Austria, France, the Netherlands, and Slovakia had increasing trends over the years. At the EU level the weighted mean *Salmonella* spp. prevalence decreased significantly (logistic regression, P<0,001) within the nine MS with control programs, that consistently reported over the past three years (Figure SA11b). Conversely, there was no statistically significant overall trend in the weighted mean *S*. Enteritidis/ *S*. Typhimurium prevalence in these MS (Figure SA11d). See Appendix 1 and notes to Figure SA11 for descriptions of statistics.

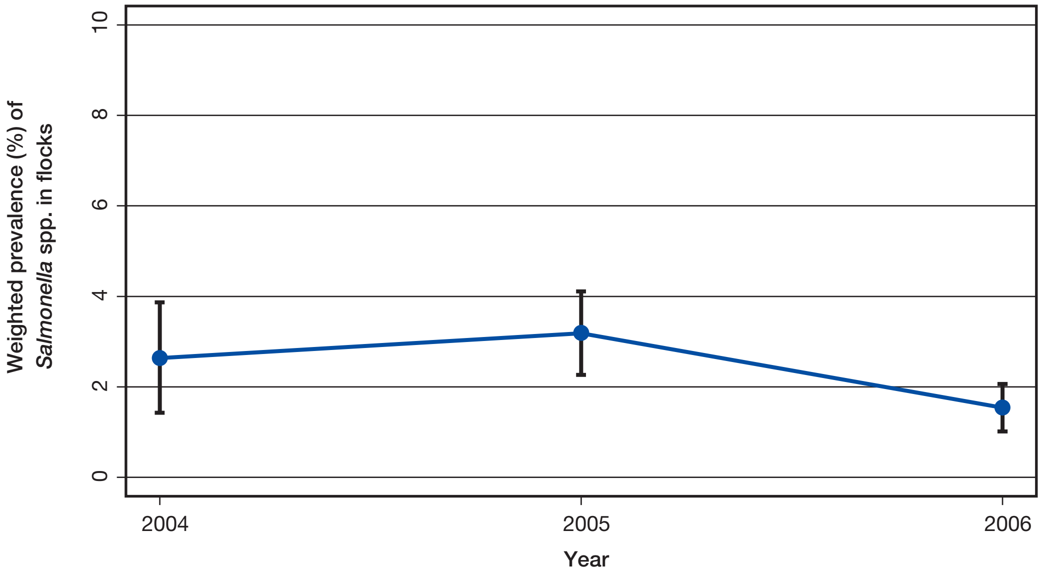
The weighted mean prevalence only reflects the *Salmonella* status in the MS running control programs during the period 2004 to 2006. Some other MS not running a control programme throughout these three years have substantial production volumes and relatively high prevalence of *Salmonella* positive laying hen flocks and including these MS in the trend analysis may have increased the weighted EU- prevalence.

Figure SA11a. Salmonella spp. in laying hen flocks (all age groups[1], flock based data), prevalence and 95% CI[2] in MS running a control programme[3], 2004-2006



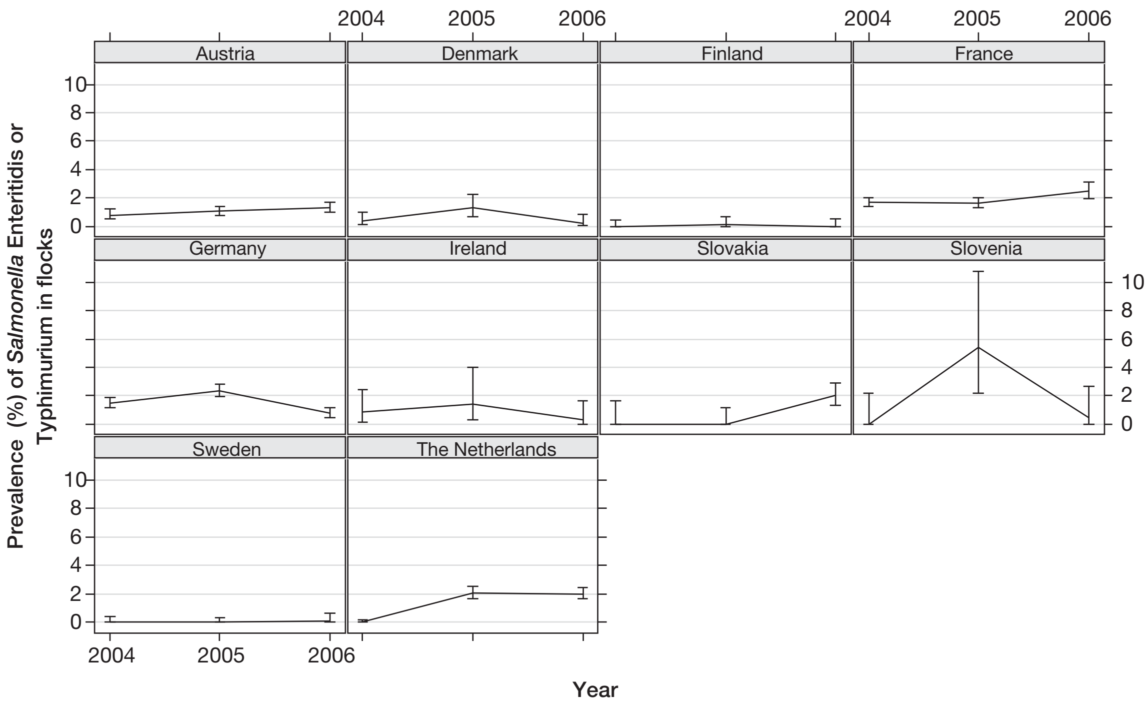
1. Combined data (day-old chicks, rearing and production) have been used to estimate the prevalence of flocks that were found positive at any point in their lifespan.
2. Vertical bars indicate exact binomial 95% confidence intervals.
3. Includes only MS with data from all three years

Figure SA11b. *Salmonella* spp. in laying hen flocks (all age groups[1], flock based data), weighted[2] mean prevalence and 95% CI in MS running a control programme[3], 2004-2006



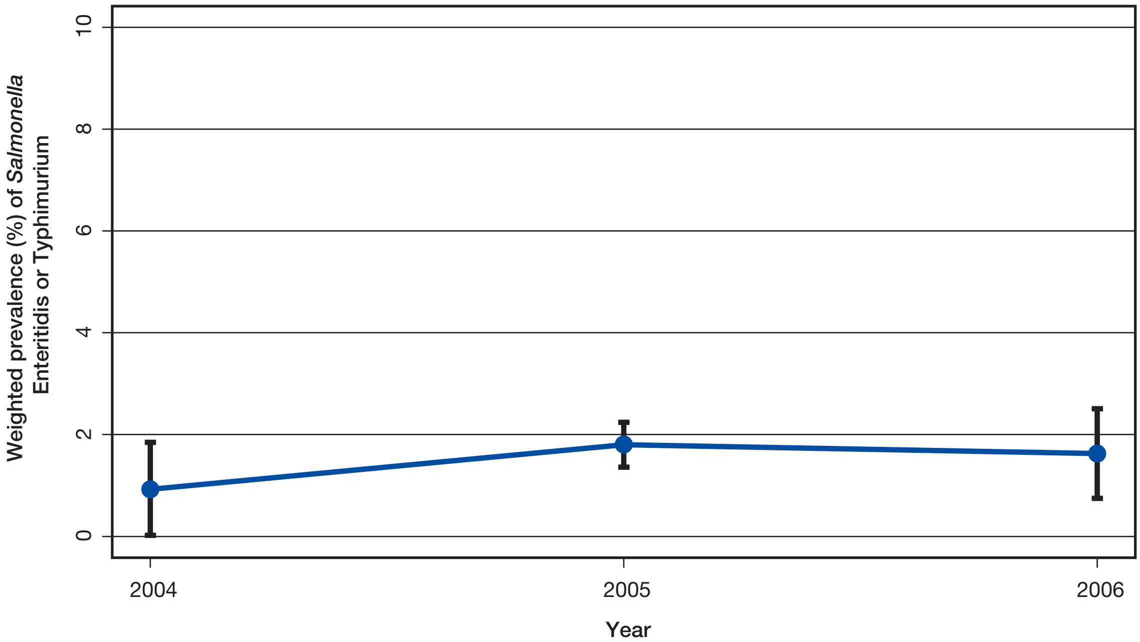
1. Combined data (day-old chicks, rearing and production) have been used to estimate the prevalence of flocks that were found positive at any point in their lifespan
2. Weight is the reciprocal of the ratio between the number of tested flocks per MS per year, and the number of laying hens per MS in 2005-2006. Numbers of laying hens per MS were based on the population data reported for 2006, and supplemented with EUROSTAT data from 2005 (AT and IT)
3. Includes only MS with data from all three years: AT, DK, FI, DE, IE, SK, SI, SE, NL.

Figure SA11c. *Salmonella* Enteritidis and/or Typhimurium in laying hen flocks (all age groups[1], flock based data), prevalence and 95% CI[2] of in MS running a control programme[3], 2004-2006



1. Combined data (day-old chicks, rearing and production) have been used to estimate the prevalence of flocks that were found positive at any point in their lifespan.
2. Vertical bars indicate exact binomial 95% confidence intervals.
3. Includes only MS with data from all three years

Figure SA11d. Salmonella Enteritidis and/ or Typhimurium in laying hen flocks (all age groups[1], flock based data), weighted[2] mean prevalence and 95% CI in MS running a control programme[3], 2004-2006



1. Combined data (day-old chicks, rearing and production) have been used to estimate the prevalence of flocks that were found positive at any point in their lifespan.
2. Weight is the reciprocal of the ratio between the number of tested flocks per MS per year, and the number of laying hens per MS in 2005-2006. Numbers of laying hens per MS were based on the population data reported for 2006, and supplemented with EUROSTAT data from 2005 (AT and IT)
3. Includes data from AT, DK, FI, FR, DE, IE, SK, SI, SE, NL.

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

Meat production line of *Gallus gallus*

Elite-breeding flocks and grandparent-breeding flocks

In the Netherlands, six elite breeding flocks were found *Salmonella* positive during rearing and production period, while no positive flocks were found in France. Eight MS (BE, ES, FI, FR PL, SE, SL and UK) reported investigations of grandparent flocks; positive flocks were detected in France, Sweden and the United Kingdom. The positive flocks tested positive to *S*. Enteritidis in France (2 flocks) and to *S*. Typhimurium in Sweden (1 flock), whereas *S*. Enteritidis or *S*. Typhimurimum was not found among the positives flocks in the United Kingdom.

Parent-breeding flocks

A total of 5.2% of the tested parent-breeding flocks were found infected in 2006, which is similar to what was reported in 2005. Four MS and Norway reported no infected flocks, while reported prevalences in MS with positive flocks ranged from 0.4% to 37.5%. Portugal reported *Salmonella* positive batches. The relatively high proportion of positive flocks, reported by the United Kingdom in 2004, was significantly reduced in 2006 (from 37.1% to 13.3%), whereas the high proportion observed in Spain in 2004 has increased significantly from 10.4% in 2004 to 20.5% in 2006 (Table SA24).

Several MS found serovars other than *S*. Enteritidis and *S*. Typhimurium. However, except for Germany, Greece, Spain and the United Kingdom, *S.* Enteritidis remained the predominant serovar.

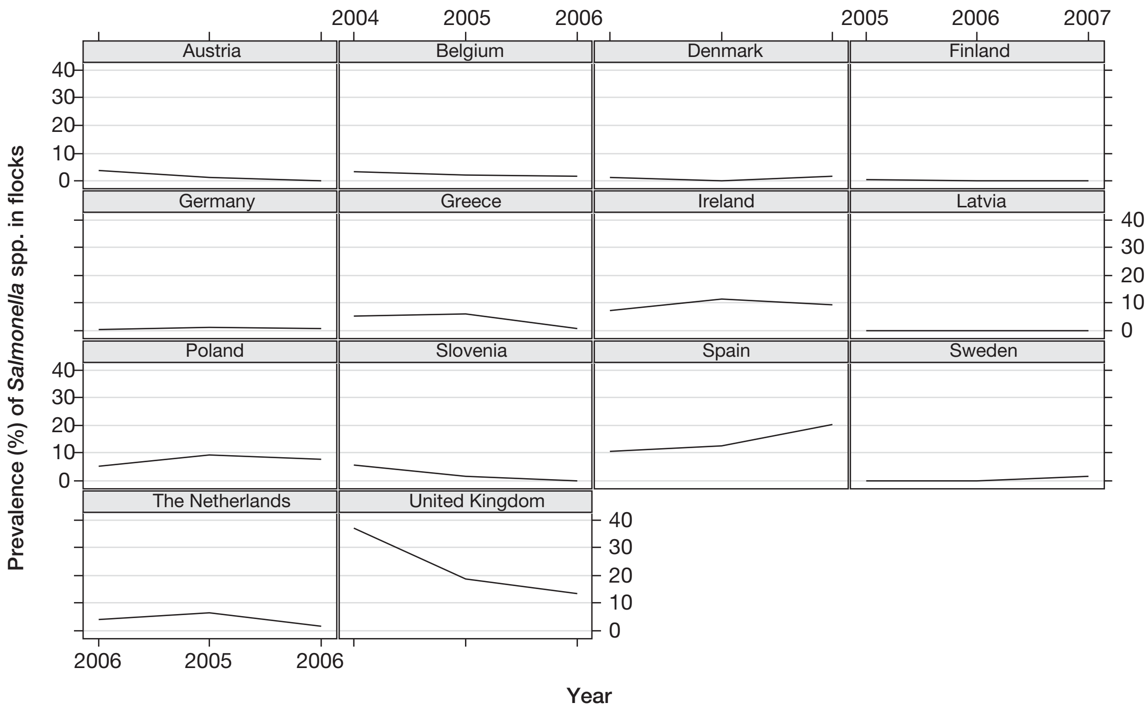
Table SA24. Salmonella in broiler parent-breeding flocks (all age groups[1], flock based data) in MS running control programmes in accordance to Council Directive 2003/99/EC, 2004-2006

Country	2006				2005				2004			
	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ
Austria	76	0	0	0	142	1.4	1.4	0	57	3.5	-	-
Belgium	724	1.8	0	0	925	1.9	0.3	0	1,010	3.5	0.1	0.4
Czech Republic	301	0.4	0.4	0	-	-	-	-	325	2.5	2.5	0
Denmark	113	1.8	0	1.8	120	0	0	0	438	1.4	-	-
Estonia	16	37.5	37.5	0	-	-	-	-	-	-	-	-
Finland	269	0	0	0	305	0	0	0	255	0.4	-	-
France	1,607	0.4	0.2	0.2	1,833	0.4	0.3	0.1	2,186	0.2	0.1	<0.1
Germany	2,272	0.8	<0.1	0	2,409	1.3	-	-	2,271	0.4	-	-
Greece	277	0.7	0	0	168	6	2.4	0	660	5.3	1.8	0.9
Ireland	583	9.4	0	0	522	11.5	0	0	548	7.3	-	-
Italy[2]	-	-	-	-	31	0	0	0	352	13.6	0.4	0.6
Latvia	16	0	0	0	14	0	0	0	28	0	0	0
Lithuania[3]	726	3.2	2.8	0	-	-	-	-	172	0	0	0
Netherlands	347	1.4	1.2	0.3	590	6.3	0.5	0.3	2,589	<0.1	<0.1	0
Poland	2,736	7.8	3	0.5	1,698	9.4	5.1	0.6	2,297	5.1	3.3	0.1
Portugal[4]	-	-	-	-	111	27	22.5	0.9	-	-	-	-
Slovakia	744	0.5	0.4	0	-	-	-	-	-	-	-	-
Slovenia	59	0	0	0	71	1.4	1.4	0	35	5.7	5.7	0
Spain	1,087	20.5	9.3	1.5	823	12.5	7.3	1.7	1,000	10.4	2.4	0
Sweden	254	1.6	0	1.6	138	0	0	0	115	0	0	0
United Kingdom[5]	354	13.3	0.6	0	567	18.7	0.2	0	533	37.1	0	0
EU Total[6]	**11,835**	**5.2**			**10,467**	**5.4**			**14,699**	**4.1**		
Norway[7]	70	0	0	0	65	0	0	0	172	0	0	0

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 of the lifespan of a flock
2. Italy reported in 2006 collated data from breeding flocks for egg and meat production line: 338 tested flocks and 4.1% positive
3. Sample based data
4. Portugal reported for 2006: 51 tested batches 13.7% positive
5. Holding based data
6. EU-total does not include data from Lithuania
7. Holding based data, collated data from breeding flocks for egg and meat production line 2005 - 2006

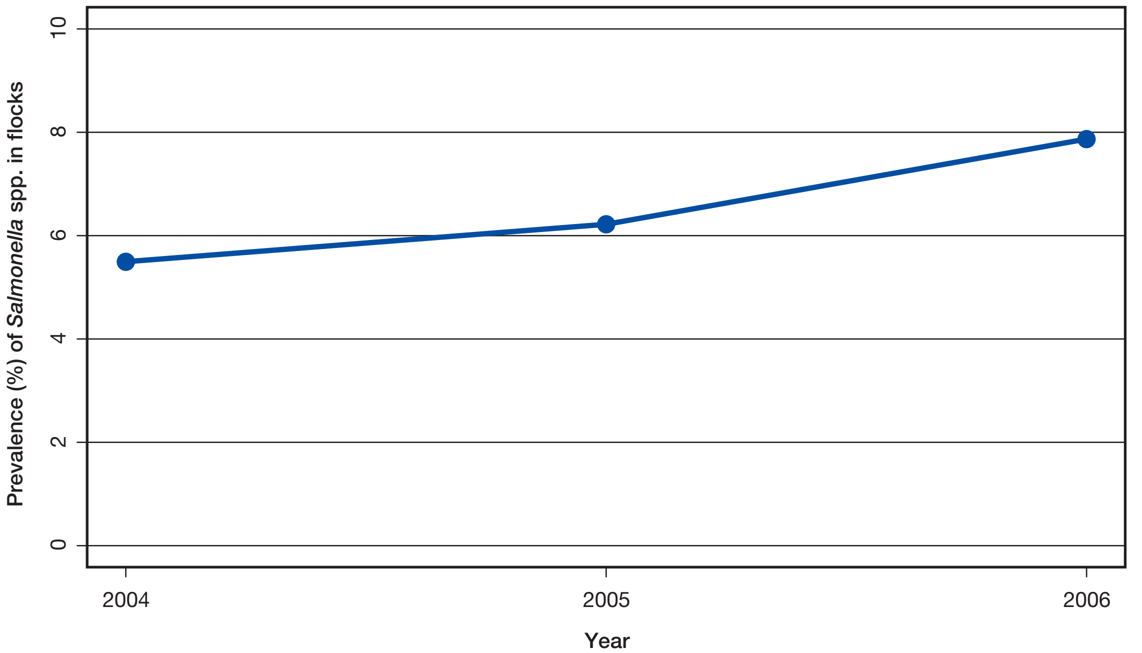
MS specific trends for 2004-2006 *Salmonella* spp. and for *S*. Enteritidis/ *S*. Typhimurium prevalence in parent breeding flocks for meat production in 2004-2006 are illustrated in Figures SA12a and SA12c. Austria, Belgium, Greece, Slovenia, the Netherlands, and the United Kingdom reported decreasing trends in *Salmonella* spp. prevalence over these past three years, whereas Ireland, Poland, Spain and Sweden experienced increasing prevalences. Only Greece and Slovenia has a decreasing trend in *S*. Enteritidis/ *S*. Typhimurium prevalence, while several MS (DK, FR, PL, ES, SE, NL, UK) had an increasing trend over these years. At the EU level, both the overall prevanlence of *Salmonella* spp. and *S*. Enteritidis/ *S*. Typhimurium in the reporting 14 MS increased over these three years (Figures SA12b and SA12d).

Figure SA12a. Salmonella spp. in parent-breeding flocks for meat production (only parent flocks[1], all age groups), prevalence in MS running a control programme[2], 2004 – 2006



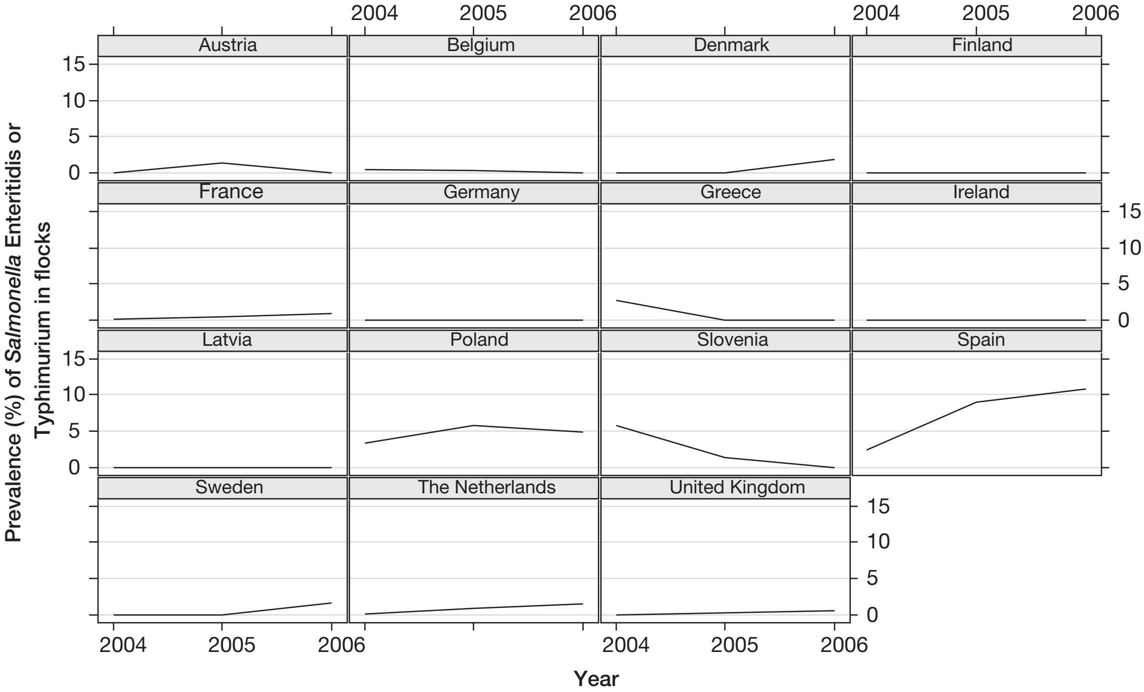
1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock
2. Include only MS with data from all three years

Figure SA12b. Salmonella spp. in parent-breeding flocks for meat production (all age groups[1], flock based data), overall prevalence in 14 MS running a control programme[2], 2004 – 2006



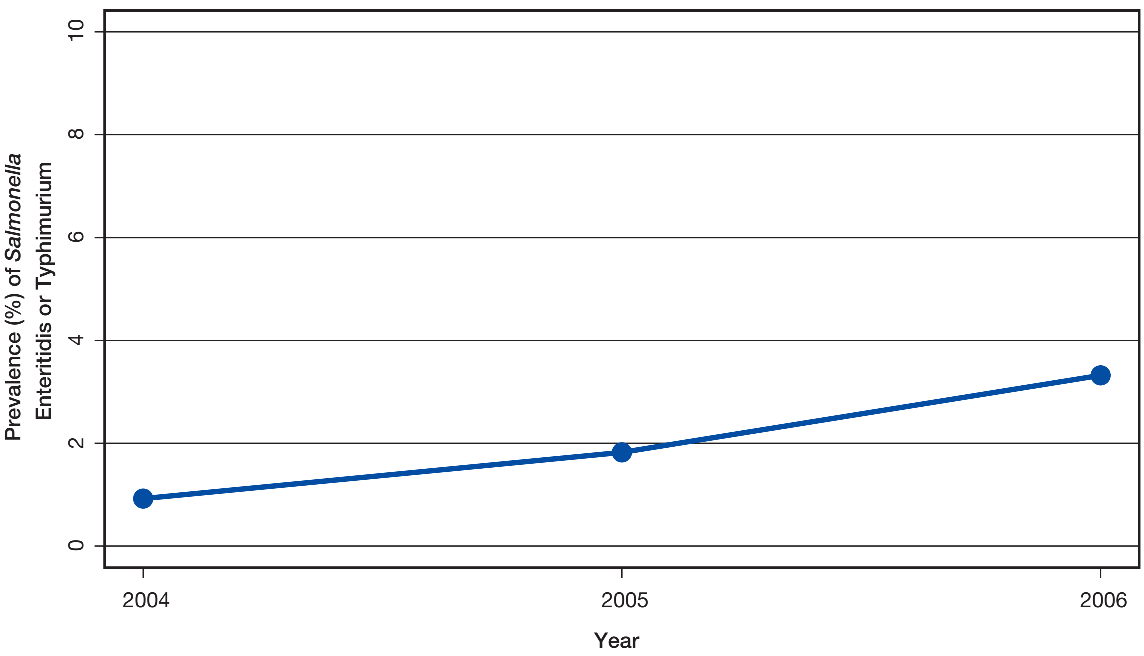
1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock
2. Include only MS with data from all three years: AT, BE, DK, FI, DE, GR, IE, LK, PL, SI, ES, SE, NL, UK

Figure SA12c. Salmonella Enteritidis and/or S. Typhimurium positive parent-breeding flocks for meat production (only parent flocks[1], all age groups), prevalence in MS running a control programme[2], 2004 – 2006



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 of a flock
2. Include only MS with data from all three years

Figure SA12d. Salmonella Enteritidis and/or S. Typhimurium in parent-breeding flocks for meat production (all age groups[1], flock based data), overall prevalence in 15 MS running a control programme[2], 2004 – 2006



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 of a flock
2. Include only MS with data from all three years: AT, BE, DK, FI, FR, DE, GR, IE, LK, PL, SI, ES, SE, NL, UK

Broiler production flocks

A total of 3.4% of tested broiler flocks were found infected in 2006 in EU. This is lower than the two previous years. Only Norway reported no positive broiler flocks. Among the other reporting MS, the proportion of positive flocks ranged from less than 0.1% to 66.0%. For most MS reporting, the occurrence of *Salmonella* in broiler flocks has remained at the same level or decreased since 2004. However, in Italy the proportion of positives has increased from no infected flocks in 2005 to 30.8% in 2006, and in Spain the proportion increased form 15.2% in 2004 to 41.2% in 2006 (Table SA25).

Among the MS reporting data from both parent-breeding and production flocks, the MS reporting a low *Salmonella* occurrence in the broiler parent-breeder flocks also reported relatively few infected broiler flocks. As in 2005, Germany was an exception to this; reporting only 0.8% in broiler parent-breeders, while reporting a moderate occurrence in broilers (11.9%).

Table SA25. Salmonella in broiler flocks (all age groups[1], flock based data), 2004-2006

Country	2006				2005				2004			
	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ
Austria	4,546	1.3	0.1	<0.1	6,021	3.3	2.2	0.1	3,619	3.3	2.0	0.1
Belgium	13,596	2.4	0	0	14,768	3.4	-	-	5,381	7.2	-	-
Denmark	3,640	2.2	0.1	0.4	4,083	2.1	0.2	0.5	4,313	1.5	0.1	0.3
Estonia	154	5.2	5.2	0	-	-	-	-	-	-	-	-
Finland	3,020	0.3	0	0	3,087	0.1	0	0	3,132	0.2	0	0
France	383	8.9	0.3	0.3	-	-	-	-	-	-	-	-
Germany	1,566	11.9	0.7	0	1,521	18.1	1.0	0.9	1,546	7.1	0.2	0.6
Greece	262	6.5	0.8	0	-	-	-	-	582	14.6	0.5	0.9
Hungary	359	66.0	5.0	3.1	-	-	-	-	-	-	-	-
Italy	331	30.8	3.6	0.6	57	0	0	0	-	-	-	-
Lithuania	-	-	-	-	788	1.3	1.3	0	1,737	1.0	0.8	0
Netherlands	26,025	0.8	0.1	0	58,635	2.8	0.2	0.1	28,279	3.9	0.1	0.2
Poland	10,010	10.1	7.7	0.6	20,073	9.4	2.7	0.3	22,552	7.8	3.4	0.3
Slovakia	4,430	2.1	1.6	0	-	-	-	-	1,944	3.2	2.7	0.1
Slovenia	1,800	0.5	0.3	0	621	1.1	0.3	0.2	1,146	1.0	0.3	-
Spain	388	41.2	29.4	0.3	-	-	-	-	415	15.2	9.9	0.7
Sweden	2,351	0.2	0	0.2	2,368	0	0	0	3,000	0.1	0	0
EU Total	**72,861**	**3.4**			**112,022**	**4.1**			**77,646**	**4.9**		
Norway	4,051	0	0	0	3,883	<0.1	0	0	3,772	0	0	0

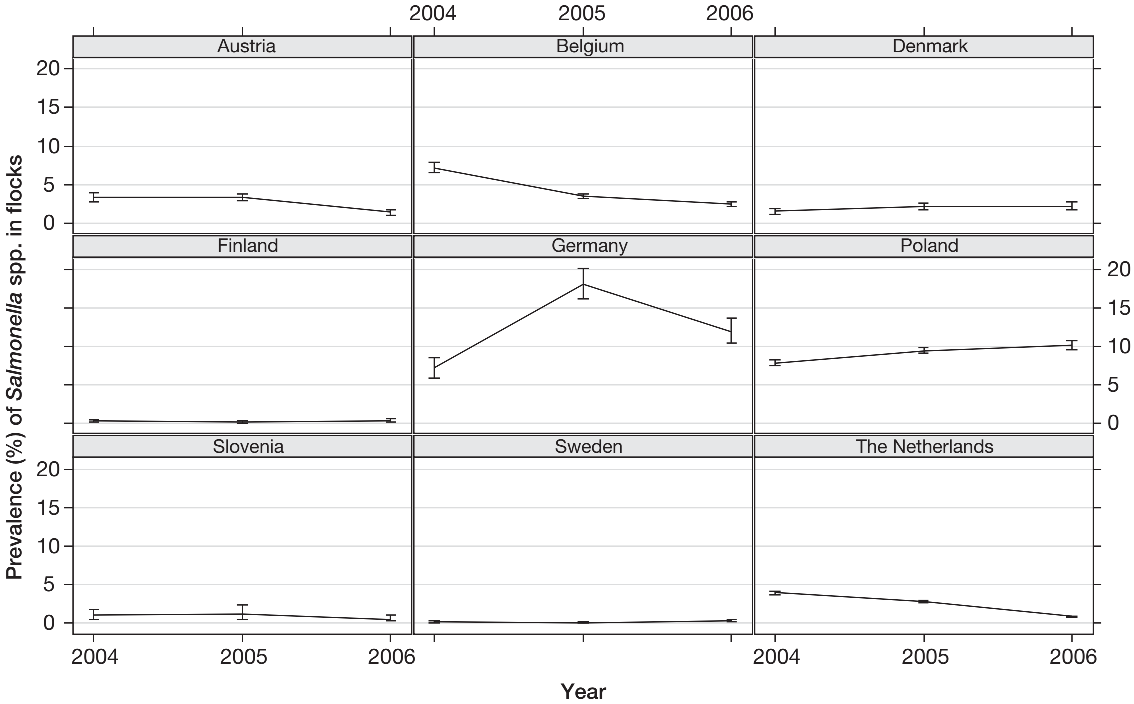
1. Combined data (day-old chicks and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock

MS specific trends in *Salmonella* spp. and *S*. Enteritidis/ *S*. Typhimurium prevalence in broiler flocks in 2004-2006 are presented in Figures SA13a and SA13c, respectively. Over the past three years, there appears to be decreasing trends in *Salmonella* spp. in Austria, Belgium, and the Netherlands, whereas prevalence increased in Germany and Poland. A decreasing trend for *S*. Enteritidis/ *S*. Typhimurium prevalence was also reported from Austria and the Netherlands, while the prevalence in Poland increased. There was no statistically significant trend in the weighted mean prevalence of *Salmonella* spp. or *S*. Enteritidis/ *S*. Typhimurium in the nine MS with control programs, that consistently reported over the past three years (Figure SA13b, Figure SA13d).

See Appendix 1 and notes to Figure SA13 for descriptions of statistics.

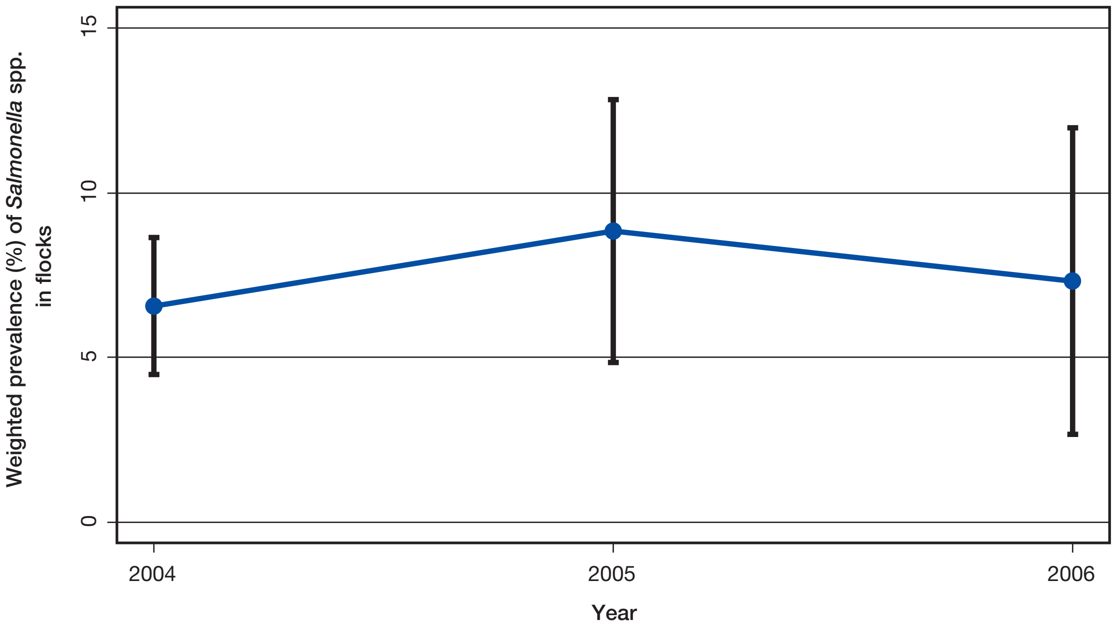
For further information of reported data please refer to Level 3.

Figure SA13a. *Salmonella* spp. in broiler flocks (all age groups[1], flock based data), prevalence and 95% CI in each MS running a control programme[2], 2004 - 2006



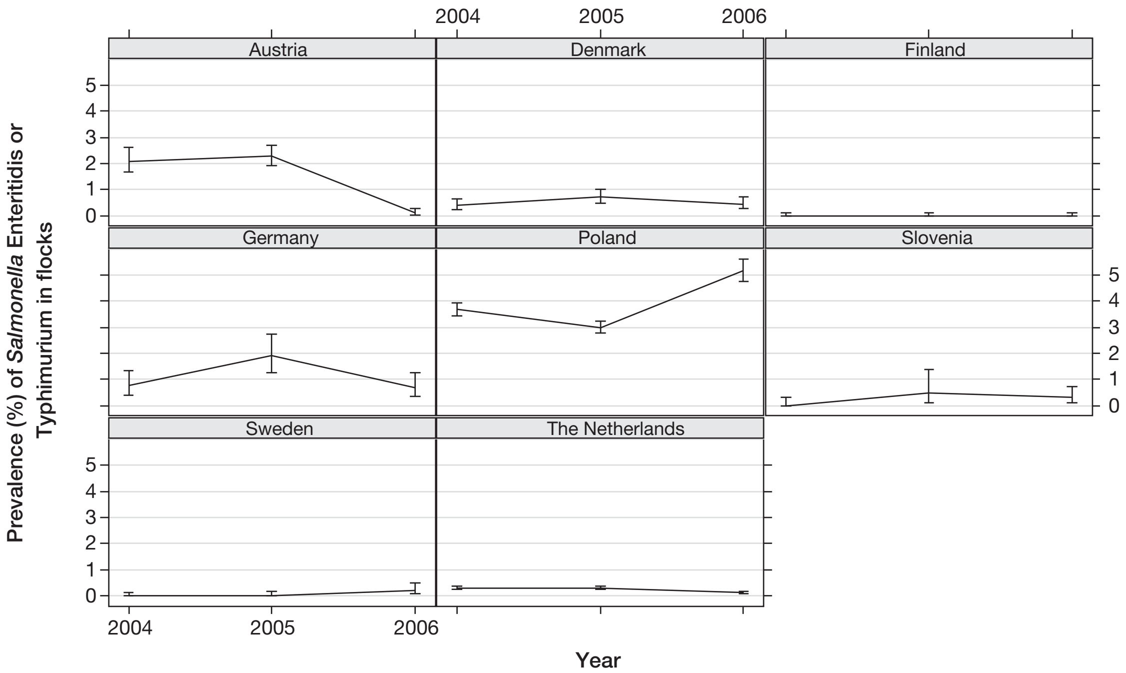
1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock
2. Include only MS with data from all three years

Figure SA13b. *Salmonella* spp. in broiler flocks (all age groups[1], flock based data), weighted[2] mean prevalence and 95% CI in 9 MS running a control programme[3], 2004 - 2006



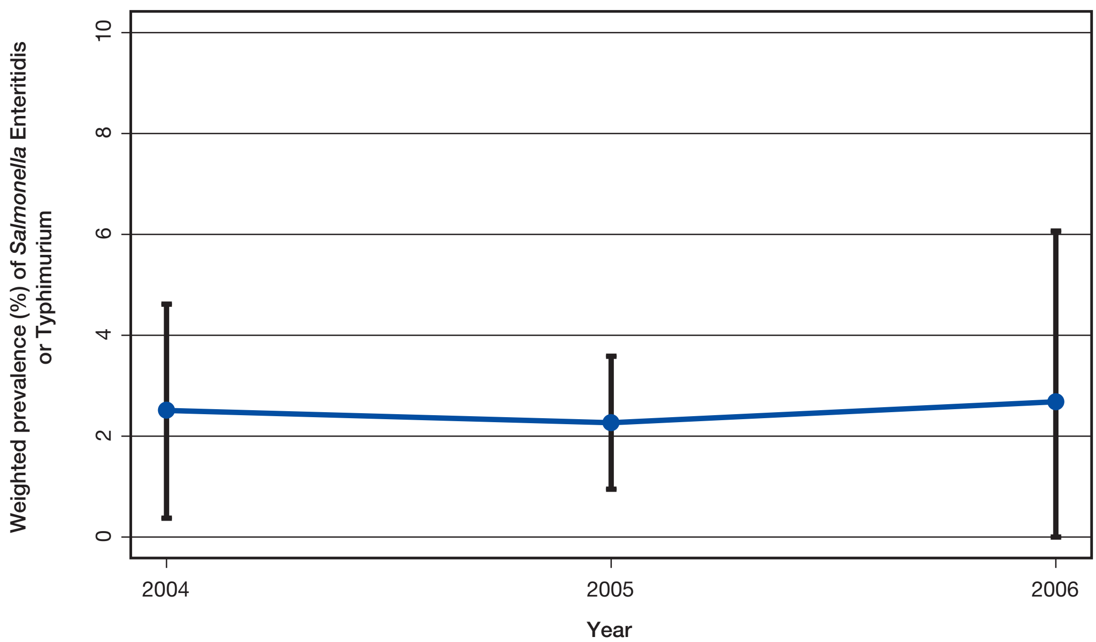
1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock
2. Weight is the reciprocal of the ratio between the number of tested flocks per MS per year, and the number of broilers per MS in 2005-2006. Numbers of broilers per MS were based on the population data reported for 2006, and supplemented with EUROSTAT data from 2005.
3. Include only MS with data from all three years: AT, BE, DE, DK, FI, NL, PL, SE and SI

Figure SA13c. Salmonella Enteritidis and/or Typhimurium in broiler flocks (all age groups[1], flock based data), prevalence and 95% CI in each MS running a control programme[2], 2004 - 2006



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 of a flock
2. Include only MS with data from all three years

Figure SA13d. Salmonella Enteritidis and/or Typhimurium in broiler flocks (all age groups[1], flock based data), weighted[2] mean prevalence and 95% CI in 9 MS running a control programme[3], 2004 - 2006



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 of a flock
2. Weight is the reciprocal of the ratio between the number of tested flocks per MS per year, year, and the number of broilers per MS in 2005-2006. Numbers of broilers per MS were based on the population data reported for 2006, and supplemented with EUROSTAT data from 2005
3. Include only MS with data from all three years: AT, DE, DK, FI, NL, PL, SE and SI

Information from the Baseline Study on the Prevalence of *Salmonella* in broiler flocks of *Gallus gallus*, *2005* - 2006

From October 2005 to September 2006, an EU-wide fully harmonised *Salmonella* baseline survey was conducted in commercial flocks of broilers with at least 5,000 birds. Norway participated in the study on a voluntary basis whereas Luxembourg and Malta did not provide information.

The survey was carried out in accordance with Regulation EC/2160/2003, which requires an EU target for reducing *Salmonella* prevalence in broilers to be laid down. Therefore, comparable data on the current prevalence in MS needed to be available. According to Commission Decision 2005/636/EC five faeces samples were taken from the flocks within 3 weeks before leaving for slaughter. Samples were taken by agents of the Competent Authority in each MS and were tested by the National Reference Laboratory (or a laboratory authorised by it) using the new ISO 6579 Annex D method. A total of 6,325 holdings corresponding to 7,440 flocks with validated results were included in the survey analyses.

The EU and MS-specific *Salmonella* flock observed prevalences are presented in Figures SA14 and SA15. The *Salmonella* spp. EU weighted flock observed prevalence was 23.7% and the *S*. Enteritidis and/or *S*. Typhimurium prevalence 11.0%.

The five most frequently isolated *Salmonella* serovars at the flock-level were, in descending order: *S*. Enteritidis (37.1% of the isolated serovars), *S*. Infantis (20.4%), *S*. Mbandaka (7.9%), *S*. Typhimurium (4.6%) and *S*. Hadar (4.1%). These serovars were respectively isolated in 17, 14, 12, 15 and 8 MS.

Figure SA14. Observed prevalence of Salmonella spp. in broiler flocks, with 95% confidence intervals, for EU Member States and Norway, 2005-2006

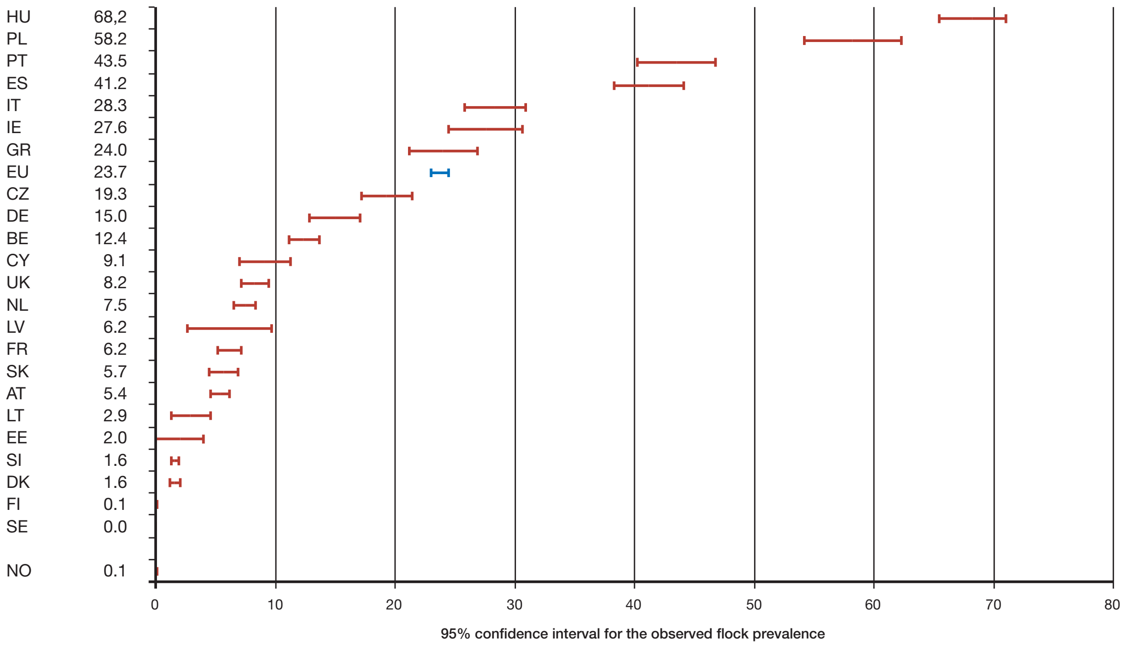
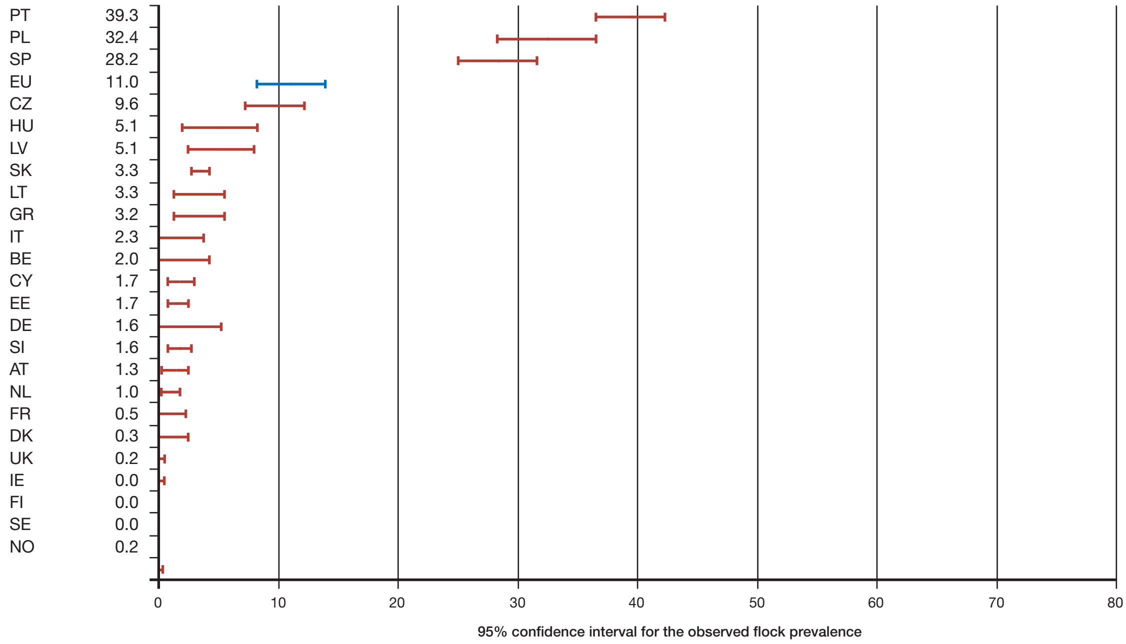


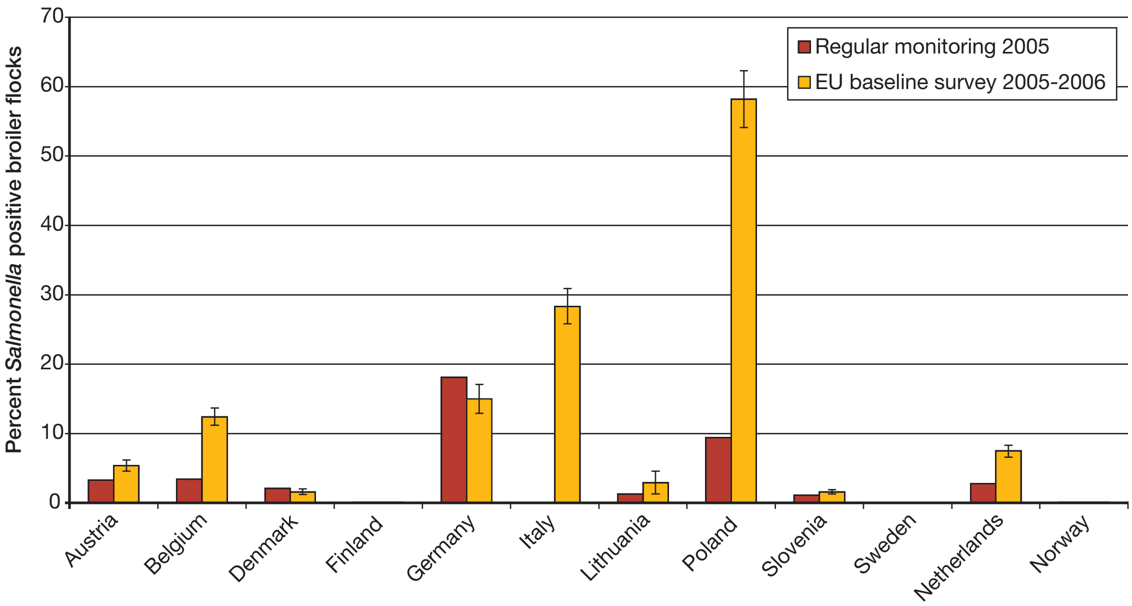
Figure SA15. Observed prevalence of S. Enteritidis and/or S. Typhimurium in broiler flocks, with 95% confidence intervals, for EU Member States and Norway, 2005-2006



In general the observed prevalences for *Salmonella* spp. in MS in the baseline study were comparable or substantially higher compared to the prevalences reported by the MS for broiler flocks in the national zoonoses reports for previous years as well as for the regular monitoring results from 2005 (Figure SA16). This may be explained by the more sensitive sampling design applied in the baseline survey and by the increased sensitivity of the ISO6579 Annex D analytical method used. Indeed the number of samples taken from a flock in the survey was generally higher than those normally used by most MS in routine monitoring. Also the fact that the period of sampling was not exactly the same may have contributed to the difference.

More information on the analysis of the survey results can be found in EFSA report at:
http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1178620761745.htm

Figure SA16. Comparison of the proportion of Salmonella positive broiler flocks found as part of the regular monitoring in 2005 and the Salmonella flock prevalence observed in the EU baseline study conducted from October 2005 to September 2006



Ducks and geese

Only Poland tested a substantial number of duck breeding flocks, and found 9.2% infected. Positive production flocks of ducks were found in all five MS reporting data from at least 25 production flocks, and ranged from 6.3% to 93.3% (Table SA26). No positive production flocks were detected in Norway. In Austria and Poland, the most common serotype was *S*. Enteritidis, whereas as the extremely high occurrence among production flocks of ducks in Denmark was due to other serotypes (*S*. Anatum, *S*. Indiana, *S*. Regent and *S*. Kottbus).

Table SA26. Salmonella in production flocks of ducks (all age groups[1], flock based data), 2004 - 2006

Country	2006				2005				2004			
	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ
Austria	26	11.5	3.9	3.9	46	8.7	2.2	6.5	38	5.3	5.3	0
Belgium	-	-	-	-	28	7.1	0	0	-	-	-	-
Denmark	255	93.3	0.0	0.0	-	-	-	-	201	57.2		
Germany	119	19.3	-	8.4	160	7.5	0	1.9	122	10.7	0	1
Greece	32	6.3	0.0	3.1	-	-	-	-	-	-	-	-
Italy[2]	-	-	-	-	-	-	-	-	21	4.8		
Poland	204	15.2	4.9	2.5	568	15.3	1.6	0.5	442	15.6	2	1.8
Sweden	40	7.5	-	-	26	0	0	0	-	-	-	-
EU Total	**676**	**44.4**	**1.6**	**2.5**	**828**	**12.7**	**1.2**	**1.1**	**824**	**24.3**	**1.6**	**1.1**
Norway	50	0	0	0	40	0	0	0	48	0	0	0

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 of a flock
2. Italy reported for 2006: 2 positive of 45 tested samples (4.4%)

Poland tested a substantial number of geese breeding flocks, and found 7.8% infected. Within the four MS reporting data for production flocks, the proportion of infected flocks ranged from 0% to 11.1% (Table SA27).

Table SA27. Salmonella in production flocks of geese (all age groups[1], flock based data), 2004 - 2006

Country	2006				2005				2004			
	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ
Austria	94	8.5	0	3.2	151	17.2	0	10.6	48	14.6	0	0
Germany	56	3.6	0.0	1.8	111	3.6	0.0	2.7	88	6.8	0.0	2.3
Poland	1,238	11.1	1.0	2.4	2,377	10.1	1.1	0.9	2,708	7.4	1.8	1.7
Sweden	12	0.0	-	-	42	0	0	0	-	-	-	-
EU Total	**1,400**	**10.4**	**0.9**	**2.4**	**2,681**	**9.9**	**1.0**	**1.4**	**2,844**	**7.5**	**1.7**	**1.7**

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 of a flock

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

Turkeys

During 2006, three MS tested 25 turkey breeding flocks or more. No positive breeding flocks were found in Ireland, whereas the occurrence in Poland and Slovakia was 7.1% and 13.3%, respectively. No positive production flocks were found in the Nordic countries or Ireland. Among the MS with positive production flocks, the occurrence ranged between 3.4% and 14.7% (Table SA28).

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

Table SA28. Salmonella in production flock of turkeys (all age groups[1], flock based data), 2004 - 2006

Country	2006				2005				2004			
	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	282	9.6	0	0	1,092	6.3	0.1	0	185	7.0	0	1.1
Belgium	-	-	-	-	127	7.9	0	0	-	-	-	-
Denmark	32	0	0	0	-	-	-	-	-	-	-	-
Finland	1,026	0.2	0.1	0.1	900	0.1	0	0	989	0.0	0.0	0.1
Germany	675	3.4	0.2	0.3	353	3.4	0.3	0	1,627	4.5	0.3	0.6
Greece	34	14.7	0	0	-	-	-	-	-	-	-	-
Ireland	76	0	0	0	-	-	-	-	-	-	-	-
Italy[2]	-	-	-	-	40	5.0	0	2.5	57	14.0	0	0
Poland	2,260	6.3	0.8	1.2	4,952	8.1	0.5	1.2	4,424	8.6	0.5	0.9
Slovakia	29	6.9	6.9	0	-	-	-	-	53	35.8	0	1.9
Slovenia	92	4.4	0	0	72	11.1	0	1.2	-	-	-	-
Sweden	140	0	0	0	108	0	0	0	131	0	0	0
EU Total	**4,646**	**5.0**	**0.5**	**0.6**	**7,644**	**6.6**	**0.4**	**0.8**	**7,466**	**6.6**	**0.4**	**0.7**
Norway	345	0	0	0	310	0	0	0	347	0	0	0

1. Combined data (day-old chicks and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock
2. Italy reported for 2006: 45 positive of 165 tested slaughter batches (27.3%)

Pigs

Five MS and Norway reported data on the occurrence of *Salmonella* from active bacteriological monitoring of pigs in breeding and fattening herds (Table SA29). At the farm, the Netherlands reported the highest herd prevalence (23.0%) whereas Finland, Sweden and Norway did not isolate *Salmonella* from this stage of production. A survey carried out in Luxemburg showed that 40.7% of the 91 tested fattening pig herds were infected with *Salmonella*. Some MS and one non-MS performed monitoring of *Salmonella* at the slaughterhouse by bacteriological analysis of lymph nodes. Slovenia found 2.2% of animals positive, which represents more than a halving compared to the results in 2005. Similar monitoring in Nordic countries showed low occurrences similar to those reported in previous years. In the Veneto Region (Italy) monitoring is performed per slaughter batch by pooled bacteriological analysis of 3-5 lymph nodes from each of 15 animals. Based on this system, Italy reported 58.8% of tested slaughter batches positive, which is comparable with the level reported in 2005. MS used different sampling schemes since the monitoring of *Salmonella* is not harmonised in EU. Therefore the results are not directly comparable between countries.

In general, a large part of the reported pig data were from analysis of samples that were not identified in relation to control programmes, production stage sampling unit and material. This means that the usefulness of the obtained information is limited in relation to the description of the overall prevalence at Community level. Among all reported data from pigs, *S.* Typhimurium was the most commonly isolated *Salmonella* serovar followed by *S.* Derby and *S.* Cholerasuis. However, a wide range of different serovars and unspecified serovars were reported.

For more information in reported data please refer to Level 3.

Table SA29. Salmonella in pigs from MS running a monitoring programme, 2006

	Unit	N	Pos	% Pos
Farm, feacal samples				
Denmark[1]	Herd (fattening)	11,239	386	3.4
Estonia[2]	Animal	600	1	1.7
Finland	Herd (AI station)	220	0	0
	Herd (breeding)	68	0	0
Netherlands	Holding	100	23	23
Sweden[3]	Herd (fattening)	976	0	0
Norway	Herd (breeding)	143	0	0
Slaughter, lymph nodes				
Finland	Animal (breeding)	3,070	4	0.1
	Animal (fattening)	3,262	1	<0.1
Italy[4]	Slaughter batch	68	40	58.8
Slovenia	Animal (fattening)	224	5	2.2
Sweden	Animal (fattening)	3,153	3	0.1
	Animal (breeding)	2,794	7	0.3
EU Total		**25,774**	**470**	**1.8**
Norway	Animal (breeding)	1,173	0	0
	Animal (fattening)	2,411	0	0

1. In Denmark conducts serological surveillance, and only herds with medium and high serological levels are bacteriologically tested
2. In Estonia, sample material is not stated
3. In Sweden, 550 pooled samples from 976 herds in the voluntary programme BIS run by the industry
4. In Italy, only the Veneto Region has a monitoring program

Cattle

Data from active bacteriological monitoring of cattle herds were reported by five MS, and one non-MS (Table SA30). In Finland, Norway and Sweden, the situation was similar to previous years, as no or very few *Salmonella* infected herds/animals were identified in 2006. Also Estonia and Slovenia reported low prevalences. In Italy, batches of cattle were investigated prior to slaughter. The proportion of infected batches was 4.5%, which represent a decline compared to 2005 (6.7%).

In general, a large part of the reported cattle data were from analysis of samples that were not related to a control programme, production stage sampling unit and material. This means that the use of the obtained information is limited in relation to the description of the infection at Community level. Among all reported data from cattle, *S.* Typhimurium were the most commonly isolated serovar followed by *S.* Enteritidis and *S.* Dublin. However, a wide range of different serovars and unspecified serovars were reported.

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

Table SA30. Salmonella in cattle from MS running a monitoring programme, 2006

	Unit	N	Pos	% Pos
Farm, feacal samples				
Estonia[1]	Animal	927	68	7.3
	Animal	1,213	1	0.1
Finland	Herd (parent herds for AI bulls)	205	0	0
Prior to slaughter, feacal samples				
Italy[2]	Slaughter batch[3]	67	3	4.5
Slovenia	Animal	236	3	1.3
Slaughter, lymph nodes				
Finland	Animal	3,022	2	0.1
Sweden	Animal	3,518	2	0.1
EU Total		**9,188**	**79**	**0.9**
Norway	Animal	2,317	0	0

1. In Estonia, faecal samples from 5-10 animals were pooled for investigation
2. In Italy, only the Veneto Region has a monitoring program
3. In Italy, faecal sample from 15 animals per batch are examined

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 MS. Results show that all types of poultry can be infected with *Salmonella* and several serovars may be present even though there was a tendency for *S.* Typhimurium to be most frequently isolated, especially from wild birds. An overview of the reported data is presented in Level 3.

The reported data on *Salmonella* in sheep, goats and solipeds were primarily results from diagnostic submissions. In several countries, *Salmonella* was detected in sheep (AT, DE, CZ, EE, GR, IE, IT, LT, LU, PL, PT, SL, UK as well as BG, NO and RO), goats (AT, DE, CZ, GR, IE, IT, LU, PL, PT, SL and UK as well as NO) and solipeds (AT, DE, CZ, HU, IE, IT, LT, NL, PL, PT, SL, SE and UK as well as NO). In Norway, only the specific serotype *S. enterica* subsp. *diarizonae* 61:(k):1,5,(7) was isolated from 15 (17.9%) of 84 sheep samples of primarily diagnostic origin. In Italy, control programmes and surveys did not find *Salmonella* in 23 sheep holdings and 50 samples from individual sheep. Similarly, none of 13 goat holdings and 4 individual samples was positive.

Pets, in particular cats and dogs, have been investigated for *Salmonella* in several countries. In Italy, control programmes and surveys found no *Salmonella* in 6 cats and 24 dogs. A relatively high proportion of *Salmonella* positive samples from reptiles, snakes and turtles were observed. An overview of the reported data is presented in Level 3.

3.1.4 *Salmonella* in feedingstuffs

Data on *Salmonella* in feedingstuffs was provided by 22 MS and one non-MS. The data could not be separated into MS with comparable surveillance programmes and those reporting random sampling of domestic and imported feedingstuffs (Appendix, Table SA1). Presentation of sample and batch based data from the different monitoring systems were therefore summarised, and may include both domestic and imported feedingstuffs. Due to significant differences in monitoring and reporting strategy data are not comparable between MS, and cannot be considered as national prevalences. All reported data are presented in Level 3.

Table SA31 reports EU proportions *Salmonella* positive samples in animal and vegetable derived feed material since 2002. In 2006 the overall EU occurrence of *Salmonella* in fishmeal was 1.9% and made the general decrease observed since 2002 to discontinue. The overall observed levels of contamination in meat and bone meal varied between the years and were on average slightly higher compared to fishmeal. The proportion *Salmonella* positive meat and bone meal samples ranged from 0.5% (lowest) in 2003 to 2.9% (highest) in 2002.

The level of *Salmonella* contamination in feed material of vegetable origin also varied considerably between 2002-2006 and no general trends were apparent. In 2006, *Salmonella* contamination of cereals was 0.3%. As in previous years the *Salmonella* contamination percentages of this feedingstuff was somewhat lower compared to other feed material. In 2006, 2.5% of the samples/batches of oil seeds and products thereof were positive in 2006. Since 2002 this feed material has been consistently the most contaminated one ranging from 2.5% (lowest) in 2006 to 5.7% (highest) in 2004. This finding generally indicates that oil seeds like soybean, rape, sunflower and products thereof probably are the most likely sources of *Salmonella* in animal feed.

Table SA31. Salmonella in animal derived feed material, 2002-2006

	2006		2005		2004		2003		2002	
EU Totals	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**
Fishmeal	2,414	1.9	1,362	0.4	5,280	1.1	1,249	1.6	1,824	2.1
Meat and bone meal	12,350	2.3	10,633	1.3	13,113	1.7	8,064	0.5	2,033	2.9
Cereals	5,331	0.3	4,735	0.5	5,382	0.7	3,928	1.0	4,538	1.2
Oil seeds and products	18,449	2.5	20,849	4.3	20,326	5.7	14,381	4.8	13,764	5.3

In compound feedingstuffs (final products), the proportion of *Salmonella* positive findings ranged from none to 9.4% in cattle feed, 3.3% in pig feed and 5.3% in poultry feed (Table SA32). No general trend was apparent, but for cattle and pig feed the observed ranges of positive samples were larger than recorded the previous two years.

Table SA32. Salmonella in compound feedingstuffs (final products), 2002-2006

	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Cattle feed										
Finland	452	0.2	431	0	453	0	513	0	439	0
Germany	197	0	243	0.8	261	0	375	1.1	139	1.4
Hungary	50	0	-	-	-	-	-	-	-	-
Ireland	79	0	65	0	56	0	44	0	-	-
Italy	177	2.8	350	1.4	206	1.0	168	0	44	2.3
Luxembourg	32	9.4	-	-	-	-	-	-	-	-
Netherlands	2,438	0.3	2,467	0.5	-	-	1,409	0.9	1,671	0.8
Poland	507	0.8	441	1.8	477	0.4	-	-	-	-
Slovakia	37	0	32	0	-	-	-	-	-	-
Slovenia	61	1.6	47	0	-	-	26	7.7	-	-
Spain	111	5.4	82	2.4	177	1.1	384	2.3	470	4.5
EU Total	**4,141**	**0.7**	**4,158**	**0.7**	**1,630**	**0.4**	**2,919**	**0.8**	**2,763**	**1.3**
Pig feed										
Finland[1]	338	0	350	0	299	0	241	0	235	0
Germany	513	0	814	0.3	569	0.2	1020	0.7	471	0.9
Hungary	316	1.6	-	-	-	-	-	-	-	-
Italy	150	0	180	1.7	116	0.9	-	-	-	-
Latvia	39	0	36	0	67	0	152	2.6	-	-
Luxembourg	60	3.3	29	0	-	-	-	-	-	-
Netherlands	2,917	0.3	3,301	0.4	3,048	0.6	2,904	0.6	3,146	0.6
Poland	1,406	1.3	1,224	1.7	1,827	1.2	-	-	-	-
Slovakia	384	0.3	34	0	-	-	-	-	-	-
Slovenia	83	0	101	1.0	53	1.9	43	4.7	-	-
Spain	28	0	46	0	97	1.0	89	0	120	8.3
EU Total	**6,234**	**0.6**	**6,115**	**0.7**	**6,076**	**0.7**	**4,449**	**0.5**	**3,972**	**0.7**
Norway	60	0	51	0	44	0	74	0	104	0
Poultry feed										
Austria	341	0.3	249	0	926	1.1	683	0.9	377	1.6
Belgium	114	0.9	-	-	-	-	106	1.9	33	0
Finland[1]	141	0.7	181	0	175	0	243	0	180	0
France	85	2.4			-	-	50	4.0	24	0
Germany	1,941	1.2	1,726	1.1	2035	3.0	1763	2.5	1179	2.6
Greece	57	5.3	227	6.2	176	6.3	344	3.2	68	0
Hungary	338	1.2	-	-	-	-	-	-	-	-
Ireland	31	3.2	-	-	570	5.1	-	-	325	0
Italy	325	3.7	613	4.2	356	3.9	-	-	-	-
Latvia	41	0	197	0	150	2.7	120	2.5	-	-
Luxembourg	40	2.5	-	-	-	-	-	-	-	-
Netherlands	7,617	0.3	8,256	0.4	-	-	-	-	-	-
Poland	2,215	1.1	2,050	1.4	2,682	0.9	-	-	-	-
Slovakia	371	0.8	29	0	-	-	-	-	-	-
Slovenia	104	1.0	127	0.8	-	-	-	-	-	-
Spain	58	3.4	-	-	-	-	-	-	-	-
EU Total	**13,819**	**0.8**	**13,655**	**0.9**	**7,070**	**2.0**	**3,309**	**0.7**	**2,186**	**0.3**
Norway	61	0	50	0	28	0	61	0	78	0

1. Import data excluded from Finland (2003)

As for all results on feedingstuffs, the relevance of the positive findings depend on whether the data are representative of the feedingstuffs available in the country, or whether it reflects intensive sampling of high risk products. The national reports do not provide this information.

The reported occurrence of *S.* Enteritidis and *S*. Typhimurium in feedingstuffs was low. *S*. Enteritidis was detected in final products of compound feedingstuffs for farm animals in France (1 batch), Italy (5 samples), Hungary (1 batch) and Slovakia (1 batch), and occationally in feed materials in Denmark (1 sample), the Netherlands (1 batch), Slovakia (2 batches), Spain (3 batches) and the United Kingdom (1 batch).

Finland (1 sample), Italy (4 samples) and France (1 batch) reported findings of *S.* Typhimurium in final products of compound feedingstuffs for farm animals. *S.* Typhimurium was also occasionally detected in different kinds of feed materials in Denmark (1 sample), Germany (3 samples), Italy (2 samples) and the United Kingdom (10 batches).

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

3.1.5. *Salmonella serovars and phage types*

The available information on the distribution of *Salmonella* serovar and phage types along the food chain varies greatly between countries. In all MS serotyping of *Salmonella* isolates is carried out according to the Kaufmann-White Scheme. For phage typing of *S.* Enteritidis and *S.* Typhimurium the Colindale scheme is predominantly used. The Netherlands, however, classifies *S.* Typhimurium with another set of phages. Therefore, Dutch phage type data are not included here.

In the following, the ten most frequently reported serotypes among isolates from food and animal species as well from feedingstuffs are presented. Ranking was done within each group by adding up the number of each serotype across all countries. The serovar distributions for each MS include isolates reported from monitoring, surveillance and official controls, but also data from investigations where the framework of sampling was not stated, were included, as the material otherwise would have been very limited. Data from the baseline study in broilers and results from HACCP samples, and clinical investigations were not included for analysis of the overall serovar distributions. The distributions were based on the number of typed isolates, including non-typeable isolates. More countries reported serovars distributions in 2006 compared to earlier years.

Most MS reported a subset designated “other serotypes”. For some MS this may include isolates belonging to the ten most common serovars in the Community and the relative Community occurrence of some serovars may therefore be underestimated.

The ten most frequently reported *Salmonella* serovars and phage types of *S*. Enteritidis and *S*. Typhimurium in human cases are presented in the subchapter 3.1.1.1. Salmonellosis in humans.

For detailed data on serovars in humans, foodstuffs, animals, feedingstuffs, and data on phage types in humans please refer to Level 3.

Serovars in foodstuffs

Broiler meat

Overall, *S.* Infantis was the most frequent serovar from broiler meat in 2006 (Table SA33). This was, however, caused by a very comprehensive report from Hungary, where *S.* Infantis constituted 96.3% of 1,982 serotyped isolates. If the data from Hungary are excluded, *S*. Enteritidis becomes the most commonly occurring serovar, followed by *S*. Paratyphi B var. Java, *S.* Infantis, *S.* Bredeney and *S*. Typhimurium (Table SA33). The predominance of specific serovars in broiler meat varied importantly between the MS indicating that specific clones may have been established in different MS. However, it should be noted that the number of serotyped isolates was very low for some MS, and this makes a clear interpretation of the data difficult. A total of 56 different serovars was reported along with a number of incomplete types and non-typable strains. The serotype distribution in broiler meat in 2006 was largely comparable to the distribution in 2005.

Table SA33. Distribution of the ten most common Salmonella serovars in broiler meat[1], 2006. The serovar distribution for each MS was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars, (% isolates)

	No. of isolates serotyped	S. Infantis	S. Enteritidis	S. Paratyphi B incl. var. Java	S. Bredeney	S. Typhimurium	S. Hadar	S. Anatum	S. Blockley	S. Indiana	S. Livingstone	Other serotypes
EU Total No. of Isolates	**3,733**	**2,029**	**276**	**246**	**150**	**134**	**82**	**68**	**69**	**60**	**122**	**497**
Austria	100	44.0	14.0	0	0	2.0	4.0	0	3.0	3.0	1.0	29.0
Belgium	545	2.8	5.5	33.4	23.3	8.3	4.6	0.2	10.8	2.0	1.3	7.9
Czech Republic	63	11.1	14.3	0	0	6.3	1.6	0	0	0	0	66.7
Estonia	33	0	69.7	0	0	0	0	0	0	0	0	30.3
France	6	0	100	0	0	0	0	0	0	0	0	0
Germany	118	12.7	9.3	11.0	0.8	19.5	0.8	6.8	1.7	4.2	4.2	28.8
Greece	114	0	1.8	0	2.6	2.6	0	49.1	3.5	14.9	24.6	0.9
Hungary	1,982	96.3	1.4	0	0.2	0.6	0	0	0	0	0	1.6
Ireland	79	2.5	1.3	2.5	2.5	5.1	3.8	1.3	1.3	1.3	0	78.5
Italy	285	0	21.0	0	0.7	7.4	6.3	0	0	0	27.7	36.8
Latvia	21	0	95.2	0	0	0	0	0	0	0	0	4.8
Lithuania	11	0	63.6	0	0	0	9.1	0	0	0	0	27.3
Luxembourg	6	16.7	33.3	33.3	0	0	0	0	0	0	0	16.7
Netherlands	122	13.9	6.6	38.5	0.8	2.5	5.7	1.6	0	4.1	1.6	24.6
Poland	111	9.9	19.8	0	0	13.5	14.4	0	0	10.8	0	31.5
Portugal	14	0.0	71.4	0	0	0	7.1	0	0	0	0	21.4
Slovakia	22	4.5	90.9	0	0	0	0	0	0	0	0	4.5
Slovenia	11	54.5	27.3	0	0	9.1	0	0	0	0	0	9.1
Sweden	4	0	0	0	0	0	0	0	0	0	0	100
United Kingdom	86	1.2	1.2	0	11.6	2.3	5.8	0	0	7.0	0	70.9
% EU		**54.4**	**7.4**	**6.6**	**4.0**	**3.6**	**2.2**	**1.8**	**1.8**	**1.6**	**3.3**	**13.3**
Norway	1	0	0	0	0	0	0	100	0	0	0	0
Romania	54	0	24.1	0	0	0	53.7	0	0	0	0	22.2

1. Include isolates from fresh meat, meat products, meat preparations and unspecified meat

Table eggs

Generally, table eggs were not monitored using bacteriological methods. The serotype distribution among isolates originated from different investigations is presented in Table SA34. These results support the conclusion from previous years, i.e *S.* Enteritidis is the predominant serovar in table eggs and related products.

Table SA34. Distribution of Salmonella serovars in table eggs and egg products, 2006. The serovar distribution for each MS was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars, (% isolates)

	Total number of isolates	*S.* Enteritidis	*S.* Mbandaka	*S.* Typhimurium	*S.* Kottbus	*S.* Livingstone	*S.* group C	*S.* Bareilly	*S.* Duisburg	*S.* Virchow
EU Total, No. of isolates	**351**	**317**	**14**	**5**	**2**	**2**	**2**	**1**	**1**	**1**
Austria	57	96.5	0	1.8	0	0	0	0	1.8	0
Germany	37	94.6	0	5.4	0	0	0	0	0	0
Greece	2	0	0	0	100	0	0	0	0	0
Hungary	25	100	0	0	0	0	0	0	0	0
Italy	19	68.4	0	0.0	0	0	0	0	0	0
Lithuania	3	100	0	0	0	0	0	0	0	0
Luxembourg	2	100	0	0	0	0	0	0	0	0
Netherlands	4	100	0	0	0	0	0	0	0	0
Slovakia	10	80.0	0	0	0	0	0	10.0	0	10.0
Slovenia	3	66.7	0	33.3	0	0	0	0	0	0
Spain	28	82.1	0	3.6	0	7.1	7.1	0	0	0
United Kingdom	161	91.3	8.7	0	0	0	0	0	0	0
% EU		**90.3**	**4.0**	**1.4**	**0.6**	**0.6**	**0.6**	**0.3**	**0.3**	**0.3**
Romania	2	100	0	0	0	0	0	0	0	0

Pig meat

All serovars reported from different types of pig meats (fresh meat, meat products, meat preparations and type of product not indicated) were included for the serovar distribution. As in previous years, *S*. Typhimurium was the predominant serovar isolated from pig meat (0–100%) followed by *S.* Derby (0-72.7%) (Table SA35. The predominance of specific serovars in pig meat varied importantly between the MS, but care should be taken when interpretation the results, since the number of serotyped isolates was very low for some MS. For example, two MS (Latvia and Austria) reported *S.* Enteritidis to be the most prevalent serovar in pig meat representing 93.8% and 50.0% respectively, but this proportion was based on typing of 16 and 6 isolates. No major changes were observed in relation to the distribution of serovars in pig meat from 2005 to 2006. Five serovars (*S.* Typhimurium, *S.* Derby, *S.* 1.4.5,12:-:i, *S.* Enteritidis, *S.* London and *Salmonella* O-group B) were included in “top 10” of serovars isolated from both pig meat and pigs.

Table SA35. Distribution of the ten most common Salmonella serovars in pig meat[1], 2006. The serovar distribution for each MS was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars, (% isolates)

	No. of isolates serotyped	S. Typhimurium	S. Derby	S. 1,4,5,12:-:i	S. Rissen	S. Infantis	S. London	S. Enteritidis	S. Bredeney	S. Kentucky	S. group B	Other serotypes
EU Total, No. of Isolates	**1,454**	**525**	**368**	**102**	**69**	**50**	**48**	**29**	**24**	**8**	**7**	**224**
Austria	6	16.7	16.7	0	0	0	0	50.0	0	0	0	16.7
Belgium	11	27.3	72.7	0	0	0	0	0.0	0	0	0	0
Czech Republic	10	30.0	50	0	0	0	0	0.0	0	0	0	20
Denmark	156	38.5	23.1	0	0	6.4	0	0.0	0	0	0	32.1
Estonia	4	75.0	0	0	0	0	0	0.0	0	0	25.0	0
France	284	50.4	40.8	0	4.93	3.9	0	0.0	0	0	0	0
Germany	57	57.9	15.8	0	0	3.5	3.5	0.0	0	0	10.5	8.8
Hungary	129	41.1	18.6	10.1	0	20.9	5.4	0.8	0	0	0	3.1
Ireland	89	52.8	19.1	0	0	0	3.4	0.0	4.5	9.0	0	11.2
Italy	636	24.1	23.11	14.0	7.7	0	5.7	0.6	2.8	0	0	22.0
Latvia	16	0	6.3	0	0	0	0	93.8	0	0	0	0
Netherlands	14	50.0	14.3	0	0	0	0	7.1	0	0	0	28.6
Poland	5	80.0	0	0	0	0	0	0.0	0	0	0	20
Portugal	4	0	0	0	25	0	0	25.0	0	0	0	50
Slovakia	5	20.0	20	0	0	0	0	0.0	40	0	0	20
Slovenia	1	100	0	0	0	0	0	0.0	0	0	0	0
Spain	28	46.4	3.6	0	17.9	0	0	14.3	0	0	0	17.9
% EU		**36.1**	**25.3**	**7.0**	**4.7**	**3.4**	**3.3**	**2.0**	**1.7**	**0.6**	**0.5**	**15.4**
Norway	1	0	0	0	0	0	0	0.0	0	0	0	100
Romania	48	4.2	52.1	0	0	6.3	6.3	6.3	4.2	2.1	0	18.8

1. Include isolates from fresh meat, meat products, meat preparations and unspecified meat

Bovine meat

All serovars reported from different types of bovine meats (fresh meat, meat products, meat preparations and type of product not indicated) were included for the serovar distribution (Table SA36. As in 2005, *S.* Typhimurium was the predominant serovar in bovine meat followed by *S.* Dublin. As for broiler and pig meat, the predominance of specific serovars in bovine meat varied greatly between the MS, and interpretations should be made carefully, considering the small sample sizes in some MS.

Table SA36. Distribution of the ten most common Salmonella serovars in bovine meat. The serovar distribution for each MS was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars, (% isolates)

	No. of isolates serotyped	S. Typhimurium	S. Dublin	S. Derby	S. Anatum	S. Montevideo	S. Enteritidis	S. Newport	S. 1,4,12:d:-	S. Infantis	S. Mbandaka	Other serotypes
EU Total, No. of isolates	**326**	**120**	**43**	**33**	**26**	**16**	**12**	**5**	**4**	**2**	**3**	**62**
Austria	2	0	0	0	0	0	50.0	0	0	0	0	50.0
Czech Republic	7	42.9	0	14.3	0	14.3	0	0	0	0	0	28.6
Denmark	14	14.3	57.1	0	0	0	0	0	0	0	0	28.6
Estonia	3	33.3	0	33.3	0	0	0	0	0	0	0	33.3
Finland	2	0	0	0	0	0	0	0	0	100	0	0
France	109	41.3	9.2	15.6	21.1	12.8	0	0	0	0	0	0
Germany	2	50.0	0	0	0	0	0	0	0	0	0	50.0
Greece	1	100	0	0	0	0	0	0	0	0	0	0
Hungary	20	20	0	0	0	0	10.0	25.0	20.0	0	0	25.0
Italy	64	39.1	0	10.9	0	0	3.1	0	0	0	0	46.88
Ireland	58	39.7	39.7	5.2	0	0	0	0	0	0	0	15.5
Latvia	5	40.0	0	40.0	0	0	0	0	0	0	0	20.0
Luxembourg	1	0	0	0	0	0	0	0	0	0	0	100
Netherlands	22	50.0	9.1	9.1	0	4.5	13.6	0	0	0	0	13.6
Poland	2	0	0	0	0	0	0	0	0	0	0	100
Slovenia	1	100	0	0	0	0	0	0	0	0	0	0
Spain	13	7.7	0	0	23.1	0	30.8	0	0	0	23.1	15.4
% EU		**36.8**	**13.2**	**10.1**	**8.0**	**4.9**	**3.7**	**1.5**	**1.2**	**0.6**	**0.9**	**19.0**
Romania	10	0	0	40.0	0	0	10.0	10.0	0	10.0	0	30.0

Serovars in animals

Gallus Gallus

As in 2004 and 2005, the dominant serovars isolated from *Gallus gallus* in 2006 were *S.* Enteritidis, *S.* Infantis and *S.* Typhimurium. *S.* Enteritidis was the most common serotype in most reporting MS, but in Finland, Italy and the United Kingdom *S.* Livingstone was the most commonly reported serovar. In Denmark, *S.* Typhimurium dominated in 2006 as in 2005 (Table SA37).

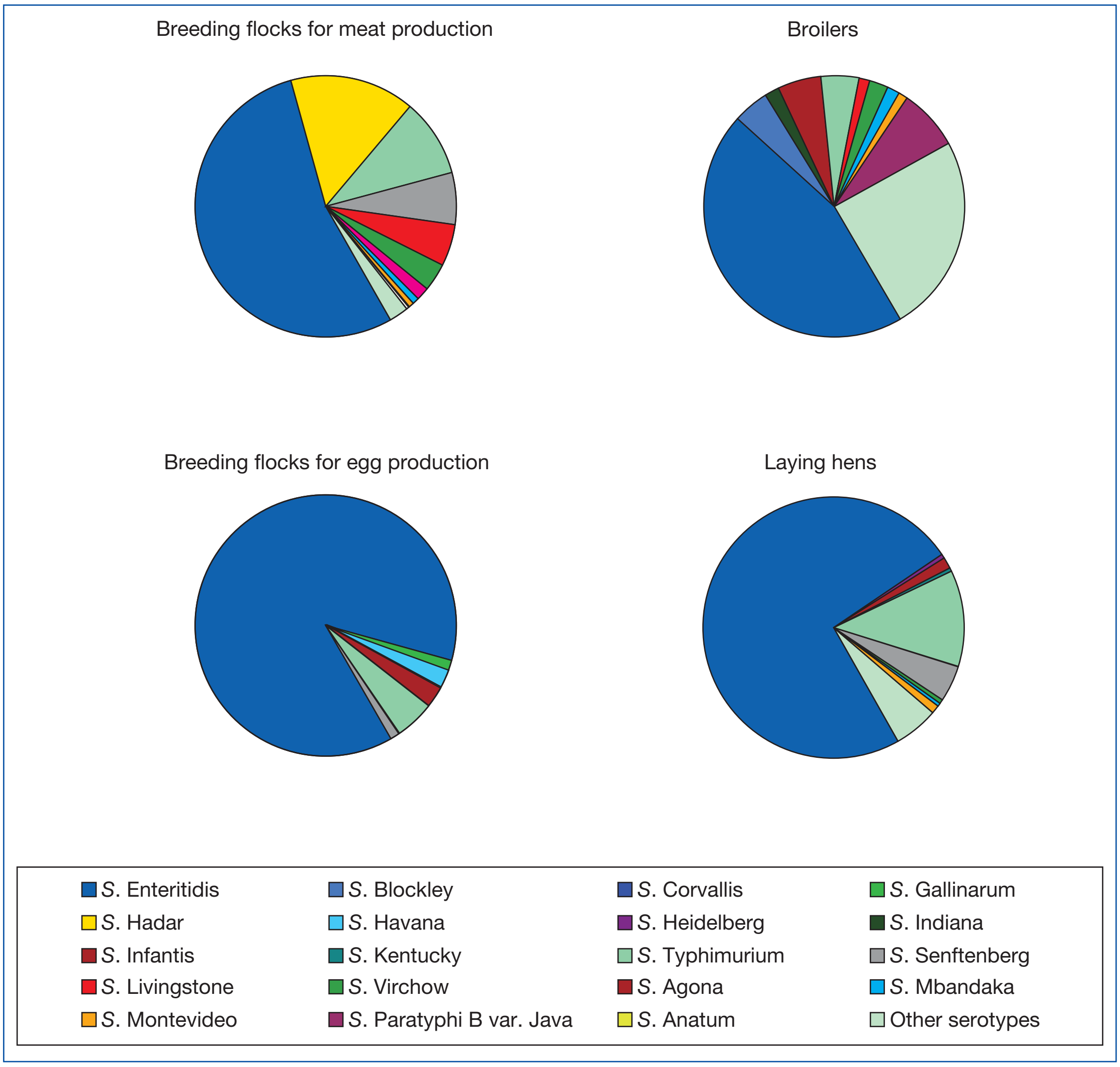
Table SA37. Distribution of the ten most common Salmonella serovars in Gallus gallus[1], 2006. The serovar distribution for each MS was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars, (% isolates)

	Total isolates serotyped	S. Enteritidis	S. Typhimurium	S. Infantis	S. Livingstone	S. Paratyphi B var. Java	S. Hadar	S. Virchow	S. Bredeney	S. Montevideo	S. Senftenberg	Other serotypes
EU total, No. of isolates	**5,930**	**2,210**	**390**	**354**	**277**	**270**	**185**	**184**	**176**	**167**	**151**	**1,577**
Austria	625	29.7	10.9	10.2	0.6	0	0.8	1.6	1.5	21.2	7.0	16.5
Belgium	583	27.1	7.2	2.6	1.9	15.3	3.9	2.7	13.6	0	1.9	23.8
Czech Republic	108	72.2	0	3.7	0	0	0	0.9	0	4.6	0	18.5
Denmark	79	2.5	17.7	0	0	0	0	0	0	0	0	79.7
Estonia	204	100	0	0	0	0	0	0	0	0	0	0
Finland	20	0	0	15.0	35	0	0	0	0	0	0	30.0
Germany	114	75.4	6.1	7.0	4.4	0	0	1.8	0	0	0	5.3
Greece	252	16.7	3.2	0	0.4	0	2.8	0.8	4.4	2.8	4.0	65.1
Hungary	71	5.6	1.4	88.7	0	0	0	0	0	0	0	4.2
Italy	924	16.6	5.7	0.0	19.2	0	4.9	0.0	7.5	0	0	46.0
Ireland	1	0	100	0	0	0	0	0	0	0	0	0
Latvia	30	86.7	0	0	0	0	0	0	0	0	0	13.3
Luxembourg	2	100	0	0	0	0	0	0	0	0	0	0
Netherlands	656	6.9	4.7	13.2	2.3	27.2	3.0	8.4	0.9	0	6.8	26.4
Poland	1,263	54.6	12.4	5.5	0	0	6	7	0	0	0	13.4
Portugal	486	80.2	0	6.4	0	0	0	0	0	0	1	12.3
Slovakia	154	76.0	1	1.3	0	0	1	1	0	3	0	16.2
Slovenia	41	46.3	0	12.2	0	0	0	0	0	0	0	41.5
Sweden	4	0	0	0	0	0	0	0	0	0	0	100.0
United Kingdom	311	3.5	1.9	0.6	17.0	0	1.6	1.3	0	3.9	11.9	58.2
% EU		**37.3**	**6.6**	**6.0**	**4.7**	**4.6**	**3.1**	**3.1**	**3**	**2.8**	**2.5**	**26.4**
Norway	1	0	100	0	0	0	0	0	0	0	0	0

1. Include serovars in monitoring isolates from breeding flocks, laying hen flocks and broiler flocks.

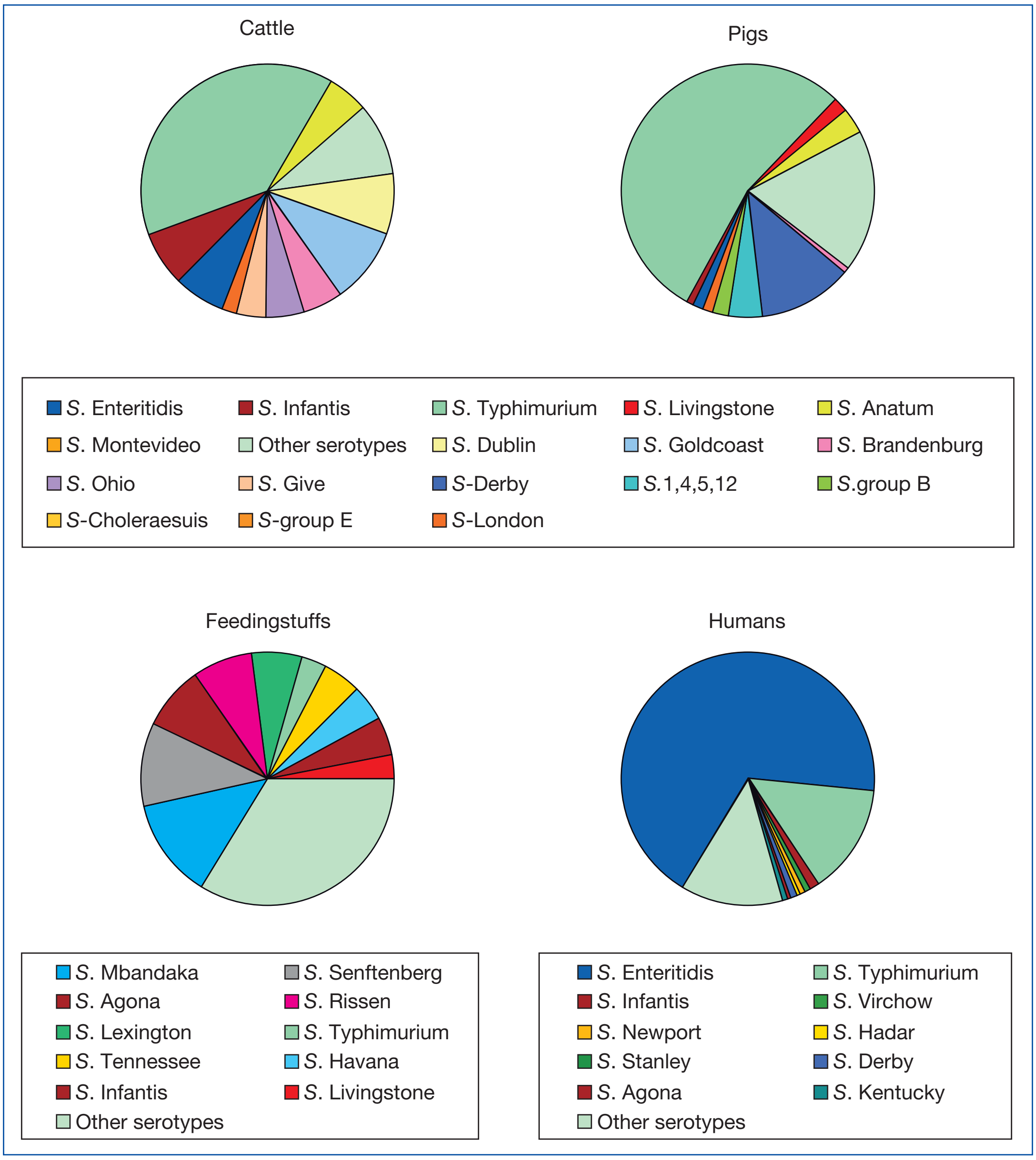
The distribution of the ten most common serotypes in breeding flocks for egg and meat production and in broilers and laying hens is shown in Figure SA17b. In all four production types, *S.* Enteritidis covers more than 50% of the isolates. *S.* Hadar were only reported in breeding flocks for meat production and in broilers, and were also found in broiler meat (Table SA33), whereas the serotype was not reported from the egg production line or in table eggs and egg products (Table SA34).

Figure SA17a. Distribution of the ten most commonly reported Salmonella serovars in breeding flocks for meat and for egg production[1], and in broilers and laying hens, 2006



[1] 94% of the serotyped isolates from breeding flocks for egg production are from LT and PO.

Figure SA17b. Distribution of the ten most commonly reported Salmonella serovars in cattle, pigs, feedingstuff and humans, 2006



Pigs

Information on the serovar distributions in isolates from pigs was provided by 17 MS (Tabel SA38), compared to only four MS in 2005. *S.* Typhimurium was by far the predominant serovar, followed by *S.* Derby, *S.* 1,4,5,12:-:i. and *S.* Anatum.

Table SA38. Distribution of the ten most common Salmonella serovars in pigs, 2006. The serovar distribution for each MS was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars, (% isolates)

	No. of iolates serotyped	*S.* Typhimurium incl. var. Copenhagen	*S.* Derby	*S.* 1,4,5,12:-:i	*S.* Anatum	*S.* group B	*S.* Livingstone	*S.* London	*S.* Enteritidis	*S.* Infantis	*S.* Brandenburg	Other serotypes
EU total, No. of isolates	**2,253**	**1,235**	**265**	**96**	**77**	**43**	**36**	**31**	**31**	**17**	**14**	**408**
Austria	26	0	15.4	0	0	0	0	0	3.8	3.8	0	76.9
Belgium	271	68.3	8.9	0	1.1	4.1	1.8	1.1	2.2	1.8	2.6	8.1
Czech Republic	36	69.4	11.1	0	0	0	0.0	0.0	5.6	5.6	0	8.3
Estonia	10	10.0	0	0	0	0	0	0	50.0	0	0	40.0
Finland	6	83.3	0	0	0	0	0	0	16.7	0	0	0
Germany	644	79.3	3.4	0	0.2	4.8	0.3	4.2	0.9	0.6	0.5	5.7
Greece	13	15.4	23.1	0	0	0	0	0	7.7	0	0	53.8
Hungary	27	40.7	40.7	0	0	0	0	0	7.4	0	0	11.1
Italy	807	25.5	18.8	10	8.9	0	2.6	0.0	0.4	0.0	0.0	34.0
Lithuania	11	0.0	27.3	0	0	9.1	0	0	0	0	0	63.6
Luxembourg	96	54.2	27.1	14.6	0	0	0	0	1.0	0	0	3.1
Netherlands	140	60.7	9.3	2.9	0.7	0	5.7	0.7	0.7	2.9	2.9	13.6
Poland	1	0	0	0	0	0	0	0	0	0	0	100
Slovakia	11	27.3	27.3	0	0	0	0	0	9.1	0	0	36.4
Slovenia	5	60.0	0	0	0	0	0	0	20.0	20.0	0	0
Sweden	10	60.0	0	0	0	0	0	0	0	0	0	40.0
United Kingdom	140	100	0	0	0	0	0	0	0	0	0	0
% EU		**54.8**	**11.8**	**4.3**	**3.4**	**1.9**	**1.6**	**1.4**	**1.4**	**0.8**	**0.6**	**18.1**

Cattle

Information on the serovar distributions in isolates from cattle was provided by 12 MS, and 2 non-MS (Table SA39), compared to only four MS in 2005. The dominant serovar was *S.* Typhimurium followed by *S.* Goldcoast, *S.* Dublin and *S.* Infantis.

Table SA39. Distribution of the ten most common Salmonella serovars in cattle, 2006. The serovar distribution for each MS was based on the number of serotyped isolates, including non-typeable isolates. Ranking was based on the sum of all reported serovars, (% isolates)

	No. of isolates serotyped	S. Typhimurium	S. Goldcoast	S. Dublin	S. Infantis	S. Enteritidis	S. Anatum var. 15	S. Brandenburg	S. Ohio	S. Give	S. group E	Other serotypes
EU Total, No. of isolates	**4338**	**1,716**	**428**	**319**	**300**	**286**	**226**	**219**	**201**	**173**	**70**	**400**
Czech Republic	75	18.7	0	0	68.0	12.0	0	0	0	0	0	1.3
Estonia	62	51.6	0	16.1	0	0	0	0	0	0	0	32.3
Finland	173	53.2	0	0	13.9	0	0	0	0	0	0	32.9
Germany	3,532	41.4	12.0	5.7	6.3	2.2	6.4	6.2	5.7	4.9	2.0	7.4
Hungary	6	16.7	0	0	0	16.7	0	0	0	0	0	66.7
Italy	84	64.3	0	0	0	1.2	0	0	0	0	0	34.5
Luxembourg	1	100	0	0	0	0	0	0	0	0	0	0.0
Netherlands	205	27.8	2.4	52.7	1.5	2.4	0	0	0	0	0	13.2
Poland	2	50.0	0	0	0	50.0	0	0	0	0	0	0.0
Slovenia	3	0	0	0	33.3	0	0	0	0	0	0	66.7
Sweden	3	100	0	0	0	0	0	0	0	0	0	0.0
United Kingdom	192	0	0	0	0	100	0	0	0	0	0	0.0
% EU		**39.6**	**9.9**	**7.4**	**6.9**	**6.6**	**5.2**	**5.0**	**4.6**	**4.0**	**1.6**	**9.2**
Norway	2	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Romania	13	15.4	0.0	0.0	0.0	38.5	0.0	0.0	0.0	0.0	0.0	46.2

Serovars in feedingstuffs

Serovars most commonly reported from feedingstuffs varied between MS, and depended, to a wide extent, on the sampling strategy and the products tested. The ranking of serovars in feedingstuffs should therefore be interpreted cautiously.

The ten most common serovars isolated from feedstuffs are presented in Table SA40. *S.* Enteritidis, which was the most commonly encountered serovar in humans, was not among the ten most common serotypes in feedingstuffs. However, *S.* Agona, *S.* Infantis and *S.* Typhimurium, which were also among the ten most common serovars found in human cases, were reported as some of the ten most common serovars in feedstuffs. The remaining top ten serovars in feedingstuffs were not among the most frequently isolated serovars in humans, foods and animals.

S. Senftenberg and *S.* Montevideo were among the ten most common serotypes in *Gallus gallus*, and *S.* Mbandaka was among the top ten serovars in eggs, *S.* Rissen in pig meat and *S.* Montevideo and *S.* Mbandaka in bovine meat. All these serotypes were amongst the top 10 serovars in isolates from feed.

Table SA40. Distribution of the ten most common Salmonella serovars in feedingstuffs (summed over all reported feedingstuff types, excluding environmental samples), 2006. The serovar distribution for each MS was based in the number of serotyped isolates, including nontypable isolates. Ranking was based on the sum of all reported serovars (% isolates)

	Total	*S.* Mbandaka	*S.* Senftenberg	*S.* Agona	*S.* Rissen	*S.* Lexington	*S.* Tennessee	*S.* Havana	*S.* Infantis	*S.* Typhimurium	*S.* Livingstone	Other serotypes
EU Total, No. of isolates	**599**	**77**	**64**	**50**	**48**	**39**	**29**	**28**	**28**	**19**	**19**	**198**
Austria	3	33.3	0	0	0	0	33.3	0	0	0	0	33.3
Belgium	4	25.0	0	0	0	0	25.0	0	0	0	25.0	25.0
Denmark	3	0	0	0	0	0	0	0	0	33	0	66.7
Finland	29	6.9	3	10.3	3.4	6.9	3.4	13.8	3.4	10.3	0	37.9
France	2	0	0	0	0	0	0	0	0	50.0	0	50.0
Greece	13	0	0	23.1	0	0	0	0	7.7	0	0	69.2
Hungary	6	0	0	0	0	0	16.7	0	16.7	0	0	66.7
Ireland	2	0	50.0	0	0	0	0	0	0	0	0	50.0
Italy	22	0	0	0	0	0	0	0	0	18.2	4.5	77.3
Lithuania	6	0	0	0	0	0	0	0	100	0	0	0
Luxembourg	5	20.0	20.0	0	0	40.0	0	0	0	0	0	20.0
Netherlands	206	5.8	17.5	10.7	3.4	16.0	6.8	5.3	6.3	0	6.3	21.8
Portugal	3	0	0	0	0	0	66.7	0	0	0	0	33.3
Slovakia	12	0	8.3	25.0	0	0	0	0	0	0	0	66.7
Slovenia	2	0	0	0	0	0	0	100	0	0	0	0
Spain	4	0	0	0	0	0	0	0	0	0	0	100
Sweden	90	43.3	13.3	10.0	0	0	1.1	0	1.1	0	2.2	28.9
United Kingdom	187	11.2	6.4	5.3	21.4	1.1	4.3	5.9	2.7	5.3	1.1	35.3
% EU		**12.9**	**10.7**	**8.3**	**8.0**	**6.5**	**4.8**	**4.7**	**4.7**	**3.2**	**3.2**	**33.1**
Norway	3	0	0	66.7	0	0	0	0	0	33	0	0

Phage types of *S.* Enteritidis and *S.* Typhimurium in foodstuffs and animals

Austria, Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Italy, Netherlands, Portugal, Sweden and United Kingdom reported data on phage typing of *S.* Enteritidis and *S.* Typhimurium from different food stuffs and animal species. Phage type distribution for both *S.* Enteritidis and *S.* Typhimurium is presented for flocks of broilers and poultry meat whereas only distribution for *S.* Typhimurium is presented for pigs and cattle and products hereof.

S. Enteritidis PT4 is overall the most prevalent phage type in broilers and broilers meat from the reporting countries and all countries except Portugal report this type (Table SA41). The phage type PT4 was also the most commonly isolated one from the human *Salmonella* cases in EU (Table SA5). In addition four other phage types reported by the MS in broiler meat or broilers were amongst the top ten phage types in human cases.

For *S.* Typhimurium the phage type distribution is based on a limited dataset, since many of the reporting MS only phage typed few isolates. *S.* Typhimurium DT104 was, however, the most commonly reported phagetype from poultry and pig meat, pigs and cattle. This phage type is also the most frequent phage type in *S.* Typhimurium cases in humans. Also many of the other frequently reported phage types from poulty meat and live poultry, pigs and pig meat and cattle and bovine meat were amongst the top ten *S.* Typhimurium phage types in human cases (Tables SA5 SA42, SA43 and SA44).

Table SA41. Distribution of the ten most common S. Enteritidis phage types in broiler meat and flocks of Gallus gallus. The phage typed distribution for each MS was based on the number of phage typed isolates, including RDNC and non typables isolates. Ranking was based on the sum of all reported phage types (% isolates)

Isolates from broiler meat

Country	Total	PT 4	PT 8	PT 1b	PT 6	PT 21	PT 7	PT 1	PT 4b	PT 4a	PT 6a	Other types incl. RDNC and non-typable
Austria[1]	**14**	28.6	21.4	0	21.4	7.1	0	14.3	0	0	0	7.1
Germany[1]	**45**	62.2	13.3	0	0.0	11.1	0	2.2	0	2.2	0	8.9
Hungary	**27**	44.4	18.5	0	14.8	0	14.8	0	7.4	0	0	0
Netherlands	**8**	75.0	0	0	0	0	0	0	0	0	12.5	12.5
Portugal	**10**	0	0	80	0	0	0	0	10	0	0	10.0
United Kingdom	**1**	0	0	0	0	0	0	100	0	0	0	0
% EU		**47.6**	**13.3**	**7.6**	**6.7**	**5.7**	**3.8**	**3.8**	**2.9**	**1.0**	**1.0**	**6.7**

Isolates from *Gallus gallus*

Country	Total	PT 4	PT 1	PT 21	PT 8	PT 6	PT 7	PT 2	PT 14b	PT 3	PT 6a	Other types incl. RDNC and non-typable
Austria[1]	**183**	36.1	5.5	13.1	9.8	18.0	12.0	0	0	0	0.5	4.9
Czech Republic[1]	**21**	14.3	4.8	0	38.1	0	0	0	9.5	0	0	33.3
Germany[1]	**40**	67.5	2.5	17.5	7.5	5.0	0	0	0	0	0	0
Hungary	**50**	44.0	0	0	18.0	10.0	18.0	0	0	0	0	10.0
Italy[1]	**141**	15.6	23.4	7.8	0	0.7	4.3	12.8	9.2	5.0	1.4	19.9
Netherlands	**79**	44.3	13.9	17.7	1.3	2.5	2.5	0	0	2.5	3.8	11.4
United Kingdom	**11**	18.2	63.6	0	0	9.1	0	0	0	0	0	9.1
% EU		**66.3**	**23.6**	**21.0**	**16.3**	**15.5**	**14.6**	**6.7**	**5.6**	**3.4**	**2.2**	**23.0**

1. Clinical

Table SA42. Distribution of the ten most common S. Typhimurium phage types in broiler meat and flocks of Gallus gallus. The phage typed distribution for each MS was based on the number of phage typed isolates, including RDNC and non typables isolates. Ranking was based on the sum of all reported phage types (% isolates)

Isolates from broiler meat

Country	Total	DT 104, all[2]	DT 120	DT 125	DT 135	DT 193	DT 46	DT 8	DT 99	Other types incl. RDNC and non-typable
Austria[1]	**2**	50.0	0	0	0	0	0	0	50.0	0
Germany[1]	**14**	14.3	7.1	0	0	14.3	7.1	0	0	57.1
Czech Republic	**1**	100	0	0	0	0	0	0	0	0
Hungary	**11**	0	0	9	9	0	0	81.8	0	0
United Kingdom	**1**	0	0	0	0	0	0	0	0	100
EU %		**13.8**	**3.4**	**3.4**	**3.4**	**6.9**	**3.4**	**31.0**	**3.4**	**31.0**

Isolates from Gallus gallus

Country	Total	DT 193	DT 8	DT 46	DT104, all	DT 41	DT 120	U 302	DT 99	DT 9	Other types incl. RDNC and non-typable
Austria[1]	**67**	38.8	0	28.36	4.5	4.5	7.5	0	0	0	16.42
Czech Republic[1]	**3**	0	0	0	66.7	0	0	0	0	0	33.33
Denmark	**13**	0	0	0	7.7	23.08	0	0	0	0	69.23
Germany[1]	**15**	0	6.7	0	13.3	0	0	0	0	20	60
Ireland[1]	**1**	100	0	0	0	0	0	0	0	0	0
Italy[1]	**42**	7.1	4.8	0	14.3	0	2.4	9.5	9.5	2.4	50
Hungary	**26**	0	80.8	0	0	0	0	0	0	0	19.23
United Kingdom	**6**	0	0	0	33.33	0	0	0	0	0	66.67
% EU		**17.3**	**13.9**	**11.0**	**9.2**	**3.5**	**3.5**	**2.3**	**2.3**	**2.3**	**34.7**

1. Clinical
2. Includes DT104, DT104b, DT104H, DT104l

Table SA43. Distribution of the ten most common S. Typhimurium phage types in pig meat and pigs. The phage typed distribution for each MS was based on the number of phage typed isolates, including RDNC and non typables isolates. Ranking was based on the sum of all reported phage types (% isolates)

Isolates from pig meat

Country	Total	DT 104, all[2]	DT 193	DT U 302	DT 120	DT 12	DT 140	DT 194	DT 208	DT 7	DT 10	DT 17	DT 28	DT 138	Other types incl. RDNC and non-typable
Austria[1]	**1**	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0
Germany[1]	**98**	41.8	14.3	2.0	8.2	3.1	0	2.0	2.0	0	0	1.0	2.0	0	23.5
Italy[1]	**138**	8.0	4.3	10.1	4.3	2.2	4.3	0	0.7	1.4	1.4	0.7	0	1.4	60.9
Czech Republic	**3**	66.7	0	0	0	0	0	33.3	0	0	0	0	0	0	0
Total	**240**	**22.9**	**8.3**	**6.7**	**5.8**	**2.5**	**2.5**	**1.3**	**1.3**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**44.6**

Isolates from pig

Country	Total	DT 104, all[2]	DT 193	U 288	DT U302	DT 120	DT 12	DT 40	DT 17	DT 7	DT 138	Other types incl. RDNC and non-typable
Czech Republic[1]	**18**	50.0	0	0	5.6	0	0	0	0	0	0	44.4
Germany[1]	**297**	52	9.4	0	2.0	7	1.0	0	2	1	0	24.2
Ireland[1]	**8**	25	25	50.0	0	0	0	0	0	0	0	0
Italy[1]	**203**	7.4	5.9	0	10.3	6	3.9	0	0	1	2	63.1
Sweden[1]	**3**	67	0	0	0.0	33.3	0.0	0	0	0	0	0
United Kingdom[1]	**140**	7	18.6	45.7	8.6	0.7	0	0	0	0	0	19.3
Finland	**5**	0	0	0	0	0	0	80.0	0	0	0	20.0
Germany	**30**	57	3.3	0	3.3	3	0	0	0	0	0	33.3
Sweden	**5**	0	0.0	0	0.0	20	0	60.0	0	0	0	20.0
Total	**709**	**29.6**	**9.7**	**9.6**	**5.8**	**5.2**	**1.6**	**1.1**	**1.0**	**0.8**	**0.7**	**34.8**

1. Clinical
2. Includes DT104, DT104b, DT104H, DT104l

Table SA44. Distribution of the ten most common S. Typhimurium phage types in bovine meat and cattle. The phage typed distribution for each MS was based on the number of phage typed isolates, including RDNC and non typables isolates. Ranking was based on the sum of all reported phage types (% isolates)

Isolates from bovine meat

Country	Total	DT 12	DT 104, all[2]	DT U302	DT 140	DT 160	DT 193	DT 194	DT 2	DT 22	Other types incl. RDNC and non-typable
Czech Republic	**3**	0	33.3	33.3	0	0	0	33.3	0	0	0
Germany[1]	**11**	0	54.5	0	9.1	0	9.1	0	0	0	27.3
Italy[1]	**23**	43.5	8.7	4.3	0	4.3	0	0	4.3	4.3	30.4
EU %		**25.0**	**22.5**	**5.0**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**32.5**

Isolates from bovine animals

Country	Total	DT 104, all[2]	DT 12	DT 193	DT 120	DT 9	DT U302	DT 1	DT 135	DT 85	DT 2	DT 41	Other types incl. RDNC and non-typable
Austria[1]	**4**	1.3	0	0	0	0	0	0	0	0	20.0	0.0	0
Czech Republic[1]	**4**	0.4	0	0	0	0	0	0	0	0	0	0	2.9
Finland	**8**	0	0	0	0	0	0	33.3	0	0	20.0	20.0	3.9
Germany[1]	**163**	35.1	17.2	33.3	72.7	100	0	66.7	0	0	20.0	0.0	50.5
Ireland[1]	**15**	3.5	0	0	0	0	0	0	0	100	0	0	1.0
Italy[1]	**54**	9.5	65.5	13.3	9.1	0	0	0	0	0	0	0	9.7
Sweden[1]	**5**	0.9	0	0	0	0	0	0	0	0	0	0	2.9
Sweden	**2**	0	0	0	0	0	0	0	0	0	0	0	1.9
United Kingdom[1]	**176**	49.4	17.2	53.3	18.2	0	100	0	100	0	40.0	80.0	27.2
EU %		**53.6**	**6.7**	**3.5**	**2.6**	**1.6**	**1.6**	**1.4**	**1.4**	**1.4**	**1.2**	**1.2**	**23.9**

1. Clinical
2. Includes DT104, DT104b, DT104H, DT104l

3.1.6. Antimicrobial resistance in Salmonella

Antimicrobial resistance in *Salmonella* isolates from humans

Enter-net provided data on antimicrobial resistance for *Salmonella* isolates from human salmonellosis cases in 2006. *S*. Enteritidis resistance to nalidixic acid increased from 13.4% in 2005 to 14.8% in 2006, in sulphonamides from 6.4% in 2005 to 8.0% in 2006, and from 5.1% in ampicillin in 2005 to 8.1% in 2006. While resistance to ciprofloxacin remained generally at a low level (0.6%), resistance in Luxembourg was 14.7% and approximately 11% for both Denmark and the Netherlands (Table ABSA1).

For *S*. Typhimurium, the highest levels of resistance were observed (Table ABSA1) for sulphonamide, tetracycline, ampicillin and streptomycin (59.7%, 56.3%, 55.6% and 51.9%, respectively). Compared to 2005 Enter-net data, these represent significant increase in resistance to sulphonamides and streptomycin (where the resistance proportions were 50.2%, 57.4%, 59.8% and 43.8%, respectively). Approximately 7.8% of the *S*. Typhimurium isolates were resistant nalidixic acid, whereas only 0.7% were resistant to ciprofloxacin (Table ABSA2).

The proportion of multiresistant, i.e. resistant to four or more antimicrobials, was significantly higher (Table ABSA2) in *S*. Typhimurium isolates (39.7%) than the *S*. Enteritidis isolates (0.7%).

Table AB SA1. Antimicrobial resistance in S. Enteritidis from humans per country, Enter-net data, 2006 (%)

Country	Samples Tested*	Chloramphenicol	Ampicillin	Streptomycin	Sulphonamides	Tetracycline	Trimethoprim	Ciprofloxacin	Gentamicin	Kanamycin	Nalidixic acid	Cefotaxime
Austria	4,238	0	5.1	0.2	0.4	0.4	0.2	0	0	-	4.2	0
Germany	1,116	1.6	2.8	1.5	95.3	1.7	1.3	0.1	0.2	0.4	1.3	0.1
Denmark	365	0	3.3	0	0.3	2.2	0.3	11.0	0	0.3	17.0	0.3
Estonia	342	0	6.5	1.7	7.7	4.3	5.1	0.3	1.1	0	5.0	0.4
Spain	765	0.5	8.8	1.0	2.1	3.8	1.2	0.0	0.0	0	53.5	0.3
United Kingdom	7,153	0.2	4.0	1.2	1.5	2.2	0.8	0.1	0.1	0.1	21.8	0.1
Greece	284	0	7.4	-	14.3	5.1	0.0	0	14.6	-	-	-
Ireland	158	0.6	8.2	1.9	1.9	0.6	0.6	0	0.0	0.0	23.4	0
Italy	770	1.6	4.2	1.6	2.5	2.0	1.0	0	7.0	0.0	6.0	1.3
Lithuania	3,113	0.7	28.2	0	20.0	4.6	25.0	0.2	1.0	1.4	0	0.3
Luxembourg	68	0	0.0	0	1.5	1.5	1.5	14.7	0	0	14.7	0
Latvia	232	0	3.4	0	0	0	2.3	0	0	0	0.0	0
Malta	48	-	0	-	-	-	-	0	0	-	-	-
The Netherlands	438	0.2	4.8	-	-	1.6	0.5	11.4	-	0.0	-	-
Slovenia	1,058	0	1.3	0.1	0.9	0.2	0.2	0.0	0.0	0.0	1.2	0
Total %	**20,148**	**0.3**	**8.1**	**0.9**	**8.0**	**1.7**	**4.4**	**0.6**	**0.7**	**0.1**	**14.8**	**0.1**

- no data
* Approximate: Only when ten or more samples were tested are results shown

Table AB SA2. Antimicrobial resistance in S. Typhimurium from humans per country, Enter-net data, 2006 (%)

Country	Samples Tested*	Chloramphenicol	Ampicillin	Streptomycin	Sulphonamides	Tetracycline	Trimethoprim	Ciprofloxacin	Gentamicin	Kanamycin	Nalidixic acid	Cefotaxime
Austria	627	15.6	24.0	22.2	24.6	23.3	3.0	0.2	0.8	-	2.2	0.0
Germany	588	36.1	67.2	72.1	97.6	69.4	20.1	0.0	1.5	6.8	5.8	0.3
Denmark	408	27.7	55.4	49.8	52.9	52.9	9.1	4.2	1.5	2.2	4.9	0.5
Estonia	50	6.7	42.0	-	20.0	-	13.9	0.0	0.0	-	0.0	3.6
Spain	383	46.5	74.7	55.1	76.5	75.2	12.5	0.0	2.9	2.1	10.4	0.3
United Kingdom	1,503	32.5	49.8	50.1	53.5	52.4	12.9	0.3	3.3	1.9	13.0	1.1
Greece	45	-	34.1	-	-	31.4	0.0	0.0	37.8	-	-	-
Ireland	101	58.4	69.3	63.4	67.3	64.4	6.9	0.0	1.0	0.0	5.9	1.0
Italy	1,211	29.7	74.8	69.8	71.1	76.7	15.9	0.1	10.2	3.0	3.6	1.9
Lithuania	125	16.1	52.0	-	-	60.0	7.8	0.0	0.0	0.0	-	0.0
Luxembourg	56	21.4	39.3	33.9	41.1	46.4	5.4	3.6	0.0	0.0	3.6	0.0
Latvia	13	-	69.2	-	-	-	-	0.0	-	-	-	-
Malta	28	-	59.3	-	-	-	-	3.7	0.0	-	-	-
Netherlands	383	18.8	37.1	-	-	39.4	8.6	2.9	-	0.5	-	-
Slovenia	42	47.6	61.9	54.8	64.3	57.1	21.1	0.0	7.1	4.8	26.2	0.0
Total %	**5,563**	**30.1**	**55.6**	**51.9**	**59.7**	**56.3**	**11.8**	**0.7**	**4.2**	**2.3**	**7.8**	**0.9**

- no data
* Approximate: Only when ten or more samples were tested are results shown

Antimicrobial resistance in *Salmonella* isolates from food

In this summary report, data on the occurrence of antimicrobial resistance in *Salmonella* from MS reporting more than 10 isolates, and food categories for which more than 5 MS reported, are included. Data on antimicrobial resistance in *Salmonella* spp. from pig meat and broiler meat are presented in table Table AB SA3 and Table AB SA4, respectively. For data on antimicrobial resistance in *Salmonella* spp. in other food categories, please refer to Level 3.

Pig meat

Data on the occurrence of antimicrobial resistance in *Salmonella* spp. in pig meat were provided by five MS and one non-MS (Table AB SA3). In general, the highest proportions of resistant isolates were observed for ampicillin, streptomycin, sulphonamide and tetracycline. This is coherent with results reported for pig meat by the MS in 2005 and 2004. When compared to the *Salmonella* isolates from humans, high proportions of resistance to the same four antimicrobials were observed (Table AB SA1 and Table AB SA2).
Among isolates from pig meat, the proportions of resistant isolates reported by France, Germany, Italy and Romania were higher than the proportions reported by Belgium and Denmark. Resistance to ciprofloxacin was very low, whereas a moderate level of resistance to nalidixic acid was reported Italy and Romania (10.3% and 8.3%, respectively). The highest proportion of fully sensitive isolates was reported by Belgium (57.1%).

Table AB SA 3. Antimicrobial resistance in Salmonella spp. from pig meat, 2006[1]

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxim	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Belgium	Yes	21	19.1	-	4.8	0	-	0	19.1	23.8	38.1	14.3	57.1	19.1
Denmark	Yes	546	26.0	-	11.9	0.9	0.9	0.9	38.3	38.5	39.6	8.6	-	-
France	-	161	26.1	0	20.5	-	0.6	2.5	64.6	60.3	72.7	-	-	-
Germany	-	176	44.9	-	18.8	0	0	1.7	46.6	52.3	55.1	14.2	39.2	27.3
Italy	-	253	40.3	0.4	12.3	1.2	1.2	10.3	48.2	53.8	62.9	-	22.4	28.0
Romania	Yes	48	18.8	0	14.6	0	0	8.3	68.8	-	79.2	14.6	16.7	12.5
Total, N		**1,205**	**378**	**1**	**170**	**8**	**9**	**42**	**554**	**539**	**635**	**82**	**125**	**103**
Total, %			**32.2**	**0.1**	**14.8**	**0.7**	**0.7**	**3.8**	**49.0**	**44.7**	**56.1**	**7.5**	**11.1**	**9.1**

1. Only MS reporting more than 10 isolates were included in this table
For Italy; N=161 for fully sensitive, N=161 for resistant to >4 antimicrobials, N=251 for sulfonamide

Broiler meat

Data on the occurrence of antimicrobial resistance in *Salmonella* spp. in broiler meat were provided by seven MS and one non-MS (Table AB SA4). In general, the highest proportions of resistant isolates were observed for nalidixic acid, streptomycin and tetracycline. Resistance to nalidixic acid was remarkably high (range 13.2% - 89.6%) and may indicate widespread use of quinolones for poultry. The United Kingdom further reported a moderate level of resistance to ciprofloxacin. When compared to *Salmonella* isolates from humans, high proportions of resistance to streptomycin and tetracycline was also observed in human isolates (Table AB SA1 and Table AB SA2), whereas resistance to nalidixic acid was considerably lower in isolates from broiler meat compared to isolates from humans. The highest proportion of fully sensitive isolates from broiler meat was reported by Germany (60.9%) and Latvia (77.8%).

Table AB SA 4. Antimicrobial resistance in Salmonella spp. from broiler meat, 2006[1]

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	-	100	6.0	0	1.0	0	0	57.0	31.0	45.0	52.0	57.0	36.0	1.0
Belgium	Yes	44	31.8	-	4.5	0	-	27.3	29.5	34.1	13.6	43.2	-	-
Estonia	-	13	7.7	0	0	0	0	84.6	0	0	7.7	-	7.7	0
Germany	-	230	12.6	-	1.3	0	0	21.7	19.6	19.1	20.0	23.5	60.9	17.0
Hungary	Yes	202	4.0	-	0	-	0	89.6	82.7	-	84.2	-	0	0
Latvia	Yes	9	0	-	0	0	0	22.2	0	-	0	-	77.8	-
Romania	Yes	54	59.3	1.9	1.9	48.1	1.9	81.5	75.9	-	66.7	54	3.7	61.1
United Kingdom	Yes	68	5.9	-	0	10.3	0	13.2	10.3	26.5	17.7	23.5	1.5	7.4
Total, N		**720**	**94**	**1**	**7**	**33**	**1**	**366**	**304**	**122**	**323**	**175**	**187**	**78**
Total, %			**13.1**	**0.1**	**1.0**	**4.6**	**0.1**	**50.8**	**42.2**	**16.9**	**44.9**	**24.3**	**26.0**	**10.8**

1. Only MS reporting more than 10 isolates were included in this table
For Hungary; N=5 for fully sensitive, N=4 for resistant to >4 antimicrobials,

Antimicrobial resistance in *Salmonella* isolates from animals

Data on the occurrence of antimicrobial resistance in *S.* Typhimurium and *S*. Enteritidis from animals (*Gallus gallus,* pigs and cattle) are presented in Tables AB SA5 - AB SA9.

Gallus gallus

Data on the occurrence of antimicrobial resistance in *S*. Typhimurium and/or *S.* Enteritidis in *Gallus gallus* (broilers) were reported by 14 MS and one non-MS (Tables AB SA5 and Tables AB SA6). In general, higher proportions of resistant isolates were reported for *S*. Typhimurium than for *S.* Enteritidis, and seven MS reported extremely high proportions (>70%) of fully sensitive *S.* Enteritidis isolates. The highest levels of antimicrobial resistance were reported for nalidixic acid for *S.* Enteritidis (overall average 27.5%) which may reflect widespread use of quinolones in poultry production. Trends over time for nalidixic acid resistance in *S.* Enteritidis isolates from broilers in MS providing data for years 2004-2006 are presented in Figure AB SA 1. No general trend was apparent amongs these MS.

For *S.* Typhimurium, the highest levels of resistance were reported for streptomycin (overall average 26.4%) and tetracycline (overall average 27.3%). Denmark reported 5.6% resistance to ciprofloxacin in *S.* Typhimurium isolates. The high level of nalidixic acid resistance as well as high level of resistance to streptomycin and tetracycline, corresponds to the high levels observed in broiler meat for the same antimicrobials (Table AB SA4). It is also coherent with results reported for 2005. The highest proportions of fully sensitive *S.* Typhimurium isolates were reported by Austria (85.1%) and Denmark (83.3%). Corresponding quantitative results (MIC distributions) for selected antimicrobials for *S.* Enteritidis is presented in Table AB SA MIC1. In general, Poland and the Netherlands reported the highest MIC values.

Table AB SA 5. Antimicrobial resistance in Salmonella Typhimurium from Gallus gallus, 2006[1]

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	-	67	4.5	0	0	0	0	0	9.0	9.0	7.5	0	85.1	0
Denmark	Yes	18	11.1	-	0	5.6	0	5.6	11.1	16.7	5.6	5.6	83.3	5.6
Germany	-	15	13.3	-	13.3	0	0	13.3	26.7	40.0	13.3	0	33.3	13.3
Italy	-	25	12.0	4.0	16.0	0	8.0	8.0	16.0	4.0	16.0	-	73.3	13.3
Netherlands	Yes	18	61.1	0	27.8	0	0	5.6	-	61.1	61.1	16.7	33.3	11.1
Poland	-	15	86.7	-	86.7	-	0	86.7	93.3	86.7	93.3	0	0	86.7
Romania	Yes	49	-	-	-	2.0	4.1	10.2	42.9	-	32.7	0	-	4.1
United Kingdom	Yes	13	53.9	0	46.2	0	0	23.1	53.9	53.9	53.9	-	46.2	53.8
Total, N		**220**	**41**	**1**	**30**	**2**	**4**	**27**	**58**	**47**	**60**	**4**	**100**	**29**
Total, %			**18.6**	**0.5**	**13.6**	**0.9**	**1.8**	**12.3**	**26.4**	**21.4**	**27.3**	**1.8**	**45.5**	**13.2**

1. Only MS reporting more than 10 isolates were included in this table
For Italy; N=15 for fully sensitive, N=15 for resistant to >4 antimicrobials
For Romania; N=34 for trimethoprim

Table AB SA 6. Antimicrobial resistance in Salmonella Enteritidis from Gallus gallus, 2006[1]

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	-	183	0	0	0	0	0	0.5	2.2	0.5	0.5	0	97.8	0
Czech Republic	Yes	22	4.5	0	0	0	0	4.5	0	0	4.5	0	90.9	0
Estonia	-	11	45.5	0	18.2	0	9.1	54.5	0	27.3	9.1	-	18.2	9.1
Germany	-	40	0	-	0	0	0	0	0	0	0	0	100	-
Greece	Yes	19	0	0	10.5	0	0	15.8	5.3	15.8	10.5	0	-	-
Hungary	-	19	5.3	-	0	-	0	0	0	26.3	0	-	-	-
Italy	-	100	7.0	0	4.0	0	0	12.0	1.0	9.0	15.0	-	72.7	0
Latvia	Yes	38	52.6	-	18.9	-	0	94.6	18.5	-	17.1	-	7.9	15.8
Netherlands	Yes	34	5.9	2.9	0	17.6	0	17.6	-	0	0	2.9	76.5	0
Poland	-	139	4.3	-	0	-	0.7	30.2	5.0	10.1	5.0	0	53.2	1.4
Romania	Yes	130	-	-	-	0	1.6	76.9	3.1	-	4.6	1	-	-
Slovakia	Yes	73	0	0	0	2.7	0	2.7	0	0	0	0	97.3	0
Slovenia	Yes	18	0	0	0	0	0	0	0	0	0	0	100	-
United Kingdom	Yes	51	3.9	0	0	0	0	64.7	2.0	2.0	0	-	33.3	0
Total, N		**877**	**34**	**1**	**15**	**8**	**4**	**241**	**23**	**36**	**39**	**2**	**458**	**9**
Total, %			**3.9**	**0.1**	**1.7**	**0.9**	**0.5**	**27.5**	**2.6**	**4.1**	**4.4**	**0.2**	**52.2**	**1.0**

1. Only MS reporting more than 10 isolates were included in this table
For Greece; N=13 for fully sensitive, N=17 for cefotaxime, N=17 for gentamicin, N=15 for ampicillin
For Hungary; N=15 for streptomycin, N=17 for gentamicin, N=4 for nalidixic acid
For Italy; N=11 for resistant to >4 antimicrobials, N=11 for fully sensitive
For Latvia; N=37 for chloramphenicol, N=27 for streptomycin, N=19 for ampicillin, N=37 for nalidixic acid, N=7 for gentamicin, N=35 for tetracycline
For Romania; N=129 for gentamicin, N=111 for trimethoprim

Figure AB SA1. Trends in nalidixic acid resistance in S. Enteritidis from Gallus gallus, 2006

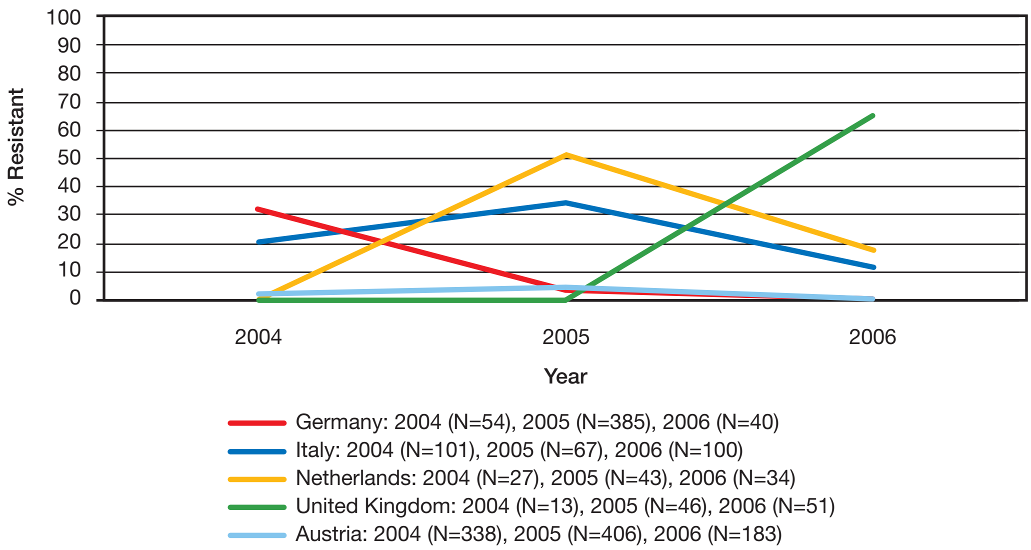


Table AB SA MIC 1. Distribution of MIC's in S. Enteritidis isolates from Gallus gallus, 2006

Compound	Country	% Resistant	N (total count)	Distribution (%) of MICs																			
				0,0075	0,015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	> 2048
Cefotaxim	Netherlands	3	34					97.1								2.9							
	Slovakia	0	73						100														
Tetracycline	Germany	0	40									95.0	5.0										
	Netherlands	0	34								17.6	82.4											
	Poland	5	139									91.2	2.9			0.7	4.3						
	Slovakia	0	73							4.1	12.3	83.6											
Ampicillin	Germany	0	40								87.5	12.5											
	Netherlands	6	34							14.7	73.5	5.9						5.9					
	Poland	4	139								74.8	18.7	2.2				4.3						
	Slovakia	0	73							2.7	83.6	13.7											
Gentamicin	Germany	0	40								100												
	Netherlands	0	34						50.0	44.1	5.9												
	Poland	1	139								99.3					0.7							
	Slovakia	0	73						78.1	19.2	1.4	1.4											
Ciprofloxacin	Germany	0	40			100																	
	Netherlands	18	34				82.4	2.9	8.8	5.9													
	Slovakia	3	73				97.3		2.7														

Note 1: Vertical lines indicate breakpoints for resistance
Note 2: The white fields denote range of dilutions tested for each antimicrobial. Values above the range denote MIC values greater then the highest concentration in the range. MICs equal to or lower than the lowest concentration tested are given as the lowest concentration

Pigs

Data on the occurrence of antimicrobial resistance in *S*. Typhimurium from pigs was reported by 7 MS (Table AB SA7). Corresponding quantitative results (MIC distributions) for selected antimicrobials is presented in Table AB SA MIC2.

For *S*. Typhimurium isolates from pigs, very high levels of resistance to ampicillin, streptomycin, sulphonamide, and tetracycline were observed (overall averages ranging from 61.5% - 71.2%), with several MS reporting over 80% of the isolates resistant to these antimicrobials. The observations are generally consistent with the reporting in 2004 and 2005. Trends over time for tetracycline resistance in *S*. Typhimurium isolates from pigs in MS providing data for 2004-2006 are presented in Figure AB SA2. The resistance seemed generally to stay at same level.
Czech Republic, Spain and United Kingdom furthermore reported very high levels of resistance to chloramphenicol (ranging from 65.7% to 77.8%). Chloramphenicol is no longer used in food animals in the EU, however these resistance combinations may indicate high proportions of multiresistant *Salmonella* DT 104 among the isolates from pigs, implying co-selection of resistance to antimicrobials not actually used in the animals. In contrast to the situation for broilers, low levels of resistance to quinolones were reported for pigs.

In general, the occurrence of antimicrobial resistance in *S*. Typhimurium isolates from pigs resembles the occurrence of resistance reported by the MS for *Salmonella* spp. in pig meat (Table AB SA3) as well as the occurrence in *S*. Typhimurium isolates from humans (Table AB SA2). Very high proportions of isolates resistant to >4 antimicrobials were reported by Czech Republic, Germany, Italy and United Kingdom (ranging from 61.1% to 75.0%), whereas the highest proportion of fully sensitive isolates was reported by Denmark (47.0%).

Table AB SA 7. Antimicrobial resistance in Salmonella Typhimurium from pigs, 2006[1]

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Czech Republic	Yes	18	77.8	0	77.8	0	0	5.6	94.4	94.4	83.3	5.6	0	61.1
Denmark	Yes	509	32.2	-	12.6	1.4	1.8	1.4	42.2	43.4	43.0	9.2	47.0	19.3
Germany	-	297	80.8	-	42.8	0.3	4.4	4.0	80.8	83.5	77.4	26.9	12.8	63.0
Italy	-	79	93.7	0	15.2	0	5.1	5.1	81.0	77.2	88.6	-	0	75.0
Netherlands	Yes	75	60.0	0	32.0	1.3	0	0	-	65.3	72.0	29.3	16.0	6.7
Spain	Yes	35	-	0	65.7	2.9	2.9	2.9	51.9	77.1	100	8.6	0	33.3
United Kingdom	Yes	555	83.8	0	69.9	0	1.8	4.0	74.8	88.8	88.3	-	2.7	68.8
Total, N		**1568**	**1002**	**0**	**652**	**10**	**37**	**47**	**965**	**1,116**	**1,113**	**153**	**304**	**695**
Total, %			**63.9**	**0**	**41.6**	**0.6**	**2.4**	**3.0**	**61.5**	**71.2**	**71.0**	**9.8**	**19.4**	**44.3**

1. Only MS reporting more than 10 isolates were included in this table
For Italy; N=4 for fully sensitive, N=4 for resistant to >4 antimicrobials
For Spain; N=27 for streptomycin, N=27 for resistant to >4 antimicrobials, N=27 for fully sensitive

Figure AB SA2. Trends in tetracycline resistance in S. Typhimurium from pigs, 2006

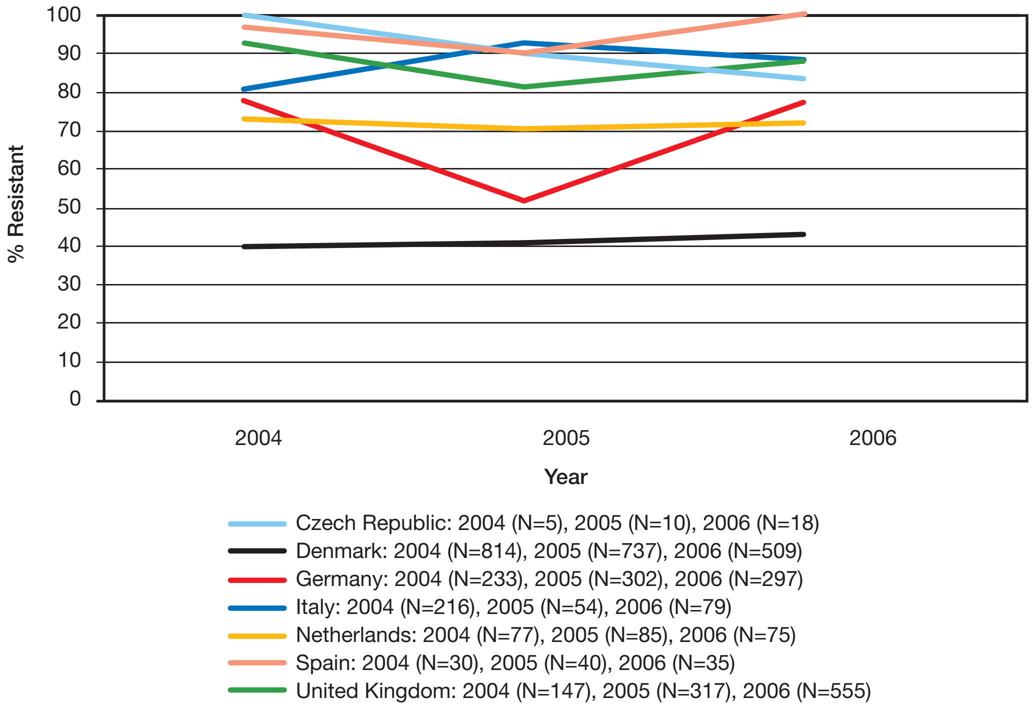


Table AB SA MIC2. Distribution of MIC's in S. Typhimurium isolates from pigs, 2006

Compound	Country	% Resistant	N (total count)	Distribution (%) of MICs																			
				0,0075	0,015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	> 2048
Cefotaxim	Netherlands	0	75					92.0	8.0														
	Spain	0	35				17.1	40.0	20.0	22.9													
Tetracycline	Denmark	43	509									55.0	2.0		0.2	42.8							
	Germany	77	297									21.2	1.3		0.7	76.8							
	Netherlands	72	75								2.7	22.7	2.7		1.3	29.3	9.3	32.0					
	Spain	100	35													22.9	8.6	8.6	60.0				
Ampicillin	Denmark	32	509								52.7	13.4	1.6	0.2		32.2							
	Germany	81	297								15.8	2.7	0.7			80.8							
	Netherlands	60	75							2.7	36.0	1.3	2.2					60.0					
Gentamicin	Denmark	2	509								97.2	1.0			0.6	1.2							
	Germany	4	297								93.3	0.7		1.7	2.4	2.0							
	Netherlands	0	75						16.0	65.3	18.7												
	Spain	3	35						25.7	65.7	5.7	1.4			2.9								
Ciprofloxacin	Denmark	1	509			89.2	9.4		1.0	0.4													
	Germany	0	297			85.9	9.1	1.0	0.3	1.7	1.7	0.3											
	Netherlands	1	75				98.7	1.3	2.7														
	Spain	3	35				97.1		2.9														

Note 1: Vertical lines indicate breakpoints for resistance

Note 2: The white fields denote range of dilutions tested for each antimicrobial. Values above the range denote MIC values greater then the highest concentration in the range. MICs equal to or lower than the lowest concentration tested are given as the lowest concentration

Cattle

Data on the occurrence of antimicrobial resistance in *S*. Typhimurium isolates from cattle was reported by seven MS (Table AB SA8). Corresponding quantitative results (MIC distributions) for selected antimicrobials are presented in Table AB SA MIC3. Very high levels of resistance to ampicillin, streptomycin, sulphonamide, and tetracycline was observed (overall averages ranging from 55.1% - 70.4%). The occurrence of resistance in isolates from cattle appeared very similar to the occurrence in pigs (Table AB SA7), and also resembled the occurrence in *S*. Typhimurium isolates from humans (Table AB SA2). This is coherent with results reported by the MS for 2005. The high levels of resistance to chloramphenicol reported by France, Italy and the United Kingdom (ranging from 55.2% – 83.7%), may suggest the presence of a large proportion of *Salmonella* DT 104 or other multiresistant types among the reported isolates. The highest proportion of isolates resistant to >4 antimicrobials was reported by Italy (75.0%).

Table AB SA 8. Antimicrobial resistance in Salmonella Typhimurium from cattle, 2006[1]

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Denmark	Yes	26	69.2	-	19.2	0	0	0	69.2	73.1	69.2	0	23.1	23.1
France	-	29	58.6	0	55.2	-	0	17.2	69.0	58.6	58.6	-	-	-
Germany	-	163	62.0	-	42.9	0	0.6	0.6	70.6	73.0	68.7	12.9	24.5	53.4
Ireland	-	16	-	-	-	-	-	-	50.0	-	18.8	-	-	-
Italy	-	49	93.9	0	83.7	0	0	10.2	75.5	69.4	91.8	-	12.5	75.0
Netherlands	Yes	40	45.0	0	22.5	2.5	0	2.5	-	35.0	40.0	15.0	37.5	7.5
United Kingdom	Yes	174	77.6	0	74.7	0	0	0	47.7	79.3	79.9	-	17.2	54.6
Total, N		**497**	**335**	**0**	**271**	**1**	**1**	**12**	**274**	**341**	**350**	**27**	**92**	**197**
Total, %			**67.4**	**0**	**54.5**	**0.2**	**0.2**	**2.4**	**55.1**	**68.6**	**70.4**	**5.4**	**18.5**	**39.6**

1. Only MS reporting more than 10 isolates were included in this table

For Ireland; N=2 for streptomycin

For Italy; N=8 for fully sensitive, N=8 for resistant to >4 antimicrobials

Table AB SA MIC3. Distribution of MIC's in S. Typhimurium isolates from cattle, 2006

Compound	Country	% Resistant	N (total count)	Distribution (%) of MICs																			
				0,0075	0,015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	> 2048
Cefotaxim	Netherlands	0	40					97.5	2.5														
Tetracycline	Denmark	69	26									30.8				69.2							
	Germany	69	163									28.8	2.5		0.6	68.1							
	Netherlands	40	40								10.0	47.5	2.5			17.5	5.0	17.5					
Ampicillin	Denmark	69	26								26.9	3.8				69.2							
	Germany	62	163								29.4	8.0	0.6			62.0							
	Netherlands	45	40							12.5	42.5							45.0					
Gentamicin	Denmark	0	26								100												
	Germany	1	163								98.8	0.6			0.6								
	Netherlands	0	40						20.0	57.5	22.5												
Ciprofloxacin	Denmark	0	26			96.2	3.8																
	Germany	0	163			96.2	5.5	0.6	0.6	0.6													
	Netherlands	2	40				97.5		2.5														

Note 1: Vertical lines indicate breakpoints for resistance

Note 2: The white fields denote range of dilutions tested for each antimicrobal. Values above the range denote MIC values greater then the highest concentration in the range. MICs equal to or lower than the lowest concentration tested are given as the lowest concentration

3.1.7. Discussion

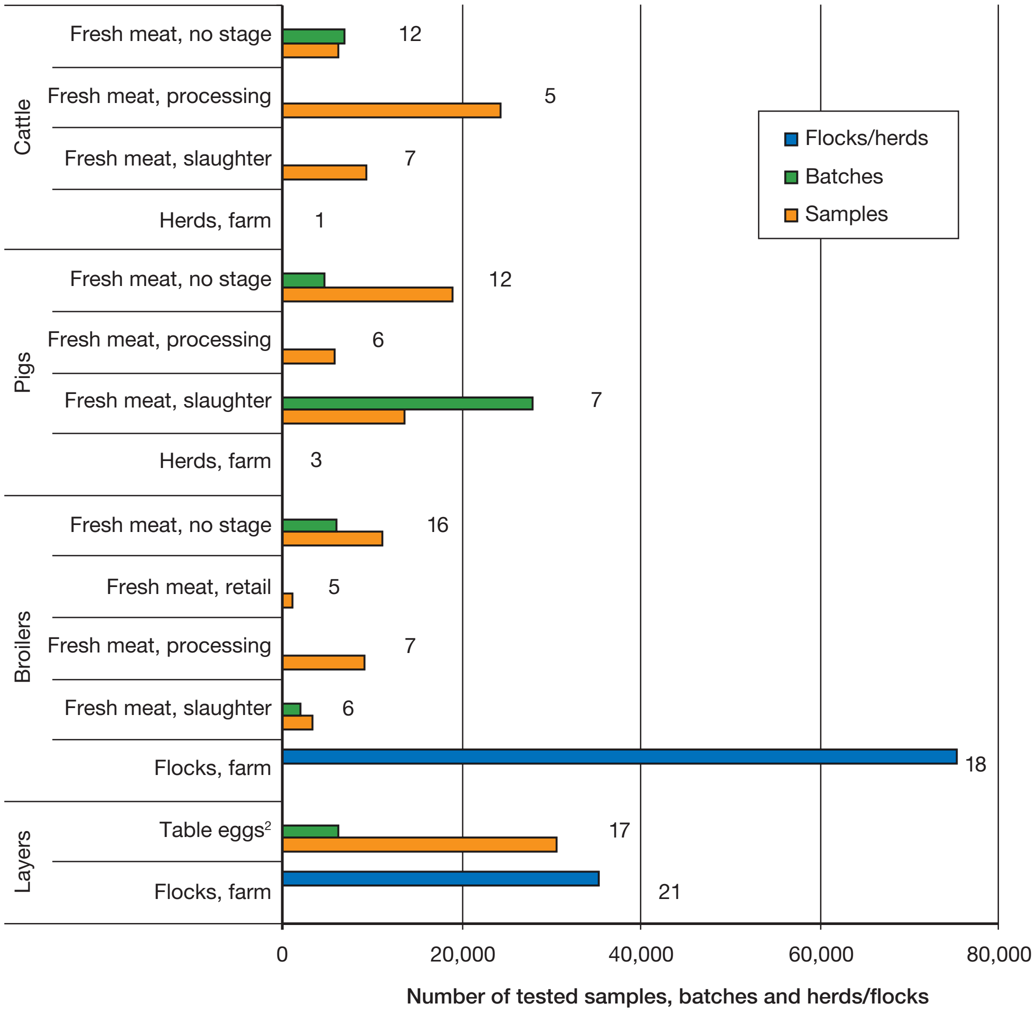
Human salmonellosis

The incidence of the human salmonellosis cases in EU has clearly decreased in the past years, and this decline continued in 2006. However, there are marked differences in the incidences reported by MS, which may partly be due to the sensitivity of the reporting systems and partly reflect the situation in the countries.

Food and animals

MS and the other reporting countries provided for large amount of information of occurrence of *Salmonella* in a foodstuffs, animal and feedingstuffs. This information is typically not directly comparable between MS, but in some sectors such as in foodstuffs and breeding flocks of *Gallus gallus*, the EU legislation sets down some extent of harmonisation. Figure SA18 illustrates the number of tested samples included in the data analyses in 2006.

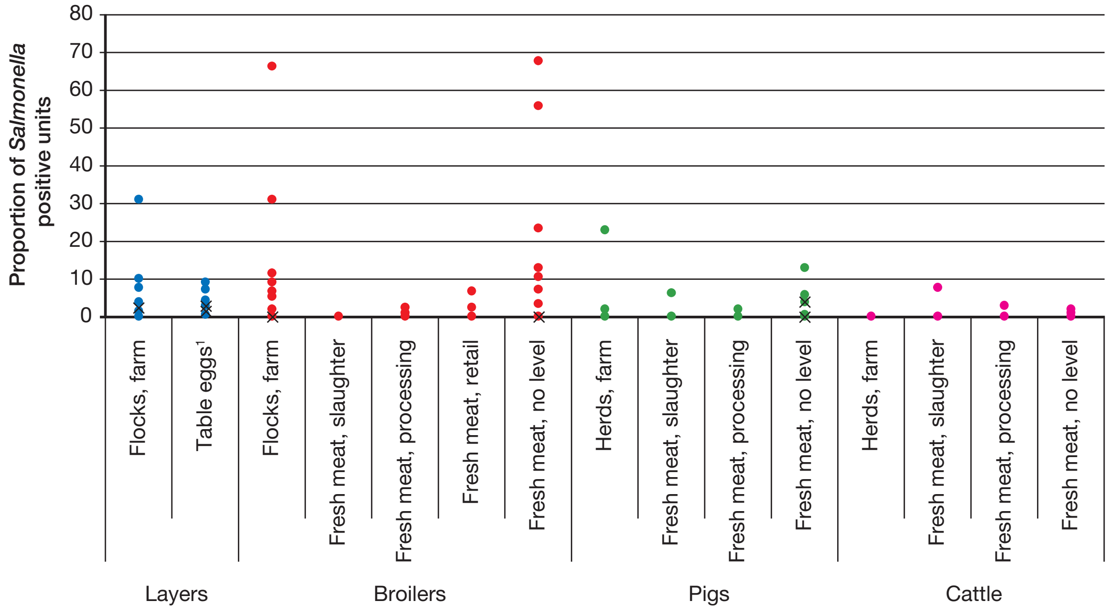
Figure SA18. The number of Salmonella tested samples, batches and herds/flocks at different sampling levels[1] included in the data analyses, 2006. Number of included MS indicated



1. Data where level of sampling were not reported is also included
2. Include table eggs tested at packing centres and retail as well as data where no level of sampling was indicated

Overall, the included data demonstrate a variation among countries in prevalence of *Salmonella* in different animal species and the proportions of positive samples in different food categories (Figure SA19). These variations are partly due to differences in sampling and partly to differences in occurrence of *Salmonella* in the different populations.

Figure SA19. Proportions of Salmonella positive samples, by animal species and food category within the EU, 2006. Each point representing a MS observation



1. Include table eggs tested at packing centres and retail as well as data where no level of sampling was indicated

Salmonella caused the majority of the food-borne outbreaks reported in 2006 in the Community. Eggs and egg products were the most often identified food vehicle in these outbreaks followed by different types of meats.

In foodstuffs MS reported the highest proportions of *Salmonella* positives samples in fresh broiler meat and products thereof, followed by fresh pig meat and products derived from it. In bovine meat the contamination levels were lower. These findings are in accordance with the situation in 2004 and 2005. A slight decreasing, but statistically non-significant trend was observed for proportion *Salmonella* positive samples in broiler meat at the Community level. In other food categories, such as dairy products, fruits and vegetables, *Salmonella* was detected less frequently. This situation is reflected also with compliance with the new *Salmonella* criteria laid down by the Regulation 2073/2005. Most violations against the criteria were observed in products of meat origin, particularly those of poultry origin, while dairy products and products from fruits and vegetables were mainly found to meet the criteria.

Eggs and egg products are an important source for human salmonellosis even though the actual isolation rates of *Salmonella* in eggs are typically low. Testing of eggs is therefore not the most efficient way to control *Salmonella* in egg primary production because of very low sensitivity and only limited data were provided of the eggs. The reported proportions of positives samples intable eggs were low, as expected, but the data shows that *Salmonella* is present in eggs produced in EU. No trend for *Salmonella* in table eggs was apparent at the Community level.

Monitoring of *Salmonella* in the laying hen flocks serves as a more appropriate monitoring of the egg production and this is carried out in most countries. A relatively low prevalence were reported by MS in the laying hen flocks when compared to the results of the EU wide *Salmonella* baseline study in laying hens 2004-2005. This indicates that the sampling and testing schemes used in routine by many MS are less sensitive than those used in the baseline study. MS are obliged to implement new control programmes in laying hen flocks starting from 2008 on a harmonised basis and this may have an influence to the reported prevalence in the coming years. The statistically significant overall trend over the past three years in *Salmonella* spp. in the reporting MS implementing a control programme is an encouraging sign that the programmes are having a positive impact. However, no clear decrease was apparent for the two most important serovars; *S*. Enteritidis and *S*. Typhimurium.

No significant trend at EU level was apparent in occurrence of *Salmonella* in broiler flocks over the last 3 years amogst the relatively few MS running a control programme. There were differences between the routine monitoring and that of the *Salmonella* baseline survey in broiler flocks but not as large as for laying hens.

In the breeding flocks of *Gallus gallus* for egg production line only a few countries reported *Salmonella* findings, and only some of them found *S*. Enteritidis or *S*. Typhimurium. A decreasing trend in the overall EU prevalence of *Salmonella* spp. and of *S*. Enteritidis/ *S*. Typhimurium EU was apparent over the past years. The good *Salmonella* status of these breeding flocks is likely to be due to the mandatory control programmes in MS that have been in place for years. However, in the breeding flocks for broiler meat production *Salmonella* was detected more often and there was an increase both in the overall EU prevalence for *Salmonella* spp. and for *S*. Enteritidis/ *S*. Typhimurium over the last years. Thus the control measures seem to be working better in the egg sector.

Few MS carry out continuous surveillance of *Salmonella* in pigs and cattle production of pig and bovine meat. Therefore the available information is sparse and heterogeneous. In the MS implementing a *Salmonella* control programmes the prevalence were low, while some other MS reported higher infection rates. No clear trends in the *Salmonella* prevalence in other farm animal populations were observed at the Community level.

Feedingstuffs

An of the important sources of *Salmonella* infection in farm animals is contaminated feed. Regulation 2160/2003 lays down that specific intervention measures in feed shall be implemented in the frame of the *Salmonella* control programme in MS. As in previous years, *Salmonella* was present in feed material and in compound feeds. However, the serovar distribution differered from that of *Salmonella* isolates from animals, food and humans, eventhough some frequent serovars were shared between the groups.

Sources of infections

Sero- and phage type distribution in foodstuffs and food producing animals can by comparison with the distribution in human cases provide initial information as to the significance of different sources of human infections. *S.* Enteritidis was the most frequent cause of human salmonellosis at Community level. This serovar was generally also the most frequently isolated serovar from poultry meat and table eggs, whereas it is less commonly isolated from pigs and cattle and products thereof. The second most prevalent serovar in humans was *S.* Typhimurium. This serovar was the most frequently isolated serovar in pigs and cattle and products thereof and also in the top-three from broilers and table eggs.

Some single serovars may be seen as animal species-indicators. *S.* Enteritidis is, as mentioned above, closely related to poultry. *S*. Derby is common in the pig production and to some extent in the cattle production, whereas *S*. Dublin is almost exclusively related to the cattle production. Among the human isolates *S.* Derby constitute less that 0.5% and *S.* Dublin less that 0.1% even though the latter is known to be highly pathogenic.

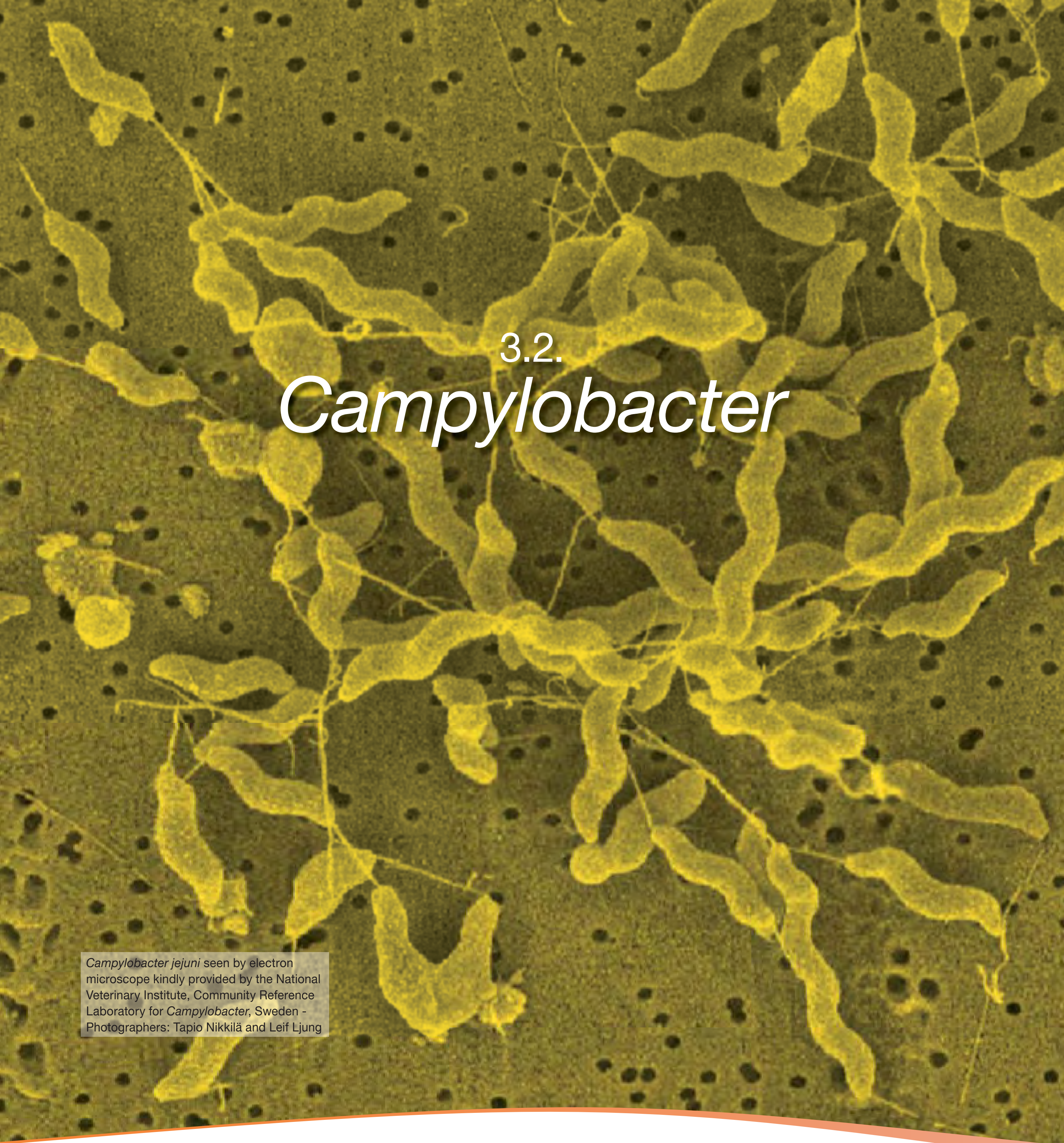
Antimicrobial resistance

Among *Salmonella* isolates from humans, the majority of *S.* Enteritidis isolates were fully sensitive to all antimicrobials tested. The situation for *S.* Typhimurium was markedly different as nearly 40% of the isolates were resistant to more than 4 of the antimicrobials tested. Some variation between MS was evident.

The occurrence of resistance in *Salmonella* isolates from pigs and cattle, and to some extend in broilers, largely resembled the occurrence of resistance reported for *Salmonella* in humans. Among isolates from broilers, higher proportions of resistant isolates were reported for *S*. Typhimurium than for *S.* Enteritidis, and several MS reported extremely high proportions of fully sensitive *S.* Enteritidis isolates. However, a high level of resistance to nalidixic acid in *S*. Enteritidis was reported by several MS Nalidixic acid is an indicator for decreasing susceptibility to fluoroquinolones, which are antimicrobials regarded as critically important for use in humans.

In foodstuffs, the occurrence of antimicrobial resistance in *S.* Typhimurium isolates from pig meat and broiler meat resembled the occurrence of resistance reported by the MS for the corresponding animal species. The resistance observed in isolates from animals likely reflects the selective pressure caused by use antimicrobials in animals. However, certain types and clones of *Salmonella* are associated with particular patterns of resistance, and therefore clonal spread of strains may also contribute to the occurrence of resistance.

The reporting of antimicrobial resistance clearly demonstrates the presence of a reservoir of antimicrobial resistant *Salmonella* in food animals and food of animal origin in the MS. These bacteria often carry resistance to antimicrobials regarded as critically important for use in humans. This may compromise effective treatment of infections in humans caused by *Salmonella* originating from the animal reservoir. However, the prevalences of infection/contamination in animals and foodstuffs in given sectors have also to be assessed when considering the burden of antimicrobial resistant *Salmonella* originating from farm animals and foodstuffs. The mandatory control programmes of *Salmonella* in laying hens, broilers and turkeys as well as in pigs, that MS shall run since 2008 successively according to the Regulation 2160/2003, should improve the epidemiological situation of *Salmonella* in animals and foodstuffs in the following years in the EU. This may decrease also the human health burden caused by the resistant *Salmonella*.



Campylobacter jejuni seen by electron microscope kindly provided by the National Veterinary Institute, Community Reference Laboratory for Campylobacter, Sweden - Photographers: Tapio Nikkilä and Leif Ljung

3.2. *Campylobacter*

3. INFORMATION ON SPECIFIC ZOONOSES

3.2. *Campylobacter*

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

The incubation period averages from two to five days. Patients may have mild to severe symptoms; the common clinical symptoms include watery, often 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. Raw milk and contaminated drinking water have been causes of large outbreaks.

In the following chapter thermotolerant *Campylobacter* will be referred to as *Campylobacter*. Table CA1 presents the countries reporting data for 2006.

Table CA1. Overview of countries reporting data for 2006

	Total number of MS reporting	Countries
Human	22	**MS:** All MS except GR, IT, LV **Non-MS:** BG, IS, NO
Food	19	**MS:** AT, BE, DK, EE, DE, HU, IE, IT, LV, LT, LU, NL, PL, PT, SK, ES, SI, UK **Non-MS:** NO, RO
Animals	21	**MS**: All MS except BE, CY, MT, UK **Non-MS**: NO, CH
Species	22	**MS:** All MS except GR, IT, PT **Non-MS:** IS, NO
AB resistance	17	**MS:** All MS except CY, EE, IE, LT, LU, MT, PL, PT **Non-MS:** NO, RO, CH

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

3.2.1 Campylobacteriosis in humans

In 2006, *Campylobacter* continued to be the most commonly reported gastrointestinal bacterial pathogen in humans in the EU, as in the years 2004 and 2005. However, the number of reported confirmed human campylobacteriosis cases in the EU decreased from a total of 195,426 in 2005 to 175,561 in 2006. The drop in numbers was principally due to a decrease of 17,776 confirmed cases in two MS (7,697 in the Czech Republic and 10,079 in Germany) (Table CA2 and Figure CA1). This marked decrease in confirmed cases in these MS accounted for 89% of the difference between the past two years.

The EU incidence dropped from 51.6 per 100,000 population in 2005 to 46.1 per 100,000 population in 2006, reaching a level just below that of 2004. Statistically significant and linear decreasing trends were observed in Sweden, while increasing trends were observed in Ireland and Slovakia (Figure CA2).

The variation in the incidence of campylobacteriosis cases among reporting MS is large, thus emphasizing the importance of comparisons from year to year within each MS as well as between each MS. The differences between data represent more than just the true variability, they also reflect differences in monitoring systems and microbiological methods employed.

Figure CA1 illustrates the geographical distribution of the reported campylobacteriosis incidences in the EU and other reporting countries. Different sensitivities of the reporting systems of the MS may have influenced these figures.

The countries reported 12% more male than female cases. These differences were evenly distributed throughout all MS (Level 3).

Table CA2. Reported campylobacteriosis cases in humans indicating: Type of report/total number of cases/confirmed cases/incidence in 2006, and number of cases 2002-2005 by all countries[1]

Country	2006				2005	2004	2003	2002
	Report type[2]	Total cases	Con-firmed cases	Confirmed cases/100,000 population	Total cases			
Austria	C	5,020	5,020	60.7	5,065	5,365	3,926	4,446
Belgium	C	5,771	5,771	54.9	6,879	6,716	6,556	7,354
Cyprus	C	2	2	0.3	-	-	-	-
Czech Republic	C	22,713	22,571	220.2	30,268	25,492	-	-
Denmark	C	3,239	3,239	59.7	3,677	3,724	3,537	4,385
Estonia	C	124	124	9.2	124	124	98	114
Finland	C	3,439	3,439	65.4	4,002	3,583	3,190	3,738
France	C	2,675	2,675	4.2	2,049	2,127	1,997	1,353
Germany	C	52,035	52,035	63.1	62,114	55,796	47,876	56,350
Greece					-	392	1	-
Hungary	C	6,829	6,807	67.6	8,288	9,087	-	-
Ireland	C	1,812	1,810	43.0	1,801	1,710	1,568	1,336
Italy					-	-	1	5
Latvia					-	-	1	3
Lithuania	A	624	624	18.3	694	797	617	
Luxembourg	C	285	285	62.0	194	-	-	-
Malta	C	54	54	13.4	91	-	-	-
Netherlands	C	3,401	3,186	19.5	3,761	3,273	2,805	3,421
Poland	C	157	156	0.4	47	24	-	-
Portugal					-	-	-	-
Slovakia	C	2,788	2,718	50.4	2,204	1,691	1,195	1,267
Slovenia	C	944	944	47.1	-	1,063	890	-
Spain	C	5,889	5,889	13.5	5,513	5,958	6,048	5,051
Sweden	C	6,078	6,078	67.2	5,969	6,169	7,149	7,137
United Kingdom	C	52,134	52,134	86.3	52,686	50,388	52,126	54,372
EU Total		**176,013**	**175,561**	**46.1**	**195,426**	**183,479**	**139,581**	**150,332**
Bulgaria[3]	A	75	0	0	-	-	-	-
Iceland	C	117	117	39.0	128	-	-	-
Liechtenstein	C	10	10	0.2	-	-	-	-
Norway	C	2,588	2,588	55.8	2,631	-	-	-
Romania[3]					-	-	-	-
Switzerland	C				5,259	5,584	5,692	6,740
Total		**178,806**	**178,276**	**45.3**	**203,444**	**189,063**	**145,273**	**157,072**

1. EU-total incidence is based on population in reporting countries
Number of confirmed cases for 2005 and number of total cases for 2002-2004
2. A: aggregated data; C: case-based data
3. EU membership began in 2007

Figure CA1. Campylobacteriosis incidence in humans in the EU, 2006 (per 100,000 population)

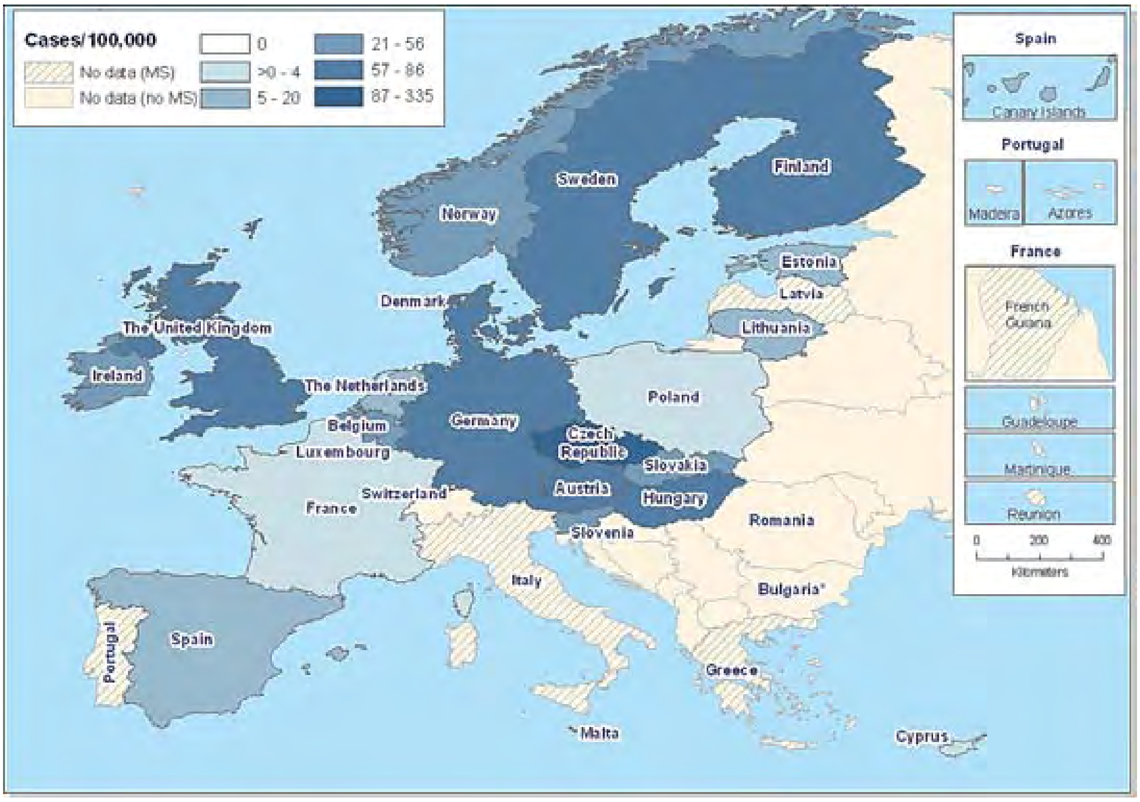
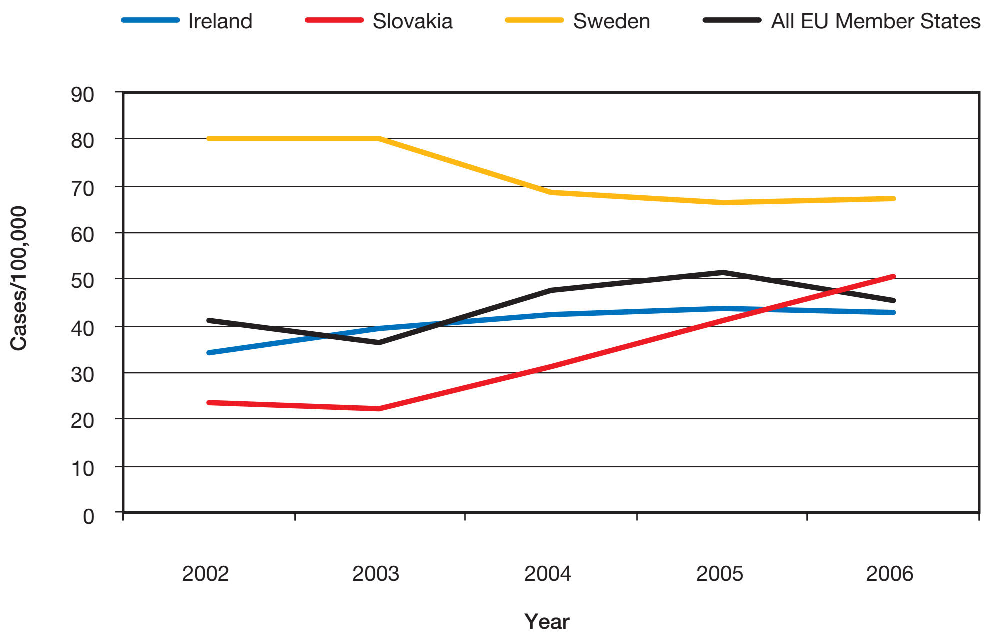


Figure CA2. Campylobacteriosis incidence trend in the EU and in those MS significant linear trends different from the Community trend, 2006



In 2006, more MS contributed with information on whether their confirmed campylobacteriosis cases were acquired domestically or abroad (imported), compared to 2005, and fewer *Campylobacter* cases were reported as source unknown (Table CA3). As in 2005, nearly 10% of reported *Campylobacter* cases were reported as imported, and close to half of cases were classified as domestic. Sweden and Finland reported high proportions of imported cases much as they did with *Salmonella* infections. In contrast, the Czech Republic, Estonia, Germany, Hungary, Lithuania, Malta, Poland, Slovakia and Spain reported that the majority of the reported confirmed cases were domestically acquired.

Higher numbers of *Campylobacter* cases were reported during the summer months, from June to October, representing the characteristic and well known seasonal variation for this type of infection in the warmer summer months (Level 3).

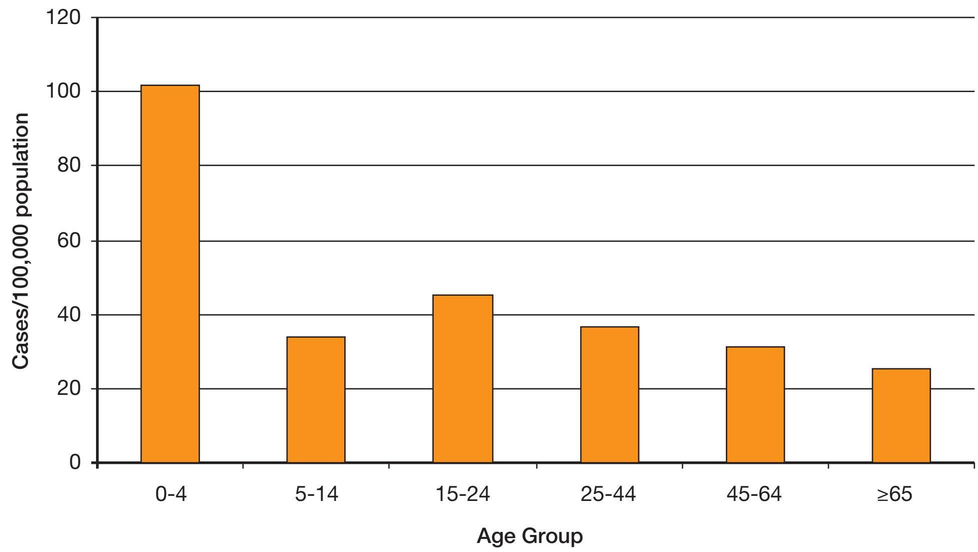
Table CA3. Reported confirmed campylobacteriosis cases in humans by reporting countries and origin of case (imported/ domestic), 2006 (%)

Country	Domestic	Imported	Unknown	Total
Austria	0	7.5	92.5	5,020
Belgium	0	0	100.0	5,771
Cyprus	100	0	0.0	2
Czech Republic	99.2	0.8	0.0	22,571
Denmark	3.6	11.9	84.5	3,239
Estonia	96.0	4.0	0.0	124
Finland	15.1	59.2	25.7	3,439
France	21.0	4.1	74.8	2,675
Germany	87.3	12.7	0.0	52,035
Hungary	99.9	0.1	0.0	6,807
Ireland	10.9	1.1	88.0	1,812
Lithuania	99.0	1.0	0.0	624
Luxembourg	33.7	1.0	0.0	285
Malta	100	0	0.0	54
Netherlands	15.3	7.1	77.7	3,186
Poland	99.4	0.6	0.0	156
Slovakia	99.7	0.3	0.0	2,718
Slovenia	0	0	100.0	944
Spain	100	0	0.0	5,889
Sweden	29.3	62.9	7.8	6,078
United Kingdom	0	2.2	97.8	52,134
EU Total	**54.0**	**8.5**	**38.1**	**175,563**
Iceland	27.4	64.1	8.5	117
Liechtenstein	0	0	100	10
Norway	42.7	48.7	8.5	2,588

At the Community level, the number of confirmed campylobacteriosis cases was fairly evenly distributed between age groups. The highest numbers of cases were observed in those 25-44 years, but this group also covers a wider age range and therefore more persons compared to the categories with younger persons. In the northern European countries (Norway, Sweden, Iceland, Finland, Denmark) the majority of infections occurred within the age group 25-44, while high percentages of infected 0-4 year olds were reported in Estonia, Hungary, Malta, Poland, Slovakia and Spain and in the non-MS Liechtenstein. For details please refer to Level 3.

Children younger than five years of age had the greatest incidence of infection (Figure CA3).

Figure CA3. Incidence of Campylobacter infection by age group, 2006



3.2.2. *Campylobacter* in food

Several MS reported data on *Campylobacter* in food Table CA4. The number of samples, within food categories, ranged from a few to several thousands, primarily covering food categories of animal origin. Poultry meat, which is considered to be one of the major vehicles of *Campylobacter* infections, was the most frequently sampled category of foods. No data were reported for *Campylobacter* originating from water sources.

Table CA4. Overview of countries reporting data on foodstuff, 2006

Food	Total number of MS reporting	Countries
Foodstuff in general	18	**MS:** AT, BE, DK, EE, DE, HU, IE, IT, LV, LT, LU, NL, PL, PT, SK, ES, SI, UK **Non-MS:** NO, RO
Poultry meat	18	**MS:** AT, BE, DK, EE, DE, HU, IE, IT, LV, LT, LU, NL, PL, PT, SK, ES, SI, UK **Non-MS:** NO, RO
Pig meat	12	**MS:** AT, BE, EE, DE, HU, IE, IT, LU, PL, SK, SI, ES **Non-MS:** RO
Bovine meat	12	**MS:** AT, EE, DE, HU, IE, IT, LU, NL, PL, SK, SI, ES **Non-MS:** RO

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

The 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 *Campylobacter* are known to be more prevalent during the summer than during the winter.

Poultry meat and products thereof

The occurrence of *Campylobacter* in fresh broiler meat sampled at slaughter at the processing plant and at retail from 2002-2006, are summarised in Table CA5. In 2006, the proportions of *Campylobacter* positive broiler meat samples ranged widely within the EU from 1.9% to 66.3%. Most of the reporting MS recorded high or very high levels (>20%) of positive samples.

The MS specific trends in the proportion of *Campylobacter* positive fresh broiler meat samples over the years 2004-2006 are presented in the Figure CA4. There appears to be a decreasing trend over these 3 years in Austria, Belgium, Denmark, Estonia and Ireland, though the trends were not statistically tested. However the

overall, weighted proportion of positive samples in these six reporting MS was stable over the years (Figure CA5), and no statistically significant trend was observed. See Appendix 1 and notes to Figure CA4 for descriptions of statistics.
Generally the proportion of *Campylobacter* contaminated broiler meat remained at high levels in the reporting MS. Only in Denmark a steady decreasing trend seems apparent since 2002.

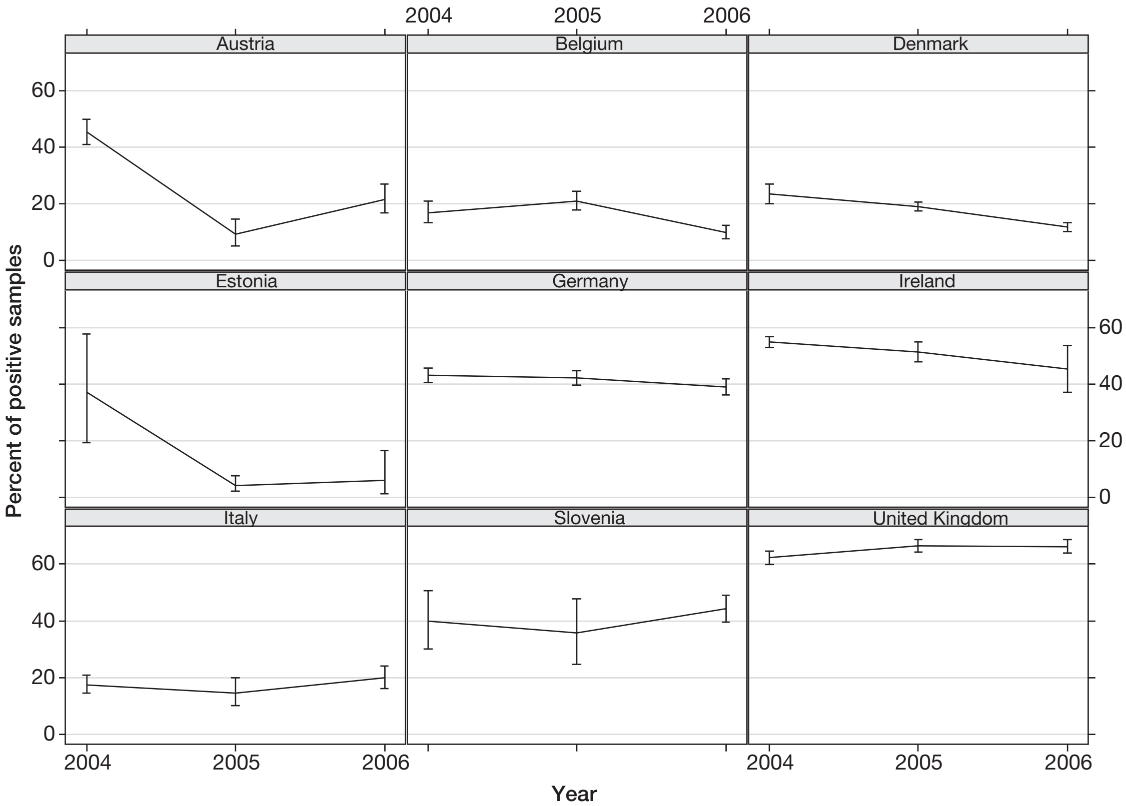
Samples of broiler meat preparations, intended to be eaten cooked, were collected in Belgium and Italy. Belgium reported 2.5% positive samples (N=162), while Italy reported no positive findings in 35 tested samples. In the Netherlands, 16.0% (N=1,473) of minced broiler meat samples were found positive for *Campylobacter*.

Table CA5. Campylobacter in fresh broiler meat[1] sampled at slaughter, processing and at retail, sample based data, 2002-2006

	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
At slaughter										
Belgium	315	1.9	270	19.6	197	4.1	142[3]	16.2	138[3]	19.6
Estonia	-	-	235	4.7	27	37.0	-	-	-	-
Sweden	-	-	3,062	18.5	2,981	19.8	144	21.1	3,764	24.4
At processing plants										
Belgium	326	12.3	249	22.9	131	26.0	-	-	-	-
Ireland	150	45.3	854	51.4	2,620	54.7	-	-	-	-
Slovenia	336	39.9	73	35.6	-	-	-	-	-	-
At retail										
Austria[2]	268	21.6	162	9.3	525	45.3	231	47.2	74	9.5
Belgium	72	34.7	77	20.8	77	35.1	99	20.2	92	16.3
Denmark	1,563	11.7	2,686	19.1	584	23.5	407	32.9	712	41.7
Estonia	50	6.0	32	21.9	-	-	-	-	-	-
Germany	1,121	39.0	1,334	42.1	1,480	43.0	1,396	19.6	1,510	25.0
Italy	424	19.8	226	14.6	570	17.5	-	-	-	-
Luxembourg	44	27.3	42	61.9	-	-	-	-	-	-
Netherlands	-	-	1,605	23.5	1,477	29.3	1,510	26.0	1,600	31.3
Slovenia	100	59.0	-	-	95	40.0	-	-	-	-
Sweden	-	-	32	3.1	27	55.6	425	13.2	-	-
United Kingdom	1,714	66.3	1,791	66.4	1,533	62.2	734	73.0	-	-
EU Total	**6,483**	**34.6**	**12,730**	**30.5**	**12,324**	**37.8**	**5,088**	**35.0**	**7,890**	**30.2**
Norway[2]	958	8.5	938	6.0	1,067	5.1	1,093	5.0	1,069	8.1

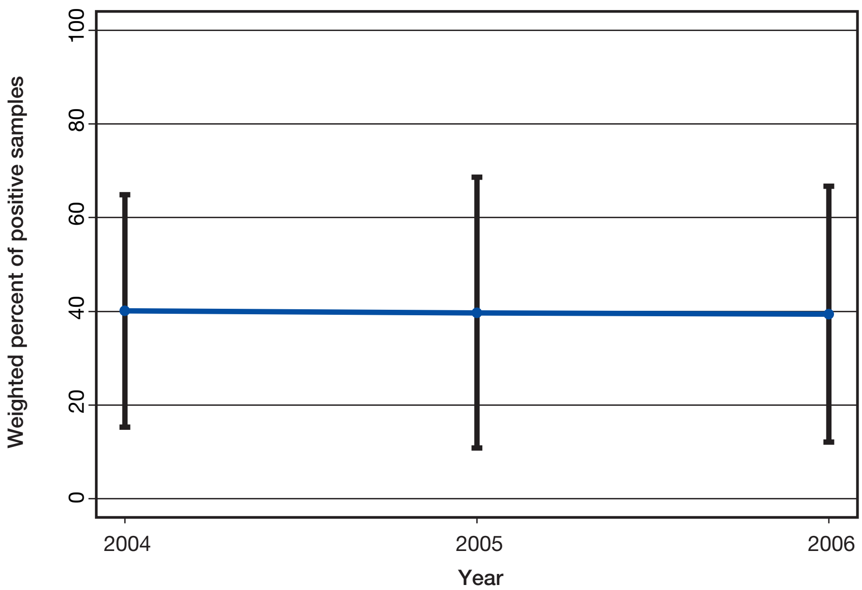
1. Data are only presented for sample size ≥25. Only data specified as fresh are included. Data on meat products, mechanically separated meat, minced meat, meat preparations and frozen meat are not included.
2. Sampling at retail and processing plants
3. Sampling at slaughterhouse or processing plants

Figure CA4. *Campylobacter* in fresh broiler meat[1] (sample based data). MS specific proportion of positive samples with 95% confidence intervals, 2004-2006.



1. Combined data (samples taken at slaughter, at processing/cutting plant or at retail) have been used to estimate the percentage of *Campylobacter* positive fresh broiler meat samples

Figure CA5. *Campylobacter* in fresh broiler meat[1] in 9 MS (sample based data). Weighted EU proportion of positive samples with 95% confidence intervals, 2004-2006[2].



1. Combined data (samples taken at slaughter, at processing/cutting plant or at retail) have been used to estimate the percentage of *Campylobacter* positive fresh broiler meat samples
2. The weighted proportion positive includes data from MS reporting for all three years (AT, BE, DK, EE, DE, IE, IT, SI and UK). Weight is the reciprocal of the ratio between the number of tested samples per MS per year, and the number of broilers per MS, based on the population data reported for 2006, and supplemented with EUROSTAT data from 2005 (AT, BE, IT and SE)

Table CA6 summarises the data reported for 2006 on *Campylobacter* in fresh turkey and other poultry meat than broilers sampled at different stages in the production chain. Only few MS have reported data on poultry meat originating from types of poultry other than broilers. The few data available suggest slightly lower proportions of positive samples in turkey meat compared to broiler meat.

Four MS and one non-MS collected samples of poultry meat products. Germany found 6.1% of 181 ready-to-eat products positive, while Ireland detected no positives of 521 samples. Non-ready-to-eat products were tested negative in Romania (N=47) and Spain (N=46), while Austria found 10.6% positive out of 85 samples (Level 3).

Table CA6. Campylobacter in fresh, non-broiler poultry meat[1] at slaughter, processing and retail, 2006

	Slaughter		Processing		Retail		Stage of sampling not specified	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Turkeys								
Germany	-	-	-	-	345	18.0	391	17.9
Hungary	-	-	-	-	-	-	114	17.5
Italy	-	-	-	-	-	-	105	17.1
Slovenia	-	-	-	-	-	-	79	8.9
Other poultry								
Belgium	246	6.5	-	-	-	-	-	-
Hungary[2]	-	-	-	-	-	-	60	23.3
Hungary[3]	-	-	-	-	-	-	36	5.6
Spain	242	58.3	87	25.3	215	12.6	-	-
EU Total	**488**	**32.2**	**87**	**25.3**	**560**	**15.9**	**785**	**16.7**

1. Data are only presented for sample size ≥25. Only data specified as fresh are included. Data on meat products, mechanically separated meat, minced meat, and meat preparations are not included.
2. Duck
3. Geese

Pig meat and products thereof

Data reported on the occurrence of *Campylobacter* in fresh pig meat sampled at retail in the period 2002-2006 is summarised in Table CA7. In 2006, the proportion of positive samples at retail was low (0-1.1%). Only Germany reported data consistently from 2002 to 2006, observing a decreasing trend in the past years.

Table CA7. Campylobacter in fresh pig meat[1] at retail, sample based data, 2002-2006

	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Austria	93	1.1	89	1.1	-	-	-	-	-	-
Germany	290	0.7	391	0.5	475	1.9	188	2.7	254	1.2
Netherlands	-	-	389	0	287	1.1	227	0	97	2.1
Spain	40	0	107	0	-	-	-	-	-	-
EU Total	**423**	**0.7**	**976**	**0.3**	**762**	**1.6**	**415**	**1.2**	**351**	**1.4**

1. Data are only presented for sample size ≥25; Only data specified as fresh are included. Data on meat products, mechanically separated meat, minced meat, and meat preparations are not included.

Slovenia found 0.6% of the fresh pig meat samples (N=159) collected at processing plants positive for *Campylobacter*, while four MS (AU, HU, IT, LU) and one non-MS (RO) reported data from samples of fresh pig meat without defining the stage of sampling. Out of these, Hungary and Italy reported positive findings, 4.8% (N=168) and 0.6% (N=172), respectively.

Minced pig meat was tested by Belgium and Italy reporting proportions of positive findings of 2.0% (N=50) and 0% (N=315), respectively. Only Italy reported data on the occurrence of *Campylobacter* in ready-to-eat pig meat products and no samples were found positive (N=41).

Bovine meat and products thereof

In 2006, more MS reported data on *Campylobacter* in fresh bovine meat than earlier years. The data are summarised in Table CA8. The proportion of *Campylobacter* positive samples of fresh bovine meat at retail was generally very low (0.4% or less). Only Hungary reported a slightly higher level of positives (2.5%). The consistently low to very low proportions positive findings in Italy and the Netherlands within the period 2002-2005 were continued in 2006.

Table CA8. Campylobacter in fresh bovine meat[1] at retail, sample based data, 2002-2006

	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Estonia	42	0	-	-	-	-	-	-	-	-
Germany	43	0	47	2.1	-	-	-	-	-	-
Hungary	202	2.5	-	-	-	-	-	-	-	-
Italy	241	0.4	394	0.5	196	0	161	0.6	90	1.1
Luxembourg	37	0	-	-	-	-	-	-	-	-
Netherlands	936	0.4	463	1.1	847	0.8	678	0.2	489	0.2
EU Total	**1,501**	**0.7**	**904**	**0.9**	**1,043**	**0.6**	**839**	**0.3**	**579**	**0.3**
Romania	37	0	-	-	-	-	-	-	-	-

1. Data are only presented for sample size ≥25
Only data specified as fresh are included. Data on meat products, mechanically separated meat, minced meat and meat preparations are not included.

Only Slovenia provided information on fresh bovine meat at processing, finding no positives out of 154 samples.

Data on minced bovine meat, intended to be eaten raw, were reported by Italy and the Netherlands. Italy reported no positive findings (N=70), while the Netherlands reported 0.3% (N=924) of the samples positive.

Samples of bovine meat preparations and meat products, collected at retail level in Austria (N=103, non ready-to-eat), Ireland (N=89; ready-to-eat) and Spain (N=41), were all found negative (Level 3).

Other foodstuff

Several MS tested food categories other than poultry, pig or bovine meat for the presence of *Campylobacter* (Table CA9). Belgium and Italy reported *Campylobacter* in red meat carcasses and rabbit meat, respectively. Four MS tested samples of cows milk (sample sizes ≥ 25), and in five out of eight investigations of raw milk *Campylobacter* was detected at low levels. Only Italy reported *Campylobacter* in cheeses. In addition, positive samples were found in samples of live bivalve molluscs in Belgium, unspecified fishery products in Italy and pre-cut ready to eat fruit and vegetables in The Netherlands.

Furthermore, Ireland tested sauces and dressings and sandwiches from retail without positive *Campylobacter* findings (Level 3).

Table CA9. Campylobacter in other food products[1], 2006

	Description	N	% Pos
Meat			
Belgium	Red meat (bovine, pig, goat), carcass	418	13.9
Italy	Meat from rabbit	689	0.3
Cows milk			
Germany	Raw milk for direct human consumption	105	1.9
Germany	Raw milk at farm	201	1.0
Germany	Raw milk for manufacture of pasteurised/UHT products	505	0
Hungary	Raw milk for manufacture of raw or low heat-treated products	46	2.8
Hungary	Raw milk for direct human consumption	437	0.7
Italy	Raw milk	1,303	0.1
Italy	Raw milk for direct human consumption	109	0
Italy	Raw milk for manufacture of raw or low heat-treated products	47	0
Spain	UHT milk	562	0
Dairy products			
Belgium	Soft or semi-soft cheeses from raw or low heat-treated cow milk, at retail	55	0
Belgium	Soft or semi-soft cheeses from raw or low heat-treated cow milk, at farm	75	0
Italy	Cheese from unspecified milk	554	0.7
Slovakia	Cheese from sheep milk	98	0
Slovenia	Soft or semi-soft cheeses from cow milk	30	0
Spain	Unspecified (not cheese)	104	0
Fishery products and live bivalve molluscs			
Austria	Fish	41	0
Belgium	Live bivalve molluscs, at retail	55	1.8
Belgium	Crustaceans, shrimp at retail	53	0
Italy	Fishery products, unspecified	28	3.6
Spain	Fishery products, unspecified	36	0
Fruit and vegetables			
The Netherlands	Pre-cut, ready-to-eat	898	0.3
The Netherlands	Sprouted seeds	48	0
Spain	Ready-to-eat salads, at retail	200	0

1. Data are only presented for sample size ≥25

3.2.3 Campylobacter in animals

In total, 23 countries (21 MS and two non-MS) reported data on *Campylobacter* in animals (Table CA10). The reported data were primarily on prevalences in broilers, but also in pigs, cattle and to some extent goats, sheep and pets. Generally, the number of reporting countries had increased for most animal species.

For animals, as for foodstuffs, it should be noted that results from countries are not directly comparable due to differences in sampling and testing schemes as well as to the season of sampling.

Table CA10. Overview of countries reporting animal data, 2006

Animals	Total number of MS reporting	Countries
Animals in general	21	**MS:** All MS except BE, CY, MT, UK **Non-MS:** NO, CH
Poultry	18	**MS:** AT, CZ, DK, EE, FI, FR, DE, HU, IE, IT, LV, LT, LU, NL, SK, SI, ES, SE **Non-MS:** NO, CH
Pigs	12	**MS:** DK, FR, DE, GR, HU, IE, IT, LV, LT, LU, SK, ES
Cattle	14	**MS:** AT, DK, DE, GR, HU, IE, IT, LV, LT, LU, NL, PL, PT, SK **Non-MS:** NO

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

Broilers and other poultry

In 2006, six additional MS, compared to 2005, reported information on the prevalence of *Campylobacter* in broiler flocks (Table CA11) and data of trends, for the MS reporting consistently since 2004, are illustrated in Figures CA5 and CA6.

Table CA11. Campylobacter in broiler flocks[1], 2002-2006

	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Austria	550	52.2	656	61.4	648	64.5	549	58.7	210	57.6
Czech Republic	189	48.7	92	52.2	-	-	-	-	-	-
Denmark	4,595	29.9	4,918	29.9	520	27.0	349	32.4	294	38.8
Estonia	224	0	-	-	-	-	-	-	-	-
Finland [2]	1,333	5.9	1,320	7.4	1,315	6.2	77	6.5	-	-
Finland [3]	123	0	104	1.0	-	-	-	-	-	-
France	202	81.7	142	85.2	183	83.1	-	-	-	-
Germany	365	22.5	766	50.4	273	39.2	-	-	859	27.4
Hungary	499	10.0	-	-	-	-	-	-	-	-
Ireland[4]	192	0	-	-	-	-	-	-	-	-
Italy	96	37.5	48	45.3	-	-	-	-	-	-
Italy (Veneto region)	155	83.2	51	86.3	212	91	154	71.4	23	87.0
Latvia	70	47.1	-	-	-	-	-	-	-	-
Latvia[4]	62	43.5	-	-	-	-	-	-	-	-
Lithuania	1,337	0.3	1,007	0.5	-	-	-	-	-	-
Lithuania[4]	840	1.2	973	0.2	1,806	0	-	-	-	-
Slovenia	311	72.3	306	65.0	-	-	-	-	-	-
Spain	98	50.0	-	-	-	-	-	-	-	-
Sweden	2,572	13.8	2,974	13.3	3,019	14.2	3,224	17.6	3,842	19.8
Sweden[4]	2,051	10.6	131	17.6	664	18.9	-	-	-	-
EU Total	**15,864**	**20.3**	**13,488**	**23.9**	**8,640**	**19.1**	**4,353**	**25.7**	**5,228**	**23.9**
Norway[4]	3,878	3.7	3,652	3.6	3,626	1.7	-	-	-	-
Norway	4,035	4.2	3,899	3.4	3,842	3.1	3,550	4.9	3,627	6.3
Switzerland	320	25.9	596	23.0	-	-	-	-	-	-

1. Data are only presented for sample size >25, sampling at slaughterhouse if nothing else stated
2. Data collected June-October
3. Data collected November-May
4. At farm

In 2006, the prevalence of *Campylobacter* in broiler flocks ranged from 0% to 83.2% in the EU. Most MS reported high to extremely high prevalence (>20% to 80%), while Finland, Hungary, Estonia, Lithuania, Sweden and Norway reported low to moderate prevalence. No general EU trend was apparent for *Campylobacter* prevalence in broilers amongst the reporting MS. In most of the reporting MS the prevalence remained approximately at the same level in 2006 as in preceding years. Only Germany reported a substantially lower *Campylobacter* prevalence for 2006 compared to previous years (Table CA11).

Figure CA6 presents the MS specific trends in *Campylobacter* prevalence in broiler flocks from 2004 to 2006. In Austria and Germany there seems to be a decreasing trend, but no apparent trends were observed for the other MS over this three year period. No statistically significant trend was observed in the weighted *Campylobacter* prevalence for this reporting MS group during the three years (Figure CA7). See Appendix 1 and notes to Figure CA6 for descriptions of statistics.

Figure CA6. Campylobacter in broilers flocks. MS specific prevalence of positive flocks with 95% confidence intervals, 2004-2006

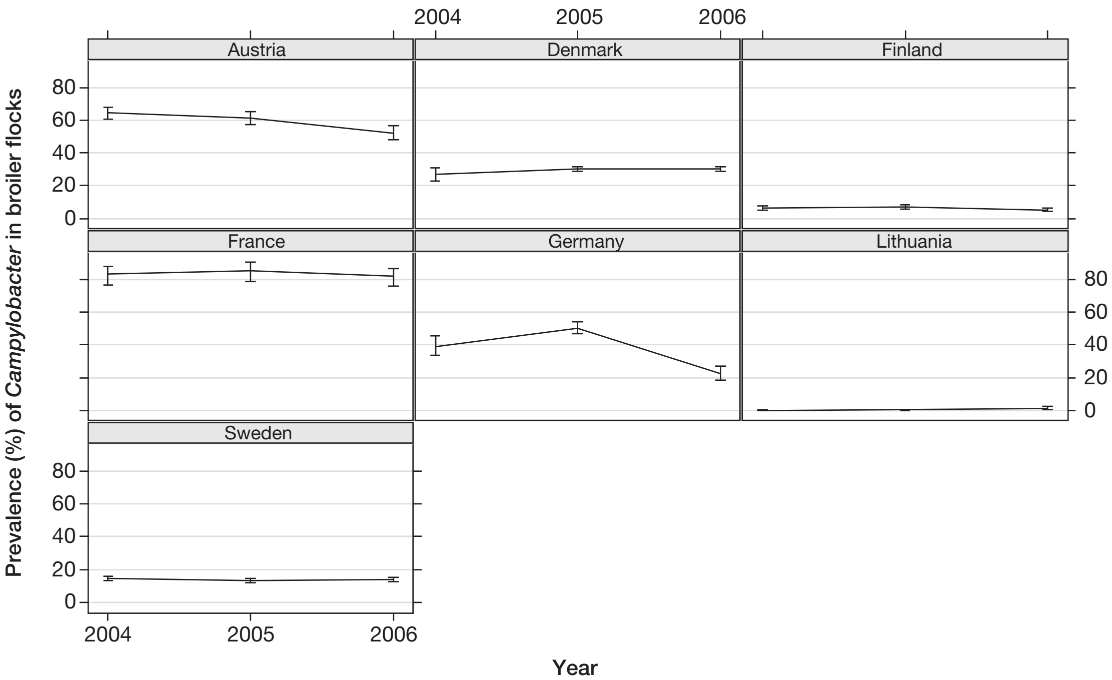
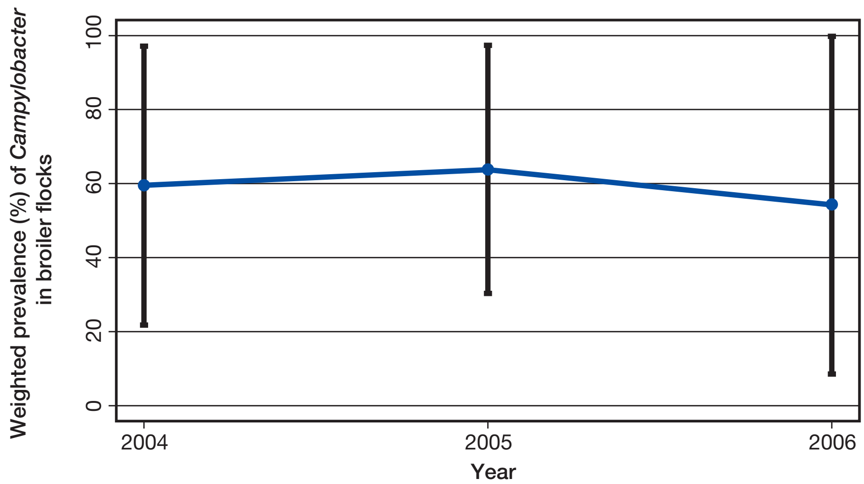


Figure CA7. Campylobacter in broilers flocks in 7 MS. Weighted EU prevalence in broiler flocks with 95% confidence intervals, 2004-2006[1].



1. Weight, for each MS, is the reciprocal of the ratio between the number of tested flocks and to the number of broilers per MS, based on the population data reported for 2006, and supplemented with EUROSTAT data from 2005 (AT and SE). The weighted proportion positive includes data from MS reporting for all three years (AT, DK, FI, FR, DE, LT and SE).

Regarding other poultry species, Italy (the Veneto region) and Slovenia tested 164 and 76 turkey slaughter batches, respectively, and found 90.9% and 63.2% positive for *Campylobacter* spp. Ireland found none of 37 tested turkeys positive and Norway reported a prevalence of 27.8% of 36 turkey flocks (Level 3).

Pigs

In 2006, additional MS reported data on *Campylobacter* in pigs compared to 2005. These data, together with data for 2002-2005 are summarized in Table CA12. In 2006, most MS reported high to extremely high *Campylobacter* prevalence (>35%) similar to the preceding years. However, Hungary and Ireland reported much lower prevalence, both from herd based sampling as did Germany from animal based sampling.

Only three MS reported data consistently over the last five years. These data show a decrease in the prevalence in Germany, and a drop to 52.2% in the prevalence in Denmark. The Italian data show no clear trend.

Table CA12. Campylobacter in pigs and pig herds[1], 2002-2006

	2006		2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Pigs (animal based data)										
Germany	559	19.7	332	24.7	375	24.8	430	22.6	266	32.7
Luxembourg	64	35.9	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	528	69.3	-	-
Pigs (herd based data)										
Austria	-	-	532	48.7	741	57.5	262	53.8	276	54.4
Denmark	295	52.2	185	85.4	191	79.6	259	93.4	240	80.4
France	204	67.6	-	-	176	70.5	-	-	-	-
Hungary	505	8.1	-	-	-	-	-	-	-	-
Ireland	216	0.9	-	-	-	-	-	-	-	-
Italy	199	55.8	84	25.0	37	67.6	46	52.2	29	44.8
Slovakia	39	56.4	53	30.2	-	-	-	-	-	-
Spain[2]	195	73.8	-	-	-	-	-	-	-	-
EU Total	**2,276**	**32.7**	**1,186**	**45.2**	**1,520**	**54.0**	**1,525**	**57.0**	**811**	**54.6**

1. Data are only presented for sample size ≥25
2. Slaughter batches, survey

Cattle

Fourteen MS provided data on cattle in 2006. Data for 2002-2006 are summarized in Table CA13. In cattle, the *Campylobacter* prevalences varied markedly from 0% to 59.7%. The majority of the observations were below 25%, which was only exceeded by Austria, Denmark, the Veneto region in Italy and Norway. Both Austria and Germany reported higher prevalence for calves < 1 year than for dairy cattle in their country.

From 2002 to 2006, a decreasing trend in prevalence is observed in Austria (dairy cows) and Italy. This also seems to be the case for cattle in Germany within the years 2004-2006. In Denmark, a drop in the proportion of positive samples was seen in 2005 and this level was maintained in 2006. In addition to the data on cattle, Poland investigated the *Campylobacter* status of 1,029 breeding bulls, which were all found negative.

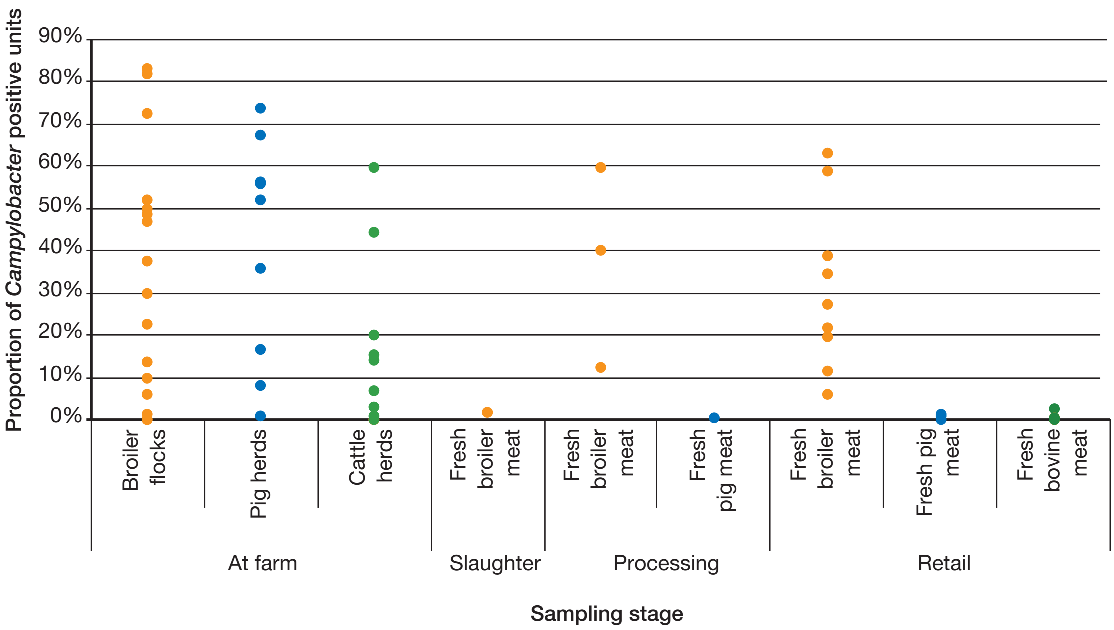
Table CA13. Campylobacter in cattle and cattle herds[1], 2002-2006

		2006		2005		2004		2003		2002	
		N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Cattle (animal based data)											
Hungary	Dairy cows	456	6.8	-	-	-	-	-	-	-	-
Ireland	-	2,048	0.1	-	-	4,375	0.8	-	-	-	-
Ireland	Calves < 1 year	3,756	6.3	-	-	-	-	-	-	-	-
Italy	Dairy cows	1,621	0.9	35	2.9	-	-	-	-	-	-
Italy	-	680	0.6	1,540	3.2	1,444	0.7	-	-	-	-
Luxembourg	-	183	20.2	-	-	-	-	-	-	-	-
Netherlands	-	22,532	0	-	-	-	-	-	-	-	-
United Kingdom	-	-		-	-	-	-	667	54.6	-	-
Norway[2]	-	41	36.6	37	16.2	-	-	-	-	-	-
Cattle (herd based data)											
Austria	Dairy cows	823	14.2	1,012	17.9	898	18.6	346	35.0	350	40.0
Austria	Calves < 1 year	83	24.1	-	-	-	-	-	-	-	-
Austria	Meat production animals	423	28.6	-	-	-	-	-	-	-	-
Denmark	-	224	44.2	73	42.5	67	64.2	88	63.6	87	65.5
Germany	Cattle (all)	697	9.8	601	12.0	394	14.0	-	-	-	-
Germany	Calves < 1 year	128	5.5	32	46.9	-	-	-	-	-	-
Germany	Dairy cows	153	-	315	0.3	-	-	-	-	-	-
Italy	-	155	15.5	295	17.0	150	28.0	119	35.3	229	35.4
Italy[3] (Veneto Region)	-	67	59.7	28	71.4	-	-	-	-	-	-
Lithuania	Dairy cows	461	0	732	1.4	1,424	0.1	-	-	-	-
Slovakia	-	434	0.7	524	0.2	-	-	-	-	-	-
EU Total		**34,924**	**2.4**	**5,150**	**8.4**	**8,752**	**4.0**	**1,220**	**47.8**	**666**	**41.7**

1. Data are only presented for sample size ≥25
2. Clinical samples
3. Slaughter batch based data

A general presentation of data reported by the MS in 2006 of the most significant animal species and foodstuff categories is illustrated in Figure CA8. These data reveal that the proportion of positive samples is much higher in pigs and cattle on farm compared to samples of fresh meat at processing and retail. The prevalence of *Campylobacter* in broilers, however, only decreases slightly from farm to processing, while no decrease is noted from processing to retail. The MS observations within sampling points are distributed evenly between the maximum and minimum observations within the different categories indicating great variations within the Community with no specific MS standing out from a common Community level.

Figure CA8. Proportions of Campylobacter positive samples, by animal species and foodstuff category within the EU in 2006. Each point represents a Member State observation



Other farm animals

In 2006, five MS reported data on sheep and goats (Table CA14). In most cases, the *Campylobacter* prevalences were low (<8%). However, Italian investigations of goats and sheep, showed high to very high prevalence. One investigation of goats revealed a proportion of positive samples of 64.8%, all isolates being *C. sputorum*, which is remarkable, as this species is more commonly known to be associated with cattle and sheep. In the second investigation, Italy reported 50 of 195 sheep (25.6%) positive for *C. jejuni*. This finding is also interesting as serotypes in sheep most frequently are identified as *C. fetus* and *C. sputorum*.

Campylobacter spp. were not found in domestic solipeds in Germany (N=65) and the Netherlands (N=233), nor in 42 buffalos in Italy.

Table CA14. Campylobacter in goats and sheep[1], 2006

	N	% Pos
Goats		
Germany	57	5.3
Ireland	36	0
Italy	156	0
Italy	54	64.8
Netherlands	91	0
Sheep		
Germany	304	1.3
Greece[2]	40	2.5
Ireland	611	1.0
Italy	894	0.7
Italy	195	25.6
Italy[3]	79	3.8
Netherlands	179	7.8
EU Total	**2,696**	**4.5**

1. Data are only presented for sample size ≥25, animal based data if nothing else stated
2. Herd based sampling
3. Holding based sampling

Pets

In 2006, six MS and one non-MS tested approximately 2,000 pets, including birds, cats and dogs for *Campylobacter* (Table CA15). No pet birds were found positive. The proportions of positive samples of cats were low, ranging from 0% to 8.6%. In dogs, the majority of observed prevalences were also low, but prevalences of 46.4% and 69.0% were found in Denmark and the Netherlands respectively.

Table CA15. Campylobacter in pets[1], 2006

		N	% Pos
Netherlands	Birds	97	0
Germany	Cats	218	1.4
Ireland	Cats	28	0
Italy	Cats	35	8.6
Netherlands	Cats	226	2.2
Denmark	Dogs	28	46.4
Germany	Dogs	430	7.0
Ireland	Dogs	447	0.2
Italy	Dogs	274	6.6
Netherlands	Dogs	71	69.0
Slovakia	Dogs	56	8.9
Norway	Dogs	103	19.4

1. Data are only presented for sample size ≥25

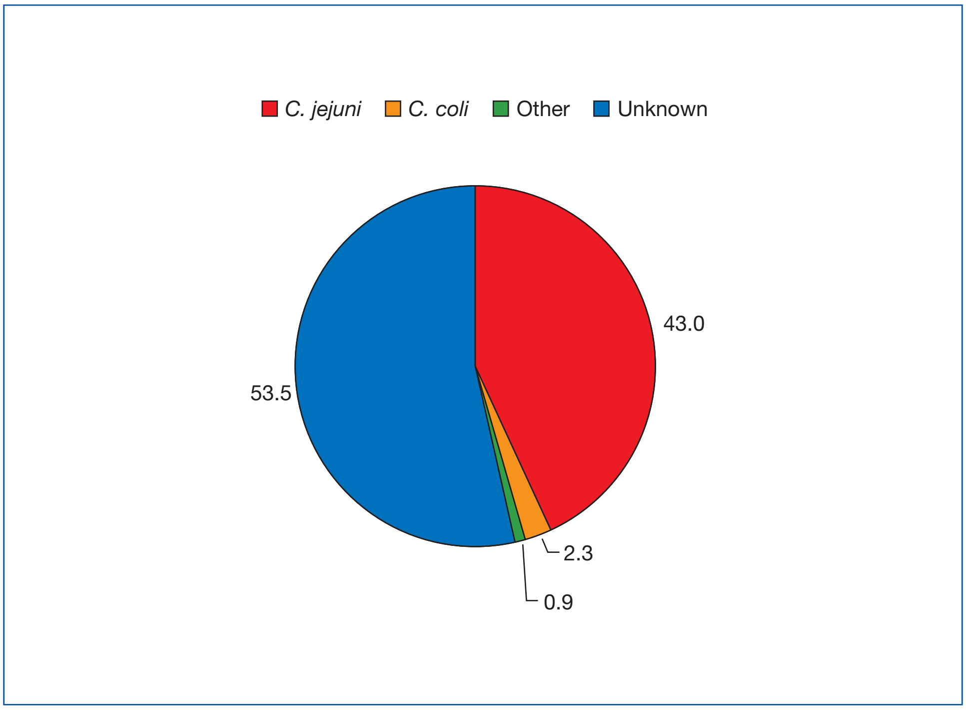
3.2.4. Campylobacter spp. distribution

In 2006, six additional MS provided information on the species distribution among human *Campylobacter* cases, compared to 2005 (Table CA16). *C. jejuni* and *C. coli* comprised 43.0% and 2.3%, respectively, of all *Campylobacter* infections in the EU in 2006 (Figure CA9). The majority of *Campylobacter* infections were, as in preceding years, reported to be caused by *Campylobacter spp.* or unknown either because speciation was not performed or because the species could not be identified. The highest proportions of *C. jejuni* cases were reported by the Czech Republic, Luxembourg and Iceland (94.4-100%), while the highest proportion of *C. coli* cases were reported in France (14.1%) and Poland (11.5%). Nevertheless, the vast majority of speciated isolates were *C. jejuni*.

Table CA16. Distribution of confirmed campylobacteriosis cases in humans by species, 2006 (%)

Country	*C. coli*	*C. jejuni*	Other	Unknown	Total
Austria	1.8	56.1	0.9	41.3	5,020
Belgium	0	0	0	100	5,771
Cyprus	0	0	0	100	2
Czech Republic	0.0	95.1	4.3	0.6	22,571
Denmark	0	0	0	100	3,239
Estonia	0	86.3	0	13.7	124
Finland	3.8	83.5	0.1	12.6	3,439
France	14.1	70.8	6.4	8.7	2,675
Germany	5.0	58.7	0	36.3	52,035
Hungary	5.7	67.9	4.0	22.4	6,807
Ireland	3.2	34.8	0.3	61.8	1,810
Lithuania	2.0	47.7	1.0	49.3	624
Luxembourg	1.1	94.4	0	4.6	285
Malta	9.3	77.8	1.9	11.1	54
Netherlands	6.0	84.7	1.9	7.4	3,186
Poland	11.5	70.5	0	17.9	156
Slovakia	0.0	44.1	0.2	55.7	2,718
Slovenia	4.3	90.3	5.4	0	944
Spain	2.1	85.0	0.2	12.6	5,889
Sweden	0	0	0	100	6,078
United Kingdom	0.0	0.6	0.0	99.4	52,134
EU Totals	**2.3**	**43.1**	**0.9**	**53.6**	**175,561**
Iceland	0	100	0	0	117
Liechtenstein	0	90	0	10	10
Norway	1.9	69.4	0.3	28.4	2,588

Figure CA9. Species of Campylobacter isolates from human cases in EU, 2006 (%)



In general, very few *Campylobacter* isolates from foodstuffs were speciated. The vast majority of these isolates were obtained from broiler meat and other poultry meat. More isolates from animals than before were speciated in 2006, however, these still constitute only a minor fraction of the total number of isolates. Only results based on 25 or more isolates tested are addressed in the following paragraphs. For further details, see Level 3.

Campylobacter species in foodstuffs

Most MS found *C. jejuni* as the predominant species isolated from fresh broiler meat, comprising 52%-90% of the positive samples. However, *C. coli* was also isolated from broiler meat samples, but in lower proportions (6%-42%). A few MS (Italy, Slovenia and the United Kingdom) found *C. lari* at low frequencies (0.2%-22%). *C. jejuni* was also the most commonly isolated species from other types of poultry meat. For information on data reported on other foodstuffs, see Level 3.

As only very few data were reported on foodstuffs, no parallels could be drawn to the species found in animals.

Campylobacter species in animals

Among samples tested positive for *Campylobacter*, only a minor number of isolates were speciated. However, the reported data indicate that *C. jejuni* was the most commonly isolated species in broilers, cattle and sheep, while the vast majority of isolates from pigs were identified as *C. coli*.

In broilers, the proportion of samples speciated as *C. jejuni* ranged from 30%-100%, with the exception of one German investigation, where only 4% of the samples were of this species. *C. coli* was also found in relative high proportions in broilers (5%-50%) and in Italy and Spain their share were as high as 55%-70%.

In cattle, the proportion of samples identified as *C. jejuni* ranged, in most MS, from 50% to 100%, while the proportion of *C. coli* isolates varied between 3% and 42%. Speciation of sheep isolates was only reported by Germany, Ireland and Italy indicating *C. jejuni* as the most commonly isolated species.

In pigs, *C. coli* was identified in 58%-100% of the investigated isolates, while *C. jejuni* were found in 5% or less.

In pets, cats and dogs, several different *Campylobacter* species were reported, comprising *C. jejuni*, *C. coli*, *C. upsaliensis* and *C. lari*.

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

3.2.5. Antimicrobial resistance in Campylobacter

Antimicrobial resistance in *Campylobacter* isolates from humans

For 2006, data on the occurrence of antimicrobial resistance in *Campylobacter* from humans was provided by Enter-net (an EU-wide surveillance network for *Salmonella*, VTEC and *Campylobacter* in humans) (Table AB CA1). In *C. jejuni* and *coli* resistance towards ciprofloxacin, tetracycline and ampicillin increased in 2006 when compared to 2005 data. The resistance to ciprofloxacin was high to very high, and together, 44.2% and 57.6% of the *C. jejuni* and *C. coli* isolates, respectively, were resistant to ciprofloxacin in 2006, whereas in 2005 the corresponding figures were 37% and 48%.

The proportion of *C. coli* isolates resistant to at least 4 antimicrobials increased from 14% in 2005 to 17.2% in 2006, whereas the proportion of *C. jejuni i*solates resistant to at least 4 antimicrobials decreased from 10% in 2005 to 8.4% in 2006 (Table AB CA2).

Table AB CA 1. Antimicrobial resistance to Campylobacter in humans in 2006 (all, C. jejuni, C. coli), Enter-net data

All	N (total)	Resistant %	Intermediate %	Sensitive %
Gentamicin	2,969	0.9	0.4	98.7
Ampicillin	2,965	26.0	7.0	66.9
Amoxi/Clavulanic acid	2,897	0.0	0.1	99.8
Erythromicin	5,202	3.4	2.6	93.9
Tetracyclines	4,996	29.1	4.6	66.3
Nalidixic acid	2,977	37.6	1.4	61.0
Ciprofloxacin	5,892	45.0	0.9	54.1
C. jejuni	**N (total)**	**Resistant %**	**Intermediate %**	**Sensitive %**
Gentamicin	2,345	0.8	0.3	98.8
Ampicillin	2,341	27.8	6.5	65.7
Amoxi/Clavulanic acid	2,281	0.0	0.0	99.9
Erythromicin	4,153	2.3	1.3	96.4
Tetracyclines	4,019	27.5	4.5	68.0
Nalidixic acid	2,353	31.4	1.2	67.4
Ciprofloxacin	4,801	44.2	0.5	55.4
C. coli	**N (total)**	**Resistant %**	**Intermediate %**	**Sensitive %**
Gentamicin	447	1.6	0.2	98.2
Ampicillin	447	21.0	9.2	69.8
Amoxi/Clavulanic acid	439	0.0	0.0	100.0
Erythromicin	611	10.0	9.3	80.7
Tetracyclines	597	45.9	5.7	48.4
Nalidixic acid	447	51.0	0.2	48.8
Ciprofloxacin	630	57.6	0.0	42.4

Table AB CA 2. Number of multiresistant Campylobacter isolates (≥4 antimicrobials) by species, 2006

Species	Total tested	No. MDR (≥4)	%
C.jejuni	2,353	198	8.4
C.coli	447	77	17.2
Others	175	10	5.7
Total	**2,977**	**285**	**9.6**

Antimicrobial resistance in *Campylobacter* isolates from food

Data on the occurrence of antimicrobial resistance in *Campylobacter* is presented only for broiler meat, since this was the only food category where a sufficient number of MS reported data on more than 10 isolates. For data on antimicrobial resistance in *Campylobacter* spp.in other food categories, please refer to Level 3.

Broiler meat

Data on antimicrobial resistance in *Campylobacter* spp from broiler meat was reported by four MS (Table AB CA3). The highest levels of resistance were reported for tetracycline (overall average 43.8%) and ciprofloxacin (overall average 30.6%). For Belgium and the United Kingdom similar proportions of resistant isolates were reported in 2004 and 2006. The observations are generally consistent with the reporting by other MS in previous years.

Table AB CA 3. Antimicrobial resistance in Campylobacter spp. from broiler meat, 2006

			Antimicrobial						
	Monitoring program		Ciprofloxacin	Erythromycin	Gentamicin	Streptomycin	Tetracycline	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Belgium	Yes	91	41.8	3.3	0	-	57.1	23.1	-
Germany	-	17	35.3	11.8	0	-	35.3	35.3	5.9
Hungary	Yes	49	57.1	2.0	0	-	24.5	32.7	2.0
United Kingdom	Yes	457	25.4	8.3	0	-	43.5	0	17.3
Total, N		**614**	**188**	**44**	**0**	**0**	**269**	**43**	**81**
Total, %			**30.6**	**7.2**	**0**	**0**	**43.8**	**7.0**	**13.2**

Only MS reporting more than 10 isolates were included in this table

Antimicrobial resistance in *Campylobacter* isolates from animals

Data on the occurrence of antimicrobial resistance in *Campylobacter* from animals were provided by 13 MS and one non-MS (Table AB CA4 - AB CA7). Data from MS reporting more than 10 isolates, and sample categories for which at least four MS reported, are presented.

Gallus gallus

Antimicrobial resistance in *C. jejuni* isolates from *Gallus gallus* (broilers) was reported by 9 MS, and two non-MS (Table AB CA4) and resistance in *C. coli* isolates was reported by 5 MS (Table AB CA5).

The highest proportions of resistant isolates were reported for ciprofloxacin and tetracycline. In *C. jejuni* the overall averages were 31.6% and 29.6% respectively, and in *C. coli* 56.7% and 66.5%, respectively. Most MS reported very high proportions of ciprofloxacin resistance, except Denmark, where legal restrictions are in place on the use of fluoroquinolones in food animals. Overall, the proportions of resistant isolates were generally higher for *C. coli* than for *C. jejuni*. These observations are coherent with data from 2005 and 2004.

The Minimum Inhibitory Concentrations (MIC) distributions for *C. jejuni* from *Gallus gallus* are presented in Table AB CA MIC 1. From the table it is obvious that MS used different breakpoints for resistance.

Table AB CA 4. Antimicrobial resistance in C. jejuni from Gallus gallus, 2006

			Antimicrobial						
	Monitoring program		Ciprofloxacin	Erythromycin	Gentamicin	Streptomycin	Tetracycline	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Czech Republic	Yes	50	48.0	4.0	2.0	2.0	12.0	-	-
Denmark	Yes	75	6.7	0	0	2.7	6.7	88.0	-
Germany	Yes	95	52.6	2.1	0	-	43.2	-	-
Finland	Yes	66	-	0	0	-	-	-	-
France	Yes	49	14.3	0	0	-	57.1	-	-
Italy	Yes	108	57.4	11.1	1.9	4.4	55.6	32.4	3.4
Netherlands	Yes	16	56.2	0	0	0	50.0	25.0	0
Norway	Yes	108	-	0	0	-	0	92.0	0
Slovenia	Yes	71	-	2.8	19.7	-	-	12.7	8.5
Spain	Yes	17	94.1	11.8	5.9	17.6	82.4	-	-
Switzerland	Yes	77	11.7	1.3	0	5.2	18.2	-	-
EU Total, N		**547**	**173**	**20**	**18**	**10**	**162**	**213**	**10**
EU Total, %			**31.6**	**3.7**	**3.3**	**1.8**	**29.6**	**38.9**	**1.8**

Only MS reporting more than 10 isolates were included in this table
For Italy; N=87 for resistant to >4 antimicrobials
For Italy; N=91 for streptomycin

Table AB CA MIC1. Distribution of MIC's in C.jejuni from Gallus gallus, 2006

Compound	Country	% Resistant	N (total count)	Distribution (%) of MICs																		
				0.02	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048
Erythromicin	Czech Republic	4	50			36.0		36.0	12.0	10.0	2.0		2.0			2.0						
	Denmark	0	75						4.0	28.0	45.3	22.7										
	Finland	0	66					4.5	10.6	59.1	25.8											
	France	0	49					20.4	14.3	32.7	22.4	10.2										
	Italy	11	108				8.3	37.0	24.1	19.4				1.9		0.9	2.8	5.6				
	Netherlands	0	16							18.8	56.3	25.0										
	Norway	0	108					12.0	57.4	30.6												
	Slovenia	3	71			18.3	1.4	29.6	31.0	12.7	4.2			1.4	1.4							
	Spain	12	17					23.5	41.2	17.6	5.9				5.9	5.9						
	Switzerland	1	77					15.6	46.8	29.9	6.5					1.3						
Ciprofloxacin	Czech Republic	48	50				6.0	32.0	8.0	6.0			2.0	30.0	4.0	12.0						
	Denmark	7	75			13.3	53.3	25.3	1.3			1.3	5.3									
	France	14	49		20.4	14.3	18.4	6.1	20.4	6.1	6.1			2.0	6.1							
	Italy	57	108			13.0	21.3	4.6	1.9	1.9		2.8	11.1	25.0	16.7	0.9	0.9					
	Netherlands	56	16				18.8	12.5	12.5			6.3		25.0	25.0							
	Spain	94	17				5.9						17.6	35.3	35.3	5.9						
	Switzerland	12	77			27.3	50.6	10.4					1.3	10.4								

Note 1: France: range for ERY and CIP missing
Note 2: Vertical lines indicate breakpoints for resistance
Note 3: The white fields denote range of dilutions tested for each antimicrobal. Values above the range denote MIC values greater than the highest concentration in the range. MICs equal to or lower than the lowest concentration tested are given as the lowest concentration

Table AB CA 5. Antimicrobial resistance in C. coli from Gallus gallus, 2006

			Antimicrobial						
	Monitoring program		Ciprofloxacin	Erythromycin	Gentamicin	Streptomycin	Tetracycline	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Italy	Yes	96	72.9	29.2	2.1	-	62.5	22.9	-
France	Yes	81	42.0	14.8	1.2	-	86.4	-	-
Netherlands	Yes	12	66.7	0	0	0	58.3	33.3	0
Slovenia	Yes	27	-	7.4	18.5	-	-	0	14.8
Spain	Yes	29	93.1	41.4	10.3	41.4	89.7	-	-
EU Total, N		**245**	**139**	**54**	**11**	**12**	**163**	**26**	**4**
EU Total, %			**56.7**	**22.0**	**4.5**	**4.9**	**66.5**	**10.6**	**1.6**

Only MS reporting more than 10 isolates were included in this table

Pigs

Antimicrobial resistance in *C. coli* isolates from pigs was reported by six MS and one non-MS (Table AB CA6). High levels of resistance were reported for ciprofloxacin, erythromycin, streptomycin and tetracycline (overall average ranging from 25.3% to 71.9%). However, considerable variation between MS was evident. Italy and Spain accounted for the highest proportions of resistant isolates in general, whereas the highest proportion of fully sensitive isolates was reported by Denmark (33.0%). MIC distributions for *C. coli* from pigs are presented in Table AB CA MIC 2.The different breakpoints used by the MS had an impact on the reported resistance rates.

Table AB CA 6. Antimicrobial resistance in C. coli from pigs, 2006

			Antimicrobial						
	Monitoring program		Ciprofloxacin	Erythromycin	Gentamicin	Streptomycin	Tetracycline	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Denmark	Yes	103	11.7	12.6	0	61.2	3.9	33.0	1.0
France	-	80	25.0	21.3	0	-	75.0	-	-
Germany	-	236	23.3	6.8	0	-	76.3	19.1	-
Italy	Yes	78	59.0	43.6	6.4	-	92.3	3.9	3.9
Netherlands	Yes	40	10.0	27.5	0	75.0	82.5	2.5	2.5
Spain	Yes	132	85.6	59.1	18.9	84.0	100	-	-
Switzerland	Yes	52	25.0	11.5	0	94.2	23.1	-	-
EU Total, N		**669**	**250**	**169**	**30**	**177**	**481**	**83**	**5**
EU Total, %			**37.4**	**25.3**	**4.5**	**26.5**	**71.9**	**12.4**	**0.7**

Only MS reporting more than 10 isolates were included in this table

Table AB CA MIC2. Distribution of MIC's in C.coli from pigs, 2006

Compound	Country	% Resistant	N (total count)	Distribution (%) of MICs																	
				0.015	0.03	0.06	0.12	0.25	0,5	1	2	4	8	16	32	64	128	256	512	1024	2048
Erythromycin	Denmark	13	103						23.3	22.3	32.0	9.7			1.0	11.7					
	France	21	80					15.0	2.5	25.0	28.8	7.5	1.3		2.5		17.5				
	Italy	45	78					1.3	14.1	25.6	12.8	1.3		1.3	23.1	19.2	1.3				
	Netherlands	28	40						2.5	7.5	10.0	32.5	20.0				27.5				
	Spain	59	132					1.5	6.8	17.4	11.4	2.3	0.8	0.8	0.8	58.3					
	Switzerland	12	52					1.9	13.5	25.0	42.3	5.8				11.5					
Ciprofloxacin	Denmark	12	103		9.7	39.8	24.3	12.6	1.0		1.0	4.9	6.8								
	France	25	80		17.5	11.3	21.3	10.0	3.8	11.3	1.3	6.3	10.0	6.3		1.3					
	Italy	59	78			15.4	15.4	9.0	1.3		1.3	6.4	19.2	29.5	2.6						
	Netherlands	10	40				67.5	20.0	2.5			2.5	2.5		5.0						
	Spain	86	132			3.8	8.3	2.3				4.5	24.2	45.5	9.1	2.3					
	Switzerland	25	52		1.9	23.1	34.6	7.7	3.8	3.8		1.9	13.5	7.7	1.9						

Note 1: France: range for ERY and CIP missing

Note 2: Vertical lines indicate breakpoints for resistance

Note 3: The white fields denote range of dilutions tested for each antimicrobal. Values above the range denote MIC values greater than the highest concentration in the range. MICs equal to or lower than the lowest concentration tested are given as the lowest concentration

Cattle

Antimicrobial resistance in *C. coli* isolates from cattle was reported by three MS and one non-MS (Table AB CA7). High proportions of *C. coli* isolates from cattle reported for 2006 were resistant to ciprofloxacin, streptomycin and tetracycline (overall averages 55.6%, 48.1% and 74.1%, respectively), whereas lower levels of resistance was reported for erythromycin and gentamicin. These observations are coherent with the reporting for 2004 and 2005.

Table AB CA 7. Antimicrobial resistance in C. coli from cattle, 2006

			Antimicrobial						
	Monitoring program		Ciprofloxacin	Erythromycin	Gentamicin	Streptomycin	Tetracycline	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	Yes	30	40.0	0	0	26.7	50.0	30.0	0
Denmark	Yes	10	10.0	30.0	0	20.0	0	30.0	-
Netherlands	Yes	68	69.1	19.1	4.4	61.8	95.6	2.9	25
Switzerland	-	27	44.4	11.1	0	40.7	55.6	-	-
EU Total, N		**108**	**60.0**	**16.0**	**3.0**	**52.0**	**80.0**	**14**	**17**
EU Total, %			**55.6**	**14.8**	**2.8**	**48.1**	**74.1**	**13.0**	**15.7**

Only MS reporting more than 10 isolates were included in this table

3.2.6. Discussion

As in 2005, *Campylobacter* was the most frequently reported cause of human gastrointestinal disease within the EU causing 175,561 confirmed reported cases. However, compared to 2005, there was a decrease in the incidence of the reported cases, which is interesting even though two MS accounted mostly for this drop.

The reported data supports the notion that the human food borne exposure to *Campylobacter* is primarily from broiler meat. Most MS reported high to very high levels of these bacteria in fresh broiler meat and no significant trend in the occurrence was apparent. In relation to reported *Campylobacter* outbreaks, broiler meat and products thereof were the second most frequent food vehicle following unspecified meat in 2006 (Chapter 5). In other food categories, including pig and bovine meat, milk and fruit and vegetables, much lower proportions of *Campylobacter* positive samples were recorded.

In animals *Campylobacter* were frequently found from poultry, pigs and cattle which indicates that these animal species serve as reservoirs of the bacteria. However, after slaughtering, broiler meat seems to be the main vehicle of *Campylobacter.* This suggests that pig and bovine carcases are less contaminated with faecal material during slaughter and/or that *Campylobacter* are not able to survive well on pig and bovine meat during the slaughtering and processing.

Campylobacter are organisms that easily acquire resistance to antimicrobial agents. In this report several MS reported a high proportion of resistance *Campylobacter* isolates from the human cases. Occurrence of resistance to the substance ciprofloxacin is of special interest, since this antimicrobial is frequently used to treat severe gastrointestinal infections in humans. Indeed, in 2006, resistance to ciprofloxacin was reported to be common amongst *Campylobacter* isolates from humans, approximately half of the isolates being resistant to this substance. High to very high levels of resistance to ciprofloxacin were also reported in *Campylobacter* isolates from broilers, broiler meat, pigs and cattle. This occurrence of ciprofloxacin resistance in *Campylobacter* in broiler meat is especially undesirable, because broiler meat is an important source of *Campylobacter* for human infections and the resistance will limit the choice of antimicrobials in the treatment of the human infections. Similar high levels of resistance were also reported in 2005 and 2004.

There were no significant Community trends observed for the proportion of *Campylobacter* positive samples either in broiler meat or in the broiler flocks. Most MS have reported continuously high or very high prevalence over the last years. However, the reported broiler flocks prevalence tended to be lower in the Nordic countries.

The challenge in comparing *Campylobacter* data at the EU level is the heterogeneous origin of data due to lack of harmonisation of sampling and analysis methods and the possible impact of seasonality on the results. Since *Campylobacter* is recognised as a major food-borne zoonosis, where further information is required for outlining best control options, an EU-wide fully harmonised baseline survey will be carried out in 2008 in all the MS (Commission Decision 2007/516/EC). This survey will provide valuable input both in terms of qualitative and quantitative information on occurrence of *Campylobacter* in the MS supplemented with data of antimicrobial resistance.

3.2. *Campylobacter*

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. Listeriae* are ubiquitous organisms that are widely distributed in the environment, especially in plant matter and soil. The principal reservoirs of *Listeria* are soil, forage and water. Other reservoirs include infected domestic and wild animals. The main route of transmission to both humans and animals is 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 kills *Listeria*, but the bacteria are known to multiply at temperatures down to +2- +4°C, which makes its occurrence in ready-to-eat foods with a relatively long shelf life particularly of 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 high mortality rate associated with them. These organisms are among the most important causes of death from foodborne infections in industrialised countries.

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

Table LI1 presents the countries that have reported data on *Listeria* for 2006.

Table LI1. Overview of countries reporting data on Listeria monocytogenes, 2006

	Total number of MS reporting	Countries
Human	25	**MS:** All MS **Non-MS:** BG, IS, LI and NO
Food	23	**All MS** except Cyprus and Malta **Non-MS:** BG, CH, NO, RO
Animals	17	**MS:** AT, CZ, EE, FI, DE, GR, HU, IE, IT, LV, LT, NL, PL, PT, SK, SE, UK **Non-MS:** CH, NO, RO

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

3.3.1. Listeriosis in humans

In 2006, MS reported 1,583 human cases of listeriosis, all of them laboratory confirmed. The overall incidence was 0.3 cases per 100,000 population. More confirmed cases of listeriosis were reported in 2006 than in 2005 and 2004, and there is a statistically significant increasing trend in listeriosis incidence within the Community over the past five years. The increased number of cases in 2006 compared to 2005 was primarily due to additional cases from the Czech Republic and France (Table LI2).

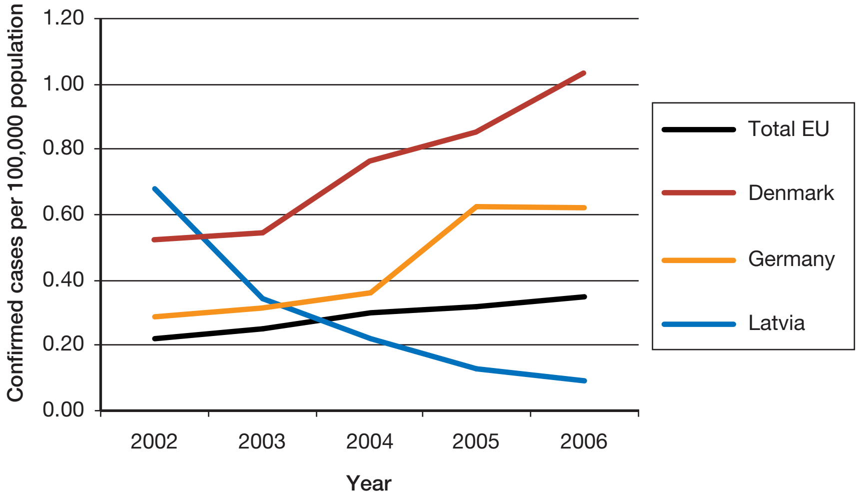
Within countries, statistically significant and increasing linear trends were noted in Denmark and Germany. Only Latvia observed a statistically significant, decreasing linear trend. The highest incidences were seen in Denmark, Finland and Luxembourg (Table LI2, Figure LI1).

Table LI2. Reported listeriosis cases in humans, 2002-2006 and incidence[1] for confirmed cases, 2006

	2006				2005	2004	2003	2002
	Report Type[2]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases			
Austria	A	10	10	0.1	9	19	8	16
Belgium	C	67	67	0.6	62	70	76	44
Cyprus	C	1	1	0.1	-	-	-	-
Czech Republic	C	78	78	0.8	15	16	-	-
Denmark	C	56	56	1.0	46	41	29	28
Estonia	C	1	1	0.1	2	2	0	0
Finland	C	45	45	0.9	36	35	41	20
France	C	290	290	0.5	221	236	220	218
Germany	C	508	508	0.6	510	296	256	240
Greece	C	6	6	0.1		3	0	5
Hungary	C	14	14	0.1	10	16		
Ireland	C	12	7	0.2	11	11	6	6
Italy	C	51	51	0.1	51	25	0	
Latvia	C	2	2	0.1	3	5	8	16
Lithuania	A	4	4	0.1	2	1	2	
Luxembourg	C	4	4	0.9	0	-	-	-
Malta	-	0	0	0	0	-	-	-
Netherlands	C	64	64	0.4	96	55	52	32
Poland	C	28	28	0.1	22	10	5	31
Portugal	-	-	-	-	-	38	-	-
Slovakia	C	12	12	0.2	5	8	6	7
Slovenia	C	7	7	0.3	0	1	6	
Spain	C	78	78	0.2	68	100	52	49
Sweden	C	42	42	0.5	35	44	48	39
United Kingdom	C	208	208	0.3	223	232	255	158
Total EU		**1,588**	**1,583**	**0.3**	**1,427**	**1,264**	**1,070**	**909**
Bulgaria	C	6	6	0.1		-	-	-
Iceland	-	0	0	0	0	-	-	-
Liechtenstein	-	0	0	0		-	-	-
Norway	C	27	27	0.6	14	-	-	-
Switzerland	A	76	76	1.0	70	58	45	28

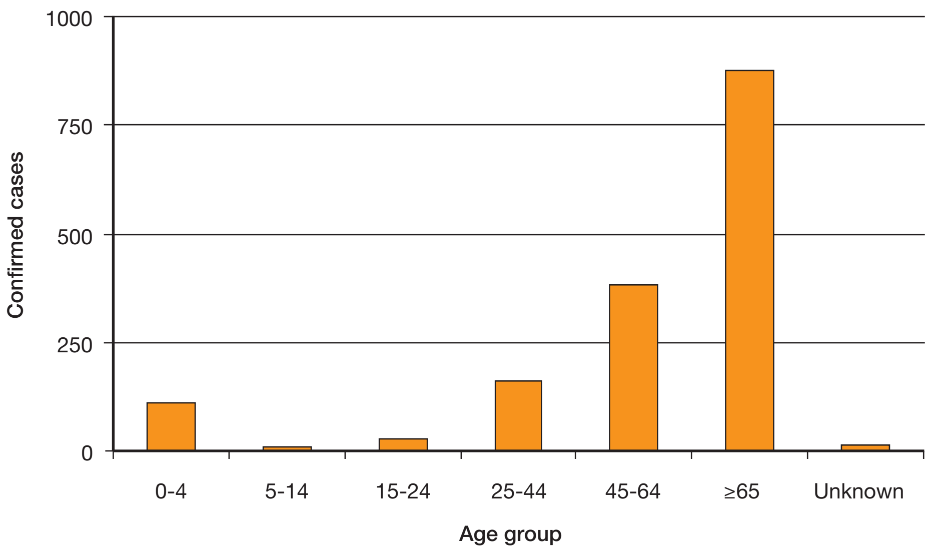
1. EU-total incidence is based on population in reporting countries
2. A: aggregated data report; C: case-based report; -: No cases reported

Figure LI1. Incidence of confirmed cases of human listeriosis in EU and MS with significant linear trend, 2002 - 2006



Human listeriosis cases were distributed evenly throughout the year, with a slight peak occurring in December. The age distribution was similar to that observed in previous years. The majority of infections was reported from the age group 65 years and older (representing 55.6% of cases), followed by the group aged 45-65 years (24.3%) (Figure LI2). The incidence among children less than five years of age was 0.4 cases per 100,000 population (representing 7.0% of cases).

Figure LI2. Distribution of confirmed human listeriosis cases by age group, 2006



In total, 59.7% of all known *L. monocytogenes* cases were reported as coming from a domestic source, yet 36.6% of all reported cases were of unknown origin. Germany reported the highest proportion of imported cases at 9.3 %.

3.3.2. *Listeria* in food

The Community legislation (Commission Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs) lays down food safety criteria for *Listeria* in ready-to-eat (RTE) foods. This regulation came into effect as from January 2006. According to these provisions *L. monocytogenes* must not be present in levels above 100 cfu/g during the shelf life of the product. In addition, products in which growth of the bacterium is possible must not contain *L. monocytogenes* in 25 g at the time they leave the production plant. This Regulation is reflected in the data reported from the MS, and the testing has focused on testing RTE foods for compliance with these limits.

Data on *L. monocytogenes* in food were reported by 23 MS and four non-MS. These reports cover a substantial number of food samples and RTE food categories. Data presented focuses 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. Unfortunately, interpretation of the data was hampered by the fact that in most cases, the information on the stage of sampling (processing/ retail) was not provided.

Ready-to-eat products of meat origin

Data on examinations for *L. monocytogenes* in RTE products from meat was available from 18 MS Data are categorised according to the type of meat. Data presented in Tables Ll3a-c all represent sample sizes ≥ 25 samples.

Table Ll3a summarises data on RTE products of bovine meat origin, reported by seven MS. Five MS found the presence of *L. monocytogenes* in 25 g. Only France reported findings of *L. monocytogenes* more than 100 cfu/g in cooked meat products. These findings are generally in line with the corresponding results from 2005.

Table Ll3a. L. monocytogenes in ready-to-eat meat products and meat preparations of bovine meat[1], 2006

	Details	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	%	%
Single samples						
Belgium	Meat preparation intended to be eaten raw, at retail	-	-	117	0.9	0
	Minced meat intended to be eaten raw, at processing	67	14.9	-	-	-
	Minced meat intended to be eaten raw, at retail	-	-	36	0	0
France	Meat products, cooked	-	-	57	29.8	7.0
Ireland	Meat products, cooked, at retail	44	15.9	44	2.3	0
	Meat products, cooked, at retail	-	-	208	0	0
Italy	Meat products, cooked	350	0			
Netherlands	Meat products, cooked	951	0.8	951	0.8	0
Batch						
Belgium	Meat products, cooked	122	27.0	-	-	-
Czech Republic	Meat products, cooked	373	0	-	-	-
Italy	Meat products, cooked	96	7.3	-	-	-
Poland	Meat products, cooked	79	10.1	8	12.5	0
EU Total		**2,082**	**3.5**	**1,421**	**2.0**	**0.3**

1. Data are only presented for sample size ≥25

Data on RTE products from pig meat was provided by 13 MS. In all except one qualitative investigation *L. monocytogenes* was detected in low proportions of the samples (1.3-6.0%). In one qualitative investigation from Ireland 34.0% of the samples were positive. Samples of cooked meat products exceeding the limit 100 cfu/g were reported by five MS. The proportions of samples above the limit varied from very low to low (up to 2.1%). Germany also reported findings over 100 cfu/g from fermented sausages and Spain from unspecified meat products (see Table LI3b).

Table LI3b. L. monocytogenes in ready-to-eat meat products and meat preparations of pig meat[1], 2006

		Units Tested Presence	L. m. presence in 25 g	Units Tested Enumeration	> detection but ≤ 100 cfu/g	L. m. > 100 cfu/g
	Details	**N**	**% Pos**	**N**	**% Pos**	**%**
Single samples						
Belgium	Meat products, cooked ham, at processing	69	1.4	-	-	-
	Meat products, cooked ham, sliced, at retail	-	-	69	1.4	0
	Meat products, cooked	68	5.9	-	-	-
	Meat products, pâté, at processing	79	1.3	-	-	-
	Meat products, raw and intended to be eaten raw, at retail	-	-	41	0	0
	Meat products, unspecified, at processing	58	5.2			
Czech Republic	Meat products, cooked, at retail	-		120	4.2	0
Estonia	Meat products	146	2.1			
France	Meat products, cooked	-	-	248	47.6	1.2
Germany	Meat products, cooked	-	-	875	14.7	0.2
	Meat products, fermented sausage	-	-	947	9.6	0.2
Greece	Meat products, fermented sausage	47	4.3	-	-	-
Ireland	Meat products, cooked,, at processing	119	0	-	-	-
	Meat products, cooked, at retail	97	34.0	97	1.0	2.1
	Meat products, cooked, at retail			437	0.2	0.2
Italy	Meat products, cooked	1,666	6.1			
Luxembourg	Meat products, cooked	-	-	31	51.6	0
Spain	Meat products, unspecified	868	3.2	868	2.0	1.3
Batch						
Czech Republic	Meat products, cooked		-	1,495	0.4	0
Hungary	Meat products, cooked	1,721	0.6	1,721	0.6	0
Italy	Meat products, cooked	1,357	7.0			
Poland	Meat products, cooked	6,210	1.6	2,335	0.6	0.2
Portugal	Meat products, cooked	390	1.3	-	-	-
EU Total		**12,895**	**2.7**	**9,284**	**4.4**	**0.3**

1. Data are only presented for sample size ≥25

Fewer positive findings were reported from samples of RTE food from broiler or other poultry meat. Data were reported by eight MS, and findings of *L. monocytogenes* above 100 cfu/g were only reported in 1.0% of cooked meat products at retail in Ireland. These finding correspond well to observations from 2005. Thirteen MS reported investigations of RTE products of other type of meat and mixed meat. The data reported on qualitative investigations revealed positive findings of *L. monocytogenes* ranging from 0 positives to 21.9%. In the quantitative investigations, *L. monocytogenes* at levels above 100 cfu/g were detected in one investigation from the United Kingdom. The observed proportion exceeding the limit was low (1.2%). The results are similar to what was reported in 2005. The results are presented in Table LI3c.

Table LI3c. L. monocytogenes in ready-to-eat meat products and meat preparations of poultry meat and other meat[1], 2006

			Units Tested Presence	*L. m.* presence in 25 g	Units Tested Enumeration	> detection but ≤ 100 cfu/g	*L. m.* > 100 cfu/g
Country		**Details**	**N**	**% Pos**	**N**	**% Pos**	**% Pos**
Poultry meat							
Estonia	Single	Broiler meat products, cooked, at retail	28	0	-	-	-
France	Single	Broiler meat products, cooked	-	-	33	30.3	0
Ireland	Single	Broiler meat products, cooked, at processing	65	0	-	-	-
	Single	Broiler meat products, cooked, at retail	104	36.5	104	0	1.0
	Single	Broiler meat products, cooked, at retail	-		545	0	0
Italy	Single	Broiler meat products, cooked	385	0			
Ireland	Single	Turkey meat products, cooked, at processing	34	0	-	-	-
	Single	Turkey meat products, cooked, at retail	-	-	82	0	0
Austria	Single	Meat products, cooked	-	-	104	2.3	0
Estonia	Single	Meat products, at processing	29	6.9	-	-	-
Ireland	Single	Meat products, cooked, at processing	45	0	-	-	-
Spain	Single	Meat products	33	3.0	-	-	-
Czech Republic	Batch	Broiler meat products, cooked	83	0	-	-	-
Hungary		Meat products, cooked	515	0			
Poland	Batch	Broiler meat products, cooked	710	0	-	-	-
Slovakia	Batch	Broiler meat products, cooked	153	-	-	-	-
Red, mixed or unspecified meat							
Austria	Single	Meat products	-		27	7.4	0
Estonia	Single	Meat products	117	1.7	-	-	-
Ireland	Single	Meat products, cooked, at retail	-	-	45	0	0
Luxembourg	Single	Meat products	-		151	17.2	0
United Kingdom	Single	Meat products, cooked, sliced, at retail	431	1.9	431	0.9	1.2
Greece	Single	Meat products, at retail	68	0			
Belgium	Single	Meat products, pâté, at retail	-	-	72	0	0
	Single	Meat products, dry sausages, at retail	-	-	41	0	0
	Single	Meat products, meat salads, at retail	-	-	26	0	0
Italy	Single	Meat products	96	21.9			
Ireland	Single	Meat products, at retail		-	86	0	0
Spain	Single	Meat products		-	167	2.4	0
Czech Republic	Batch	Meat products, cooked	2,055	2.0	-	-	-
	Batch	Meat products, fermented sausage	272	1.5	-	-	-
Poland	Batch	Meat products	1,491	0.7	-	-	-
Slovakia	Batch	Meat products, cooked	2,427	1.2	-	-	-
	Batch	Meat products, fermented sausage	74	0	-	-	-
	Batch	Meat products, raw, intended to be eaten cooked	95	0	-	-	-
	Batch	Meat products, cooked	89	2.2	-	-	-
Italy	Batch	Unspecified	34	5.9	-	-	-
EU Total			**9,433**	**1.7**	**1,914**	**2.6**	**0.3**

1. Data are only presented for sample size ≥25

Milk and dairy products

Data on *L. monocytogenes* in raw milk intended for direct human consumption were provided by Germany, Hungary, Italy and Poland. Only Hungary reported positive samples at a very low level (0.7%) and in all the positive samples the contamination level was found to be below 100 cfu/g.

Six MS reported on examinations for *L. monocytogenes* in pasteurised or UHT milk. Only Germany detected the bacteria in 47.1% of the samples, however, the contamination levels did not exceed 100 cfu/g. Similar high proportions of positive samples in pasteurised milk were reported by Germany in 2005 (32.0%), and these are unexpectedly high numbers of positive findings in heat treated milk.

In 2006, 16 MS reported a large number of data on *L. monocytogenes* in cheeses (Table LI4a and b) and other RTE dairy products. In the tables only data on cheeses are presented, and data are differentiated according to the type of milk used for the production, as well as the type of cheese in question (soft cheeses/hard cheeses). Information on heat treatment is provided where available.

The presence of *L. monocytogenes* was detected in half of the reported qualitative investigations of cheeses made from cow milk (Table LI4a). The proportions of positive samples were generally low ranging from 0.1% to 7.1%; however, Italy reported a much higher proportion positive (37.8%) in hard cheeses made from raw or low heat treated milk. In cheeses made from sheep or goat milk or mixed or unspecified milk, relatively fewer positive findings were reported from the qualitative investigations (Table LI4b). Also, in these types of cheeses the proportion positive findings were generally low. Only Ireland reported a higher percentage of positives (19.4%) in cheeses at processing.

Compared to the qualitative investigations fewer reports included investigations on quantitative investigations of cheeses. In five out of these 35 investigations, samples exceeding 100 cfu/g were observed, but the proportions of positive samples in all of these cases were very low (<1 %).

In contrast to the data from 2005, which indicated that soft and semisoft cheeses made from unpasteurised milk were most likely to harbour *L. monocytogenes,* the 2006 data does not allow inference to be made in reference to the level of contamination of cheese and other dairy products with regard to the type of milk used (raw/pasteurised), animal species from which the milk originated, or with regard to the type of cheeses in question (soft/semisoft/hard).

Table LI4a. L. monocytogenes in cheeses made from milk from cows[1] , 2006

			Units Tested Presence	L. m. presence in 25 g	Units Tested Enumeration	> detection ≤ 100 cfu/g	L. m. > 100 cfu/g
Country		**Details**	**N**	**% Pos**	**N**	**% Pos**	**%**
Soft and semisoft cheeses							
Austria	Single	-	-	-	192	0	-
	Single	Pasteurised cow milk	-	-	302	0.3	0.7
Belgium	Single	Raw or low heat-treated milk, at farm	235	0.4	-	-	-
	Single	Raw or low heat-treated milk, at processing	29	0	-	-	-
	Single	Pasteurised milk, at farm	32	0	-	-	-
	Single	Pasteurised milk, at processing	79	1.3	-	-	-
Czech Republic	Single	Pasteurised milk, at retail	-	-	36	13.9	0
	Single	Pasteurised milk	57	3.5	-	-	-
Germany	Single	Pasteurised milk	-	-	324	17.0	-
Italy	Single	-	958	0.4			
	Single	Raw or low heat-treated milk	213	1.9			
	Single	Pasteurised milk	155	0			

			Units Tested Presence	L. m. presence in 25 g	Units Tested Enumeration	> detection ≤ 100 cfu/g	L. m. > 100 cfu/g
Country		**Details**	**N**	**% Pos**	**N**	**% Pos**	**%**
Netherlands	Single	Pasteurised milk	666	0	-	-	-
Slovenia	Single	Pasteurised milk	30	0	30	0	0
Hungary	Batch	Raw or low heat-treated milk	64	1.6	64	1.6	0
	Batch	Pasteurised milk	401	1.0	401	1.0	0
Italy	Batch	Raw or low heat-treated milk	204	1.0			
	Batch	Pasteurised milk	569	0.9			
Poland	Batch	Pasteurised milk	1,810	0.1	-	-	-
Portugal	Batch	-	353	0	-	-	-
	Batch	Pasteurised milk	70	7.1			
Slovakia	Batch	Raw or low heat-treated milk	159	0	-	-	-
	Batch	Pasteurised milk	197	0.5	197	0.5	0
Hard cheeses							
Austria	Single	-	-	-	373	0.3	0
	Single	Pasteurised milk	41	0	-	-	-
Germany	Single	Pasteurised milk	-	-	1,372	19.8	0.4
Italy	Single	-	300	0.3			
	Single	Raw or low heat-treated milk	98	37.8			
	Single	Pasteurised milk	133	0	-	-	-
Netherlands	Single	Pasteurised milk	43	0	-	-	-
Portugal	Single	-	96	0	-	-	-
Czech Republic	Batch	Pasteurised milk	236	0.4	-	-	-
Italy	Batch	Pasteurised milk	25	0	-	-	-
Poland	Batch	Raw or low heat-treated milk	45	0	-	-	-
	Batch	Pasteurised milk	858	0.1	-	-	-
Slovakia	Batch	Pasteurised milk	630	0.5	-	-	-
Unspecified cheeses							
Belgium	Single	Raw or low heat-treated milk, at retail	126	0	-	-	-
	Single	Pasteurised milk , at retail	144	0	-	-	-
Italy	Single	Unspecified	1,206	0.2			
EU Total			**10,262**	**0.7**	**3,291**	**10.2**	**0.2**
Soft and semisoft cheeses							
Romania	Single	Raw or low heat-treated milk	208	0	-	-	-
	Single	Pasteurised milk	780	0	-	-	-
Switzerland	Single	Raw or low heat-treated milk	721	0.6	-	-	-
Hard cheeses							
Romania	Single	Raw or low heat-treated milk	392	0	-	-	-
	Single	Pasteurised milk	1,142	0	-	-	-

1. Data are only presented for sample size ≥25

Table LI4b. L. monocytogenes in cheese made from milk from sheep, goats or unspecified animals[1], 2006

			Units Tested Presence	L. m. presence in x g	Units Tested Enumeration	> detection but ≤ 100 cfu/g	L. m. > 100 cfu/g
Country		**Details**	**N**	**% Pos**	**N**	**% Pos**	**%**
Soft and semisoft cheeses							
Austria	Single	Sheep milk , pasteurised	30	0	-	-	-
Italy	Single	Sheep milk	118	0			
	Single	Sheep milk , pasteurised	207	0			
	Single	Sheep milk, raw or low heat-treated	117	0			
Slovakia	Single	Sheep milk , pasteurised	32	0	-	-	-
	Single	Sheep milk, raw or low heat-treated	682	0.4	-	-	-
Italy	Single	Goat milk , pasteurised	89	0			
	Single	Goat milk, raw or low heat-treated	63	1.6			
Netherlands	Single	Goat milk , pasteurised	97	0	-	-	-
Ireland	Single	Unspecified milk, at processing	33	0	-	-	-
Poland	Batch	Sheep milk, raw or low heat-treated	28	0	-	-	-
Portugal	Batch	Goat milk , pasteurised	37	2.7	-	-	-
Portugal	Batch	Sheep milk	350	0	-	-	-
Ireland	Batch	Unspecified milk, at processing	40	0			
Slovakia	Batch	Unspecified milk, pasteurised	127	0.8	127	0	0.8
	Batch	Unspecified milk, raw or low heat-treated	160	0.6	-	-	-
Hard cheeses							
Germany	Single	Sheep milk , pasteurised	-	-	89	7.9	0
	Single	Goat milk, pasteurised			120	6.7	0.8
Italy	Single	Sheep milk	110	0			
	Single	Sheep milk , pasteurised	27	0			
	Single	Sheep milk, raw or low heat-treated	63	1.6			
Slovakia	Single	Sheep milk, raw or low heat-treated	91	0	-	-	-
Germany	Single	Pasteurised goat milk	-	-	120	6.6	0.8
Ireland	Single	Unspecified milk, at processing	31	0	-	-	-
United Kingdom	Single	Unspecified milk, at retail	385	1.6	385	1.6	0
Ireland	Single	Unspecified milk, at retail	-	-	111	0	0
Poland	Batch	Sheep milk, raw or low heat-treated	29	0	-	-	-
Ireland	Batch	Unspecified milk, at processing	25	0	-	-	-
Italy	Batch	Sheep milk, pasteurised	26	0			
Unspecified cheese							
Greece	Single	Unspecified milk, at retail	524	0	-	-	-
	Single	Unspecified milk, at processing	383	0.3	-	-	-
Ireland	Single	Unspecified milk, at processing	360	19.4	-	-	-
Italy	Single	Unspecified milk	700	0.7			
United Kingdom	Single	Unspecified milk	217	0	217	0	0
Ireland	Batch	Unspecified milk, at processing	179	0	-	-	-
Portugal	Batch	Unspecified milk	35	0	-	-	-
EU Total			**5,395**	**1.7**	**1,169**	**2.4**	**0.2**

Table LI4b. L. monocytogenes in cheese made from milk from sheep, goats or unspecified animals[1] , 2006 (continued)

Country		Details	Units Tested Presence N	L. m. presence in x g % Pos	Units Tested Enumeration N	> detection but ≤ 100 cfu/g % Pos	L. m. > 100 cfu/g %
Soft and semisoft cheeses							
Romania	Single	Sheep milk, raw or low heat-treated	90	0	-	-	-
	Single	Sheep, pasteurised milk	83	0	-	-	-
Hard cheeses							
Romania	Single	Sheep, pasteurised milk	70	0	-	-	-

1. Data are only presented for sample size ≥25

A substantial number of reports on *L. monocytogenes* in RTE dairy products other than cheeses were also submitted in 2006. Low proportions of samples positive for *L. monocytogenes* were detected in only a few investigations. The United Kingdom reported a survey of butter where *L. monocytogenes* was detected qualitatively in 1.3% of the 240 investigated samples, however in quantitative examinations the numbers of bacteria were below the detection limit. A survey of 114 probiotic drinks was also carried out during the year with no positive samples detected. Six MS reported findings of *L. monocytogenes* in ice cream and the German investigation reported a total of 17.1% of the 519 samples positive although no samples were positive above the limit of 100 cfu/g.

Fishery products

In 2006, 13 MS reported data on *L. monocytogenes* findings in RTE fishery products (Table LI5). The products tested were mainly smoked fish products. Six MS provided quantitative data.

In 2006, the highest proportions of *L. monocytogenes* positive samples, as well as the highest proportions of samples with more than 100 *L. monocytogenes* per gram, were found in fish and fishery products. Similar observations were made in 2005. The highest proportions of positive samples in qualitative examinations were reported by Belgium (21.3%) in smoked fish. At retail, however, Belgium reported only 0.5% of smoked fish to exceed the limit 100 cfu/g. Germany reported two large quantitative investigations on stabilised and smoked fish products, where 22.9% and 17.4% contained *L. monocytogenes* at levels less than 100 per gram, respectively. Furthermore, 2.7% of the stabilised fish samples and 2.0% of the smoked fish samples were found to contain the bacteria more than 100 cfu/g.

Table LI5. L. monocytogenes in ready-to-eat fishery products[1], 2006

Country		Details	Units Tested Presence N	L. m. presence in 25 g % Pos	Units Tested Enumeration N	> detection but ≤ 100 cfu/g % Pos	L. m. > 100 cfu/g % Pos
Crustaceans							
Austria	Single	Shrimps shelled, shucked and cooked chilled, at retail	105	0	-	-	-
	Single	Cooked	30	0	-	-	-
Italy	Single	Cooked	26	0			
Netherlands	Single	Cooked	900	5.7	928	0.3	0
Fish							
Austria	Single	Smoked	46	0	-	-	-
Belgium	Single	Smoked, at processing plant	150	21.3	-	-	-
	Single	Smoked, at retail	-	-	186	0	0.5
Germany	Single	Stabilized	-	-	1,322	22.9	2.7
	Single	Smoked	-	-	700	17.4	2.0
Greece	Single	-	33	0	-	-	-
Italy	Single	Smoked	42	7.1			
Sweden	Single	Smoked	28	3.6	-	-	-
Czech Republic	Batch	Smoked	35	0	-	-	-
Hungary	Batch	Smoked	124	1.6	124	0.8	0
Poland	Batch	Smoked	397	4.5	-	-	-
Molluscan shellfish							
Italy	Single	Cooked	52	7.7			
Hungary	Batch	Cooked	72	0	-	-	-
Fishery products, unspecified							
Estonia	Single	-	46	10.9	-	-	-
Ireland	Single	At processing	-	-	129	-	0
Italy	Single	Preserves with fish	135	3.0			
Spain	Single		438	6.2			
Czech Republic	Batch	-	71	0	-	-	-
EU Total			**2,730**	**4.4**	**3,389**	**12.7**	**1.5**
Fish							
Norway	Single	Smoked	52	3.8	-	-	-
	Single	Fresh, wild fish	70	0	-	-	-
Bulgaria	Batch	Smoked	46	0			

1. Data are only presented for sample size ≥25

Other ready-to-eat products

A substantial number of investigations were reported on findings of *L. monocytogenes* in other RTE products (Table LI6). Most of the reported investigations did not yield positive findings. However, Greece and Slovenia reported *L. monocytogenes* in bakery and confectionary products. Greece found 34.4% of the 32 samples positive in the quantitative examinations, but no samples exceeding the limit 100 cfu/g. Slovenia reported 2.0% of their 250 samples being positive but under the 100 cfu/g limit and 0.8% of the samples exceeding the limit. Czech Republic reported 1.1% of the sampled processed chilled foods containing *L. monocytogenes* over the limit 100 cfu/g.

Greece, Ireland and the United Kingdom carried out investigations of sandwiches. The large investigations in the United Kingdom covered sandwiches sold in hospitals and care homes and at retail. The United Kingdom found between 2.7% and 7.6% of the sandwiches positive for *L. monocytogenes,* but only one sample exceeded the limit 100 cfu/g. Furthermore, they did not find significant differences between the *L. monocytogenes* contamination in sandwiches sold at hospitals and at retail. The Irish investigation carried out at retail revealed 32.9% of the samples positive although no samples exceeding the limit 100 cfu/g.

Ready-to-eat-salads were investigated by several MS and Germany reported the highest proportions of positives. In their quantitative examinations 53.9% samples contained *L. monocytogenes* at levels below 100 cfu/g, and 0.4% exceed this limit. Positive findings were also made in vegetables, where several MS detected *L. monocytogenes* and Ireland reported samples exceeding 100 cfu/g in mushrooms at retail.

Table LI6. L. monocytogenes in other ready-to-eat products[1], 2006

			Units Tested Presence	L. m. presence in 25 g	Units Tested Enumeration	> detection but ≤ 100 cfu/g	L. m. > 100 cfu/g
Country		**Details**	**N**	**% Pos**	**N**	**% Pos**	**% Pos**
Sandwiches							
Greece	Single	Sandwiches with meat	65	0	-	-	-
Ireland	Single	Sandwiches, at retail	70	32.9	70	5.7	0.0
	Single	Sandwiches, at retail	-	-	115	0	0
United Kingdom	Single	Sandwiches, at retail and hospitals	3,249	2.7	3,249	0	0
	Single	Sandwiches, at hospitals and care homes	1,538	3.4	1,538	0.3	0
	Single	Sandwiches, at retail	355	7.6	355	0.3	0.1
Ready-to-eat salads							
Estonia	Single	With mayonnaise, at retail	45	0	-	-	-
	Single	At processing	30	16.7	-	-	-
	Single	At retail	-	-	117	0	0
	Single	-	-	-	40	0	0
Germany	Single	-	-	-	475	53.9	0.4
Hungary	Batch	-	577	3.1	577	3.1	0
Vegetables (including mushrooms)							
Belgium	Single	Non-precut, at retail	-	-	71	0	0
	Single	Pre-cut ready-to-eat, at retail	-	-	101	0	0
Estonia	Single	Products, at processing	26	3.8	-	-	-
Ireland	Single	At retail	-	-	84	0	0
Slovenia	Single	Non-precut	80	1.3	80	0.0	0
Spain	Single	-	192	1.6	-	-	-
Ireland	Single	Mushrooms, at retail	171	5.3	171	0.6	0.3
	Single	Mushrooms	-	-	284	0	-
Slovenia	Single	Sprouted sees, fresh	30	0	30	0	-
Finland	Batch	At retail	30	0	-	-	-
	Batch	Non-precut , at farm	76	0	-	-	-
EU Total			**6,534**	**3.5**	**7,357**	**3.9**	**0.04**

1. Data are only presented for sample size ≥25

Compliance with microbiological criteria

The *L. monocytogenes* criteria laid down by the Commission Regulation 2073/2005, cover primarily ready-to-eat (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 the other RTE product.
- Products which are able to support the growth of the bacterium must not contain *L. monocytogenes* in 25 g at the time they leave the production plant.

For foods that support the growth of *L. monocytogenes*, the microbiological criterion is dependent on at which level of the food production chain the testing is performed. Therefore, a qualitative test should be used in testing against the criterion at the processing stage. Once the products are placed on the market, a different criterion applies. At the retail level, foods must not contain *L. monocytogenes* in levels above 100cfu/g. Therefore a quantitative test must be applied in the latter case. For foods that do not support the growth of *Listeria* only one criterion applies. These foods must not contain *L. monocytogenes* in levels above 100cfu/g.

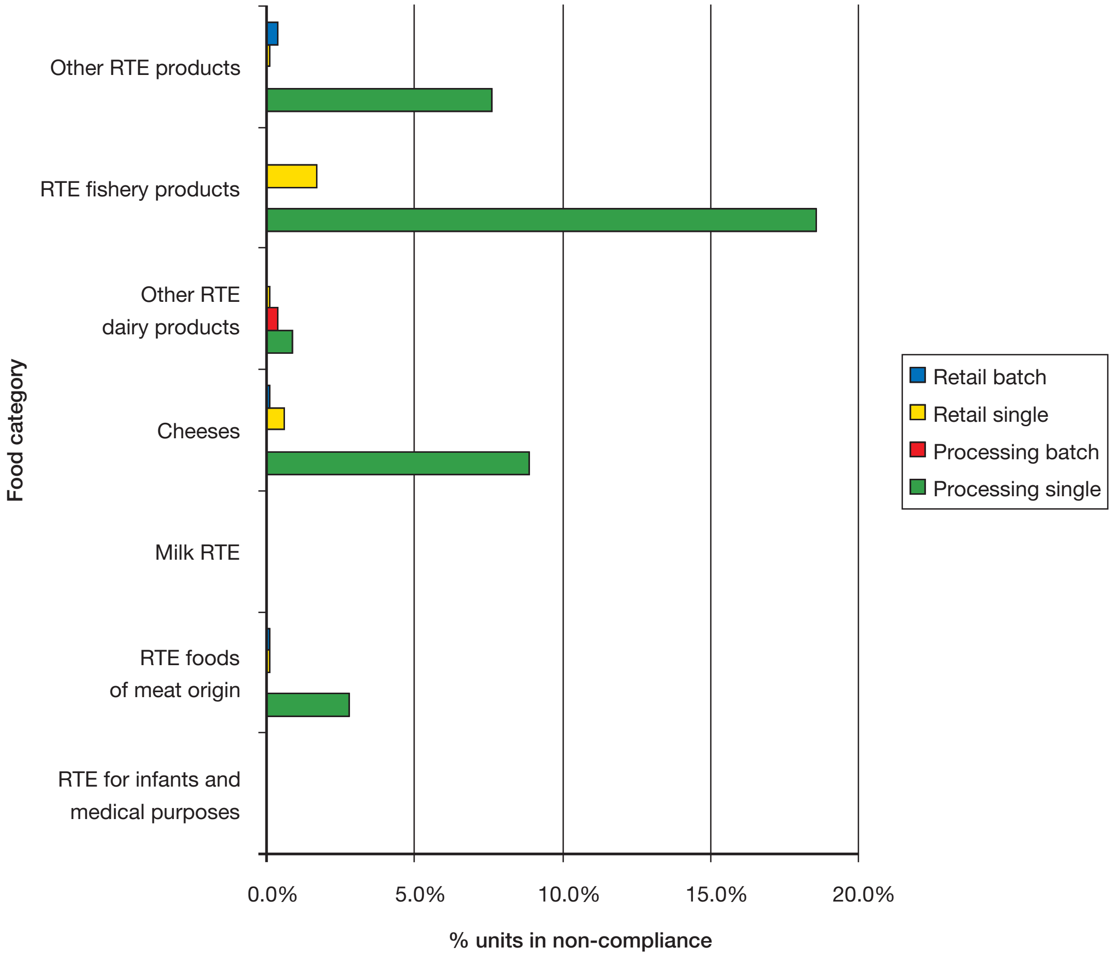
Unfortunately, for much of the reported data it was not evident, whether the RTE food tested is able to support the growth of *L. monocytogenes* or not. It may be that even within the same food category, some products may support the growth while others may not, depending on factors such as the pH, water activity and composition of the specific product. Also, in many cases it was not possible to establish at which stage in the production chain the samples were collected. Furthermore, it seemed that MS have mostly used the qualitative testing instead of the quantitative one, which makes it difficult to assess the compliance with the criterion of 100 cfu/g.

Due to the difficulties described above, the following assumptions were applied for the analysis:

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

The analysis includes all investigations, even those where less than 25 samples have been investigated. However, the results from HACCP and own checks were excluded. The results from the 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 that compliance with the limit 100 cfu/g.

***Figure LI3. Percentage of non-compliance with the L. monocytogenes criteria in selected food categories, 2006*[1]**



1. Including food categories ≥ 25 tested samples for all MS, excluding data from HACCP and own checks

Unfortunately, a large part of the reported data on occurrence of *L. monocytogenes* in foodstuffs could not be utilised in the analysis mainly because the qualitative method was used in many of the investigations carried out at retail or when the stage of sampling was not specified.

However, the results show that at processing, low to moderate proportions of the tested single RTE foodstuff were found not to comply with the criterion, Table LI7. The highest proportions were reported for RTE fishery products, cheeses and other RTE products, 18.6%, 8.9% and 7.6%, respectively. The number of samples in-compliance with the *L. monocytogenes* criteria are depicted in Figure LI3.

In case of the RTE products on the market, very low proportions of samples were generally found to be in non-compliance with the criterion on ≤ 100 cfu/g. However, also at this level, the highest proportions of non-compliance were observed in fishery products (1.7%). These results are generally in line with the observation from 2005, when fishery products were the RTE food categories most often yielding results over 100 cfu/g.

Table LI7. Compliance with the L. monocytogenes criteria laid down by Regulation 2073/2005 in the food categories in EU, 2006[1]

		Absence in 25 g		≤ 100 cfu/g	
	Total units	Units tested	% in non-compliance	Units tested	% in non-compliance
1. RTE food intended for infants and for medical purposes					
1.1 Retail and unspec.	Single	201	0	-	-
	Batch	29	0	-	-
1.2 Processing	Single	4	0	-	-
2. RTE products of meat origin					
2.1 Retail and unspec.	Single	-	-	8,921	0.1
	Batch	-	-	11,790	0.1
2.2 Processing	Single	604	2.8	-	-
	Batch[2]	10	100	-	-
3. Milk, RTE					
3.1 Retail and unspec.	Single	-	-	621	0
	Batch	-	-	14	0
3.2 Processing	Single	65	0	-	-
	Batch	24	0	-	-
4. Cheese, RTE					
4.1 Retail and unspec.	Single	-	-	1,681	0.6
	Batch	-	-	1,029	0.1
4.2 Processing	Single	796	8.9	111	0
	Batch	392	0	-	-
5. Other dairy products					
5.1 Retail and unspec.	Single	-	-	1,582	0.1
	Batch	-	-	7	0
5.2 Processing	Single	466	0.9	-	-
	Batch	288	0.4	-	-
6. RTE fishery products					
6.1 Retail and unspec.	Single	-	-	3,228	1.7
	Batch	-	-	142	0
6.2 Processing	Single	177	18.6	-	-
7. Other RTE products[3]					
7.1 Retail and unspec.	Single	-	-	15,926	0.1
	Batch	-	-	845	0.4
7.2 Processing	Single	92	7.6	-	-

1. Including all MS reported data, except data from HACCP and own check. RTE: ready-to-eat products
2. Data from Greece, not included in the further analyses
3. Include products such as pastries, sweets, fruits, vegetables and other processed foods and prepared dishes

3.3.3. Listeria in animals

In 2006, 13 MS reported data on *L. monocytogenes* in animals (Table LI8). The majority of the samples were reported by Germany.

Listeria spp. or *L. monocytogenes* were found by several MS for different animal species, generally at low level of proportion positive samples. Overall, it appears that the highest percentage positive samples are from ruminants, cattle, sheep and goats.

Table LI8. Listeria in animals[1], 2006

	L. monocytogenes		*Listeria* spp., unspecified		Details
	Units tested	% Pos	Units tested	% Pos	
Cattle (bovine animals)					
Austria	353	0.8	-	-	-
Czech Republic	78	2.6	-	-	-
Estonia	27	33.3	-	-	-
Germany	6,243	2.2	-	-	-
	1,947	1.1	-	-	Dairy cows
Ireland	6,135	0.1	-	-	Calves (under 1 year), clinical investigations
	498	0	498	0	Dairy cows, clinical investigations
	2,148	1.4	2,148	0.4	Aborted bovine foetuses
Italy	274	0	274	0.4	-
	63	0	63	3.2	Dairy cows
	34	0	34	2.9	Official sampling
Latvia	66	9.1	-	-	Clinical investigations
Netherlands	-	-	898	1.1	-
Poland	-	-	61	0	-
	-	-	54	1.9	Dairy cows
Slovakia	109	0.9	-	-	-
Switzerland	-	-	46	21.7	-
Gallus gallus (fowl)					
Czech Republic	131	0	-	-	-
Germany	2,170	0.2	-	-	-
Ireland	397	0	-	-	-
Lithuania	42	4.8	-	-	Flock data
Goats					
Austria	63	1.6	-	-	-
Germany	709	2.4	-	-	-
Greece	30	33.3	-	-	-
Italy	99	2.0	99	0	-
Netherlands	-	-	94	4.3	-
Pigs					
Austria	211	0	-	-	-
Czech Republic	209	0	-	-	-
Germany	3,310	0.3	-	-	-
Ireland	312	0	-	-	-
Italy	39	0	39	2.6	-
	171	0	171	0	
Poland	89	0	-	-	-
Sheep					
Austria	171	7.0	-	-	-
Czech Republic	62	1.6	-	-	-
Germany	4,249	1.5	-	-	-
Greece	39	15.4	-	-	-
Ireland	-	-	1,094	0.1	*L. ivanovii*
Italy	165	0.6	165	0.6	-
	891	0	891	1.5	-
Lithuania	-	-	53	-	Single
Netherlands	-	-	210	5.2	-
Slovakia	135	12.6	-	-	-
Switzerland	-	-	36	13.9	-
EU Total	**31,669**	**1.1**	**6,928**	**1.0**	

Note: Animal based data if nothing else is stated
1. Data are only presented for sample size ≥25

Interestingly, Germany reported the results of investigations of several animal species Thus, *L. monocytogenes* was found in different species in the following frequencies: Goats: 2.4%, cattle: 2.2%; dairy cows: 1.1%; sheep: 1.5%; pigs: 0.3%; chicken: 0.2%; solipeds: 0.6% and no positives found in cats and dogs.

3.3.4. Discussion

Human listeriosis is a relatively rare but serious zoonotic disease, with high morbidity and mortality in vulnerable populations. Listeriosis has been reported with increasing frequency in the EU during the past years, and the increase have been statistically significant in the past years. Listeriosis is assumed be mainly food borne infections, and therefore, reliable information on the occurrence of *L. monocytogenes* in foods is important. Apart from the individual cases of listeriosis, MS reported 9 food borne listeriosis outbreaks in 2006 where 17 affected persons died (see outbreak chapter). Soft cheese, mushrooms and dairy product were identified as the vehicles in these outbreaks.

Since *L. monocytogenes* is known to be a ubiquitous organism present in the environment and various animal species a wide range of different kind of foodstuffs can be contaminated with the organisms. However, for healthy human population, only ready-to-eat food that contains more than 100 cfu/g is considered to pose a risk.

A substantial effort has been placed on investigations of *L. monocytogenes* in foods in MS, and a large number of investigations on *L. monocytogenes* in different categories of RTE foods were reported in 2006. The reported investigations revealed that, as in previous years, proportions of samples exceeding the legal safety limit (100 bacteria per gram) were highest in ready-to-eat fishery products. However, violations with this limit were also observed in other RTE categories, particularly in cheeses. These findings indicate direct risk for human health.

The data reported in 2006 on RTE foods may be used to guide the controls made to ensure the compliance with the *L. monocytogenes* criteria. In order to facilitate assessments of trends in compliance with the microbiological criteria at the Community level, it is essential that MS report the stage of production at which samples are collected (e.g. at processing or at retail) and use the appropriate method of testing for the criterion in question. The difficulties differentiating between RTE food able or not able to support the growth of *L. monocytogenes* hampered the analyses at the Community level. This situation may be helped by the forthcoming guidelines on categorising foods to growth supporting or not supporting by the Community Reference Laboratory for *Listeria*.

L. monocytogenes was reported from various animal species, showing that animals act as a source for *Listeria* bacteria. In some MS the detected proportion of positive samples was moderate in cattle and in small ruminants.

3.4. Verotoxigenic *Escherichia coli*

3. INFORMATION ON SPECIFIC ZOONOSES

3.4. Verotoxigenic *Escherichia coli*

Verotoxigenic *Escherichia coli* (VTEC) are a group of *E. coli* that are characterised by the ability to produce toxin(s) that are designated verocytotoxin(s)[1]. Human pathogenic VTEC usually harbour additional virulence factors that are important for the development of disease in man. A large number of serotypes of *E. coli* have been recognised as verocytotoxin (VT) producers. The majority of reported human VTEC outbreaks and sporadic VTEC infections are, however, associated with a minor number of O:H serotypes. Of these, the O157:H7 or the O157:H- serotype (VTEC O157) is the one most frequently reported to be associated with human disease.

The primary symptoms associated with VTEC infection in humans vary from mild to bloody diarrhoea, which is often accompanied by abdominal cramps and 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 a reservoir for VTEC, and VTEC (including VTEC O157) have 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 types 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 2006.

Table VT1. Overview of countries reporting VTEC data for 2006

	Total number of MS reporting	Countries
Human	22	**MS:** All MS, except CY, LV, PT
		Non-MS: IS, NO
Food	17	**MS:** AT, BE CZ, EE, FR, DE, GR, HU, IE, IT, LV, LU, NL, PL, SK, SI, ES
		Non-MS: CH, RO
Animal	14	**MS:** AT, DK, EE, FI, DE, GR, IT, LI, LU, NL, PL, PO, SI, SE

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

3.4.1. VTEC in humans

Twenty-two MS reported data on human VTEC infections in 2006. The total number of confirmed VTEC cases in EU reported to TESSy was 4,916, of which 99.8% were laboratory confirmed, representing an increase of 1,694 cases from 2005. This increase was primarily a result of the case reports from the Czech Republic, for which cases were not reported in 2005. The Czech data account for 1,558 (or 91.7%) of the increase and for more than 31% of the total human VTEC cases reported in the EU in 2006. The overall incidence of VTEC infection reported by 22 MS was 1.1 case per 100,000 population, and ranged from <0.1 to 15.2 cases per 100,000, Table VT2. Overall, the United Kingdom, the Czech Republic and Germany accounted for 82% of all cases in the EU in 2006. Trends within each country were not analysed. The reported VTEC incidence in Europe shows a statistically significant and decreasing trend since 2004.

1. VTEC and verocytotoxin are also know as Shiga toxin producing E. coli (STEC) and Shiga toxin

Table VT2. Reported VTEC cases in humans, 2003-2006 (2004, confirmed cases) and incidence for confirmed cases, 2006[1] (Enter-net)

	2006				2005	2004	2003
	Report type[2]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases		
Austria	C	41	41	0.5	53	45	28
Belgium	A	47	47	0.4	-	36	39
Czech Republic	C	1,561	1,558	15.2	-	1,743	-
Denmark	C	146	146	2.7	154	163	128
Estonia	C	8	8	0.6	19	0	
Finland	C	14	14	0.3	21	10	14
France	C	67	67	0.1	-	-	-
Germany	C	1,183	1,183	1.4	1,162	903	1,100
Greece	C	1	1	<0.1	-	-	-
Hungary	C	3	3	<0.1	5	12	20
Ireland	C	158	153	3.6	125	61	95
Italy	-	17	17	<0.1	-	3	5
Lithuania	A	0	0	<0.1	-	-	-
Luxembourg	C	2	2	0.4	8	-	-
Malta	C	21	21	5.2	23	-	-
Netherlands	C	41	41	0.3	64	30	51
Poland	C	4	4	<0.1	4	3	-
Slovakia	C	8	8	0.1	61	4	1
Slovenia	C	30	30	1.5	-	2	-
Spain	C	13	13	<0.1	16	-	-
Sweden[3]	C	265	265	2.9	336	149	52
United Kingdom	C	1,294	1,294	2.1	1,171	926	974
EU Total		**4,924**	**4,916**	**1.1**	**3,222**	**4,090**	**2,507**
Iceland	C	1	1	0.3	-	-	-
Norway	C	50	50	1.1	18	12	15
Switzerland	C	64	48	0.6	62	45	56

1. EU-total incidence is based on population in reporting countries
2. A: Aggregated data; C: Case based
3. In Sweden, in July 2004 the reporting system changed so all serovars became notifiable, before this date only VTEC O157 was notifiable

While the majority of reported human VTEC infections are associated with the O157 serogroup, the proportion of non-O157 VTEC infections among known serogroups have increased from 2005 to 2006 and in 2006 almost half of all cases caused by known serogroups were non-O157. The main reason for this increase is the reported cases of non-O157 VTEC from the Czech Republic; Table VT3.

Table VT3. Reported confirmed VTEC cases in humans by serogroup (top 10), 2006 (TESSy and Enter-net)

	TESSy			Enter-net		
Serogroup	No. of cases	%Total	%Known	Serogroup	No. of cases	%Known
O157	1,635	33.7	46.5	O157	1,745	69
O26	574	11.8	16.3	O26	168	6.6
O126	183	3.8	5.2	O103	124	4.9
O55	150	3.1	4.3	O91	84	3.3
O127	135	2.8	3.8	O145	56	2.2
O25	129	2.7	3.7	Other	351	13.9
O103	87	1.8	2.5		-	-
O128	87	1.8	2.5		-	-
O119	86	1.8	2.4		-	-
Other	448	9.2	12.7		-	-
Unknown	1,338	-	-		-	-
Total	**4,852**				**2,528**	

The Czech Republic and Germany reported the most numbers of non-O157 VTEC serogroups in 2006, largely shaping the list of most common serogroups after VTEC O157. Importantly, they reported 451 and 75 cases of VTEC O26 serogroup respectively, thereby contributing to a large increase in the proportion of non-O157 infections (from over 6% in 2005 to nearly 12% of known serotypes in 2006). It is also noted, that VTEC O91 remains to be a problem in Germany Table VT4. The majority (84%) of reported VTEC infections in those aged five years and older are associated with the O157 serogroup. However, for those younger than four years non-O157 cases are more commonly diagnosed, and VTEC O26 is reported more often than VTEC O157.

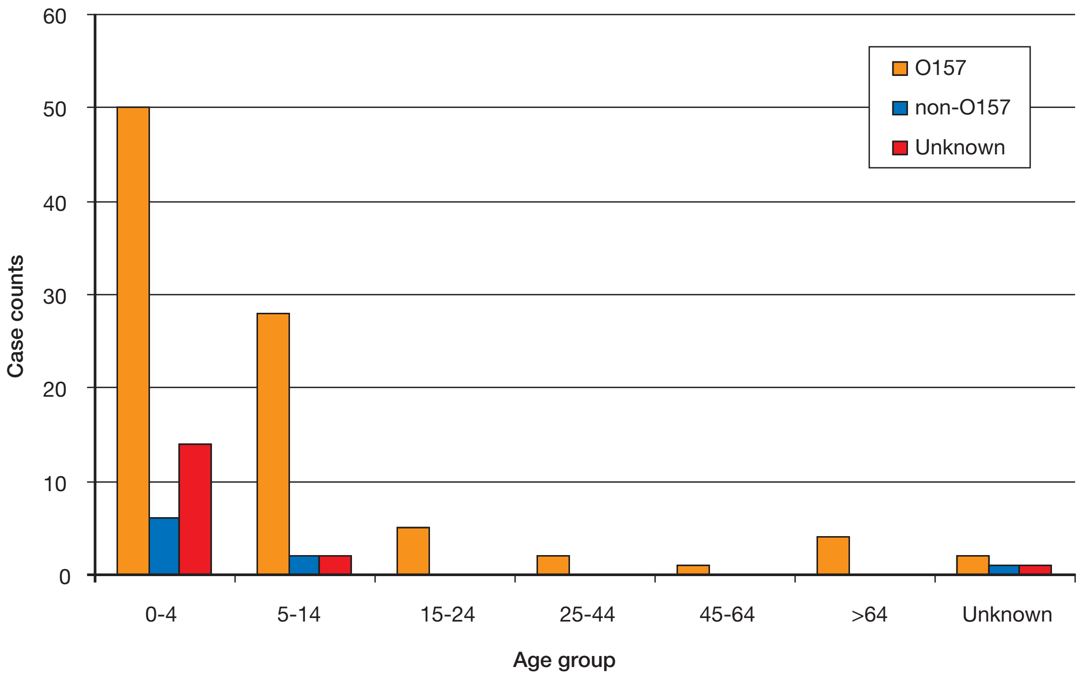
Table VT4. VTEC serogroups by country, 2006 (TESSy data)

	Serogroup										
Country	O157	O26	O126	O55	O127	O25	O103	O128	O125	O91	O145
Austria	10	2	-	-	-	-	4	-	-	-	-
Czech Republic	52	451	178	142	132	125	1	68	76	-	-
Estonia	6	-	-	-	-	-	-	1	-	-	-
Finland	5	-	-	-	-	-	-	-	-	-	-
France	26	6	-	-	-	-	-	1	-	-	1
Germany	79	75	4	8	1	4	79	10	6	42	30
Hungary	1	2	-	-	-	-	-	-	-	-	-
Ireland	119	30	-	-	-	-	2	-	-	-	-
Malta	6	3	1	-	2	-	-	6	1	-	-
Netherlands	40	-	-	-	-	-	-	-	-	-	-
Poland	4	-	-	-	-	-	-	-	-	-	-
Spain	12	-	-	-	-	-	-	-	-	-	-
United Kingdom	1,275	5	-	-	-	-	1	1	-	-	-
EU Total	**1,635**	**574**	**183**	**150**	**135**	**129**	**87**	**87**	**83**	**42**	**31**
Norway	8	5	-	-	-	-	25	1	-	-	4

Occurrences of confirmed cases of haemolytic uraemic syndrome (HUS) were recorded by France (38), Hungary (1), Ireland (15), Netherlands (3), Norway (10), and the UK (57). While other MS (i.e. Denmark and Germany) reported HUS cases occurring in 2006, they did not report them via TESSy in 2006 and are therefore not included for analysis in this report. The resulting total number of HUS cases amounted to 126. Most of the reported HUS cases were associated with VTEC O157 infection. The exact distribution of serogroups reported to be associated with HUS was O157: 92 cases, O103: 10 cases, O26: 3 cases, and O111, O145 O80 and O86: one case each. A total of 16 HUS cases were reported without serogroup specification.

The HUS data is heavily influenced by reported cases from France and the United Kingdom. The United Kingdom solely reports O157 serogroups, while France, Ireland, Hungary, and Norway report non-O157 serogroups. France reported 16 cases with unknown serogroup. While VTEC serogroup O103 may appear to be the most virulent non-O157 serogroup, the 10 HUS cases were all reported by Norway and were all associated with the same outbreak. Of reported cases, most infections were observed in the youngest age categories. Non-O157 VTEC was not reported to be associated with HUS in those aged 15 years or older, Figure VT1.

Figure VT1. Hemolytic Uremic Syndrome (HUS) by age and serogroup, 2006

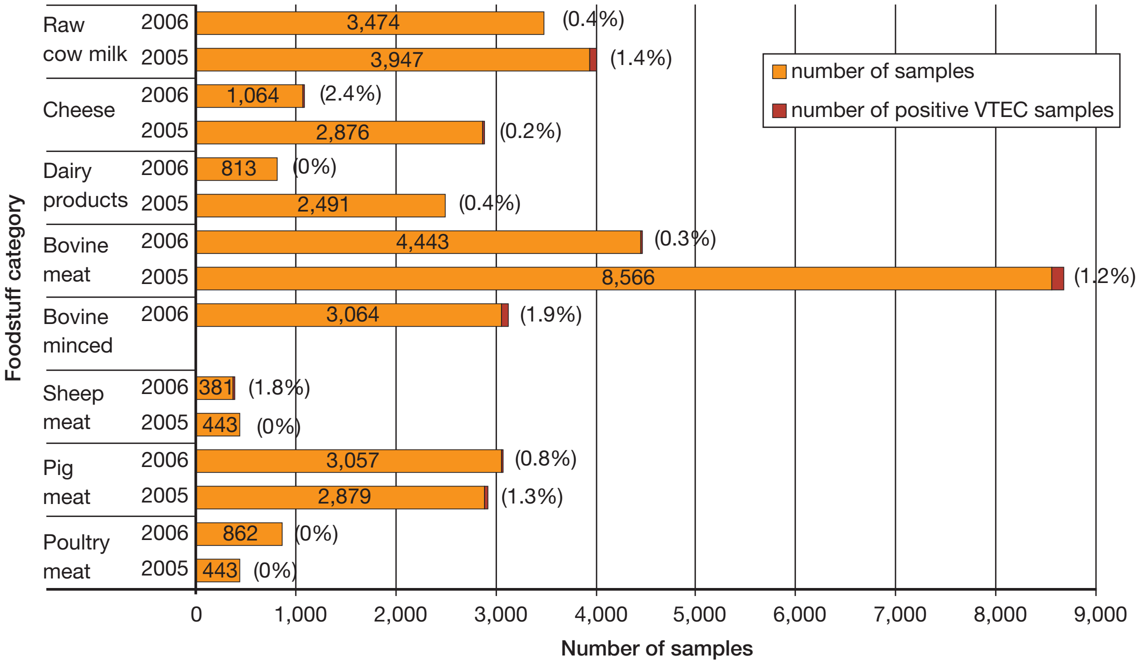


Overall, the distribution of VTEC infections follows a seasonal pattern, with a rise in case counts over the summer and autumn months. Interestingly, VTEC O157 cases demonstrate the strongest seasonal pattern with remarkable increases in case counts in the summer and autumn. VTEC non-O157 and HUS associated infections (both O-157 and non O-157 linked) are less frequent and less seasonally variable.

3.4.2. VTEC in food

The VTEC in food data reported by 16 MS, and one non-MS are presented in Tables VT5 to VT9. Only data referring to sample sizes of 25 or more are presented here. An overview of the food categories investigated, the number of samples tested and the number of VTEC positives samples is presented in Figure VT2. The majority of the data were from food of bovine origin.

Figure VT2. Numbers of food samples tested for VTEC by food category and number of positive samples[1,2], 2005 and 2006



1. Dairy products, other than cheese
2. Fresh meat

Generally, it should be noted that data from different investigations are not directly comparable. There are differences in sampling strategies and applied analytical methods across the Community. The most widely applied analytical method is solely aimed at detecting *E. coli* O157. A few studies have been performed using methods to detect VTEC e.g. immunological or DNA amplification based methods. In some of these studies VTEC are isolated, and in a few cases characterised with regard to O:H serotype. However, many data are reported without specification of the applied method and without specification of O-serogroup or O:H serotype isolated. Also the seasonal variation might have had an effect on the outcome of some of the investigations.

Table VT5 provides an overview of the reported findings in fresh bovine meat at different stages of production. Data were provided by 12 MS, of which nine reported findings of VTEC. In these investigations the proportion of positive samples was generally very low, but France reported proportions of up to 7.2% positive samples in minced meat. VTEC O157 was rarely detected in fresh bovine meats and only four countries reported findings of VTEC O157 with Luxembourg reporting the highest occurrence, 3.6% (1/28).

VTEC findings were made at the slaughter, processing and retail stages. Belgium reported results from testing of carcass swabs and reported proportion of positive samples of VTEC O157 of 0.9%. This figure corresponds well with the data reported by Belgium in 2005, where VTEC O157 was detected on 1.1% of carcass samples. Besides O157 only six other serogroups were reported to be isolated from bovine meat by Austria and Germany (one sample positive for each serogroup), namely O1:H10, O2:H6, O26, O110:H-, O113:H4, O128abc:H2. Out of these serogroup O26 and O128 are both among the 10 most frequently reported serogroups causing disease in humans in the EU.

Table VT5. VTEC in fresh bovine meat[1], 2006

	Description		VTEC		VTEC O157		
		N	Pos	% Pos	Pos	% Pos	Add. serotype information
At slaughter, cutting/processing plant							
Belgium	Carcass swabs	1,214	11	0.9	11	0.9	1600 cm^2 swabbed/Only investigated for O157
Slovenia	Fresh	153	0	-	0	-	Only investigated for O157
Spain	Fresh	152	6	3.9	2	1.3	
At retail							
Austria	Meat preparation	112	5	4.5	0	-	
Belgium	Minced meat	31	0	-	0	-	Only investigated for O157
	Fresh	94	2	2.1	2	2.1	Only investigated for O157
Stage of sampling not specified							
Austria	Fresh	31	0	-	0	-	O1:H10, O2:H6, O110:H-, O113:H4, O128abc:H2
Belgium	Minced meat	55	0	-	0	-	Only investigated for O157
	Fresh	243	0	-	0	-	Only investigated for O157
Czech Republic	Fresh	795	0	-	0	-	100 cm^2 swabbed/Only investigated for O157
France	Minced meat	796	57	7.2	0	-	
Germany	Minced meat	33	0	-	0	-	
		177	8	4.5	0	-	O26 (1) unspecified (7)
Hungary	Minced meat	163	0	-	0	-	
	Fresh	202	1	0.5	1	0.5	
Italy	Unspecified meat	33	1	3.3	1	3.3	
		77	0	-	0	-	
	Minced meat	107	0	-	0	-	
	Fresh	731	3	0.4	3	0.4	
Luxembourg	Fresh	28	1	3.6	1	3.6	
Netherlands	Fresh	877	2	0.2	0	-	Only investigated for O157
	Minced meat	954	1	0.1	0	-	Only investigated for O157
EU Total		**7,058**	**98**	**1.4**	**21**	**0.3**	
Romania	Minced meat	895	0	-	0	-	
	Fresh	1,186	0	-	0	-	

1. Data are only presented for sample size ≥25

Five MS reported data from investigations of raw cow's milk (Table VT6). Two MS reported VTEC findings. Several studies were targeted to raw cow's milk intended for human consumption, and two VTEC positive samples (1.4 %) were reported from Germany. The largest survey was conducted in Germany, where 1.0% of 977 samples of raw milk intended for manufacture of heat treated products were positive for VTEC. The isolated strains included serogroups O2, O8, O21 O22. None of these serogroups are frequently reported to cause disease in humans in the Community. Only Italy reported findings of VTEC O157 in milk.

Table VT6. VTEC in raw cow's milk[1], 2006

	Description		VTEC		VTEC O157		
		N	Pos	% Pos	Pos	% Pos	Add. serotype information
Belgium	Not specified	123	0	-	0	-	Only investigated for O157
Czech Republic	For direct human consumption	68	0	-	0	-	Only investigated for O157
Germany	For direct human consumption	148	2	1.4	0	-	
	Raw milk sold at farm with recommendation to heat for 10 min	324	2	0.6	0	-	
	Intended for manufacture of pasteurised/ UHT products	977	10	1	0	-	O2, O8, O21, O22, unspecified (6)
Italy	For direct human consumption	78	0	-	0	-	
	Not specified	88	0	-	0	-	
	For manufacture of products made of raw or low heat treated products	463	1	0.2	1	0.2	
EU Total		**2,269**	**15**	**0.7**	**1**	**0.04**	
Romania	For direct human consumption	46	0	-	0	-	
	Not specified	138	0	-	0	-	
	For manufacture of products made of raw or low heat treated products	1,021	0	-	0	-	

1. Data are only presented for sample size ≥ 25.

The VTEC findings reported by six countries in dairy products are presented in Table VT7. Many of the investigations are carried out on products made of raw or low heat-treated milk. VTEC was detected in 10 of 825 samples of cheeses made of cow's milk (1.2%) and VTEC O157 was detected in cheeses made from both milk from cows and sheep. The highest occurrence of VTEC in cheeses made from cow's milk was 2.1% in an investigation performed in Belgium. Germany investigated cheeses made of raw unspecified milk and found VTEC in 16.2% of the samples including serogroup O76 and O113. VTEC was not detected in any other dairy products besides cheeses.

Table VT7. VTEC findings in dairy products[1], 2006

Country	Description	N	VTEC Pos	VTEC % Pos	VTEC O157 Pos	VTEC O157 % Pos	Add. serotype information
Cheeses, made from cow's milk							
Belgium	Soft and semi-soft cheeses/ made of unpasteurized milk	234	5	2.1	5	2.1	Retail/Only investigated for O157
	Soft and semi-soft cheeses/ made of unpasteurized milk	27	0	-	0	-	Processing/Only investigated for O157
Italy	-	174	0	-	0	-	
Cheeses, made from goats' milk							
Italy		26	0	-	0	-	-
Cheeses, made from mixed milk							
Italy	Sheep's milk	136	0	-	0	-	
Slovakia	Sheep's milk	40	1	2.5	1	2.5	Only investigated for O157
Germany	Unspecified raw milk	37	6	16.2	0	-	O113, O76, unspecified (4)
EU Total (cheeses)		**1,064**	**12**	**1.1**	**6**	**0.6**	
Dairy products, other than cheese							
Belgium	Cream	42	0	-	0	-	-
	Ice-cream	66	0	-	0	-	-
	Butter	79	0	-	0	-	-
	Ice-cream	69	0	-	0	-	-
	Butter	70	0	-	0	-	-
Italy	-	250	0	-	0	-	-
Spain	Other products	237	0	-	0	-	
EU Total (other than cheese)		**813**	**0**	**0**	**0**	**0**	
Switzerland	Soft and semi-soft cheeses/ made of unpasteurized milk	390	5	1.3	0	-	-

1. Data are only presented for sample size ≥ 25

Table VT8 shows the VTEC findings in fresh meat other than bovine. VTEC was detected in meat of sheep in all three investigations reported, but only Italy detected the occurrence of VTEC O157 (0.7%).

Findings of VTEC from pig meat ranged from none to 19.7% in a Spanish investigation. VTEC O157 was detected in pig meat in three Italian surveys in 4.1%, 2.1% and 0.1% of the investigated samples, respectively. These findings are interesting since pork is generally not considered to be an important source for human VTEC O157 infections in Europe.

VTEC were not detected in any broiler or turkey meat samples. A German investigation of wild land game animals showed that 9.1% of these samples were VTEC positive. Serogroup information was available for six of the isolates, none of which were among the predominant human VTEC serogroups within the Community. Two other results from Germany of stabilized red meat products and minced (red) meat showed that 1.8% and 5.9% of the samples, respectively, were contaminated with VTEC. Serogroup typing of some of the strains from these investigations indicate that many of the VTEC strains present in these types of food only rarely cause human disease. An important exception from this is the finding of serogroups O91, which is a common cause of human VTEC infections in Germany. Austria reported findings of VTEC in 1.2% (serogroup O100:H- and O157:H19) of fresh mixed red meat consisting of bovine meat and pig meat.

Table VT8. VTEC findings in fresh meat other than bovine[1], 2006

	Description		VTEC		VTEC O157		
		N	Pos	% Pos	Pos	% Pos	Add. serotype information
Pig meat							
Czech Republic	Minced meat	1,033	0	-	0	-	100cm^2 swabbed
Germany	Fresh	148	1	0.7	0	-	
Italy	Meat preparation	94	2	2.1	2	2.1	
	-	128	0	-	0	-	
	Minced meat	147	6	4.1	6	4.1	O157:H7 (5)
	Fresh	692	1	0.1	1	0.1	O157:H7
Netherlands	Fresh	435	0	-	0	-	Only investigated for O157
Spain	Fresh	25	2	8	0	-	
	Fresh	46	0	-	0	-	
	Fresh	61	12	19.7	0	-	
Fresh poultry meat							
Italy	Poultry	655	0	-	0	-	
Latvia	Broilers	35	0	-	0	-	
Spain	Poultry	37	0	-	0	-	
Sheep meat							
Germany	-	36	4	11.1	0	-	
Italy	Fresh	276	2	0.7	2	0.7	
Spain	Fresh	69	1	1.5	0	-	
Other meat							
Germany	Minced meat	611	36	5.9	0	-	O102, O113, O150, O174, unspecified (33)
	Stabilised meat products	1,006	18	1.8	0	-	O8 (4), O22, O91, unspecified (12)
	Wild game, land mammals	121	12	9.9	0	-	O146, O59, O110, O113, O153, O179, unspecified (6)
Italy	-	124	0	-	0	-	
Spain	Minced meat	735	5	0.7	0	-	
Meat from bovine animals and pig							
Austria	Minced meat	164	2	1.2	0	-	O100:H-, O157:H19
Luxembourg	-	36	0	-	0	-	
Slovenia	Fresh	50	0	-	0	-	Only investigated for O157
	Minced meat	100	0	-	0	-	Only investigated for O157
EU Total		**6,864**	**104**	**1.5**	**11**	**0.16**	
Pig meat							
Romania	Fresh	248	0	-	0	-	
Fresh poultry meat							
Romania	Broilers	135	0	-	0	-	

1. Data are only presented for sample size ≥ 25

Table VT9 presents VTEC findings in other foodstuffs. The data on VTEC reported under this category indicate that occurrence of VTEC in these types of food is low. In recent years different types of vegetables have caused a number of VTEC outbreaks. However VTEC was not detected in any of the reported surveys. Spain isolated VTEC from 3.7% of unspecified fishery products but apart from this, VTEC was not recovered from any of the investigated samples.

Table VT9. VTEC findings in other foodstuffs[1], 2006

	Description		VTEC		VTEC O157
		N	Pos	% Pos	Pos
Austria	Juice	118	0	-	-
Germany	Vegetables	179	0	-	-
Italy	Eggs	130	0	-	-
	Fishery products, unspecified	101	0	-	-
	Other food	90	0	-	-
Netherlands	Fruits	816	0	-	-
Slovenia	Vegetables (sprouted seeds)	30	0	-	-
	Vegetables	50	0	-	-
Spain	Eggs	76	0	-	-
	Fishery products, unspecified	350	13	3.7	0
	Vegetables	51	0	-	-
EU Total		**1,991**	**13**	**0.7**	**0**

1. Data are only presented for sample size ≥25

In general, the reported levels of VTEC and VTEC O157 in foodstuffs in 2006 were comparable with the reported findings in 2005 and 2004.

3.4.3 VTEC in animals

Eleven MS reported on occurrence of VTEC in animals. The data are presented in Table VT10 for cattle and in Table VT11 for the other animal species.

As described for the food data, animal data from different studies are not directly comparable due to difference in the sampling and testing schemes.

The majority of the VTEC data from cattle (Table VT10) were generated from investigating single animals. However, a few data are presented at herd/holding level. The 11 MS, except Lithuania, reported VTEC findings in cattle. The occurrence at animal-level ranged from 0.1% to 76.0%. VTEC findings were made from calves, dairy cows and meat production animals. The Danish investigation was based on a PCR based approach, where all samples positive for VT encoding genes were reported as positive for VTEC.

Eight MS reported O157 serogroup findings, and the occurrence ranged from not detected to 13.7%, with the highest proportion reported by Sweden and Italy. Germany reported a large investigation of cattle without detecting VTEC O157, but other VTEC serogroups were found. The absence of VTEC O157 in German cattle does not correspond well with the findings in other MS. The Community prevalence of VTEC O157 in cattle, excluding the German investigations, is 2.2% (110/5,069).

Besides serogroups O157, there are only limited data available concerning the serogroups/types in cattle. Austria and Germany reported 15 isolates with serogroup data and the identified serogroups are only rarely observed causing human disease.

Interestingly, Sweden reported a high proportion of positive samples in a study where samples from ears of cattle are tested for VTEC O157. VTEC O157 was detected in 10.9% of the ear samples and 3.1% of the faecal samples from cattle at slaughter. The Swedish data suggest that ear samples may be a sensitive sample type for estimating the prevalence of VTEC in animals at the abattoir.

Table VT10. VTEC in cattle[1,2], 2006

	Description	Unit		VTEC		VTEC O157		
			N	Pos	% Pos	Pos	% Pos	Add. Serotype information
Calves								
Germany		Animal	682	7	1	0	-	
Netherlands		Herd	146	20	13.7	20	13.7	
Dairy cows								
Austria		Animal	194	6	3.1	0	-	O174:H28, O179:H8, O116.H- (2), O84:H-, O174,H2
Estonia		Animal	190	13	6.8	13	6.8	Only investigated for O157
Germany		Animal	1,613	2	0.1	0	-	
Netherlands		Herd	131	7	5.3	0	-	
Meat Production animals								
Austria		Animal	93	1	1.1	0	-	VTEC O116:H-
Denmark[3]		Herd	194	20	10.3	20	10.3	Bull calves/only investigated for O157
Lithuania		Animal	91	0	0	0	-	
Luxembourg		Herd	176	1	1	0	-	Only investigated for O157
Other, or not specified								
Denmark[3]		Animal	603	458	76	0	-	Samples positive for VT encoding genes (PCR)
Finland	Faeces	Animal	1,590	10	0.6	10	0.6	Only investigated for O157
Germany		Animal	34,065	42	0.1	0	-	O1, O22, O28, O55 (2), O88, O136, O179, unspecified (34)
Italy		Animal	101	4	4.0	4	4.0	
Italy		Single	149	67	45	0	-	
Portugal		Animal	157	1	0.6	0	-	O149
Slovenia	Faeces	Animal	235	6	2.6	6	2.6	Only investigated for O157
Sweden	Ear samples	Animal	294	32	10.9	32	10.9	Only investigated for O157
	Faeces	Animal	1,205	37	3.1	37	3.1	Only investigated for O157
Italy		Holding	20	7	35	5	25.0	O157 (5) unspecified (2)
		Holding	54	1	1.9	1	1.9	
EU Total			**41,983**	**742**	**1.8**	**148**	**0.4**	

1. Data are only presented for sample size ≥ 25
2. If not otherwise stated animal based data
3. In Denmark, the samples were collected in dairy cows at the slaughterhouse

Four MS provided data on VTEC in other animal species and these data are presented in Level 3. VTEC was isolated from several animal species: sheep, goats, rabbits but not in poultry, cats, dogs, and solipeds.

The highest proportions of VTEC positive samples from pigs were reported by Portugal. Germany reported investigations including many samples from pigs; where VTEC were detected in 2.4% of the animals. Thirteen isolates from the Portuguese and German studies were serogrouped. Three isolates were identified as O157 and the remaining isolates were identified as O138, O139 or O141, which three serogroups are associated with oedema disease in piglets. The VTEC causing oedema disease are generally accepted as being non-pathogenic for humans.

The highest incidence of VTEC reported in sheep and goats were 2.4% and 8.3% respectively. Rabbits were investigated in Italy and 2.3% were found VTEC positive. Germany did not found VTEC in its studies on dogs and cats.

Generally, the findings in the reported levels for VTEC and VTEC O157 in animals are comparable with the findings reported in 2005 and 2004.

Table VT11. VTEC in animals other than cattle[1,2], 2006

	Description		VTEC		VTEC O157		
		N	Pos	% Pos	Pos	% Pos	Add. serotype information
Pigs							
Germany	-	3,308	80	2.4	3	0	O139 (2), O141 (2), O157 (3) unspecified (73)
Italy	-	30	0	-	0	-	
Portugal	-	158	6	3.8	0	-	O138:K81 (5), O139:K82
Poultry, unspecified							
Germany	-	111	0	-	0	-	
Goats							
Germany	-	84	7	8.3	0	-	O9, O21, unspecified (5)
Portugal	-	41	1	2.4	0	-	O141
Sheep							
Austria	-	127	3	2.4	0	-	O76:H-, O103:H2, O128abc:H2
Germany	-	217	1	0.5	0	-	O76
Italy	Holding	20	3	15	3	15	
Portugal	-	64	0	-	0	-	
Other animals							
Germany	Dogs	576	0	-	0	-	
Germany	Not specified	197	3	1.5	0	-	O146, unspecified (2)
Germany	Solipeds, domestic	66	0	-	0	-	
Germany	Cats	648	0	-	0	-	
Italy	Rabbits, single	86	2	2.3	0	0	
EU Total		**5,733**	**106**	**1.8**	**6**	**0.1**	

1. Data are only presented for sample size ≥ 25
2. Animal based data if nothing else stated

3.4.4 Discussion

The reported data for human VTEC infection incidence in Europe show a statistically significant and decreasing trend since 2004. VTEC O157 is still the most frequently reported serogroup among human patients, and this serogroup is furthermore the predominant cause of the most severe disease i.e. HUS. There was, however, increased reporting of human cases caused by non-O157 serogroups.

The amount of information on VTEC monitoring in animals and food provided by the reporting countries is relatively sparse. There are no harmonised recommendations for the monitoring of VTEC in animals and food and many results are reported with no or limited serotype information. A likely reason is that broad VTEC surveys are laborious and expensive to carry out.

Although the human pathogenic potential of many types of VTEC remains to be fully elucidated, the current human surveillance in Europe indicates that only a fraction of existing VTEC subtypes are a frequent cause of disease in humans. The lack of serotyping and characterization with regard to known virulence markers, means that it is very difficult to assess the potential human health risk of the presence of VTEC in animals and food based on the available data.

The most important human pathogenic VTEC serogroup O157, was isolated by the MS in various food categories including bovine meat, cow's milk, cheeses, pig meat and sheep meat. The serogroup was also reported in cattle, pigs, sheep and rabbits. As in previous years, most of the findings were from cattle and food of bovine origin.

The non-O157 serogroups most frequently causing human disease were rarely reported in animals and food in 2006 or they were not recognised due to lack of serotype characterization or detection method. However, the few reports of these serogroups indicate that these serogroups are likely to be present among farm animals and food of animal origin in the EU.

Based on the available information in 2006 it is not possible to fully assess the public health importance of the presence of VTEC in various animal species and food. Further information on serotype and the presence of virulence factors would increase the possibilities to analyse the human health significance of findings.

EFSA's Scientific Panel on Biological Hazards has recently published an opinion on monitoring of verotoxigenic *Escherichia coli* (VTEC) and identification of human pathogenic VTEC types. This provides further guidance for the monitoring of the agent in animals and food. The opinion is available on EFSA website www.efsa.europa.eu.

3.5. Tuberculosis due to *Mycobacterium bovis*

3. INFORMATION ON SPECIFIC ZOONOSES

3.5. Tuberculosis due to *Mycobacterium bovis*

Tuberculosis is a serious disease of humans and animals caused by the bacterial species of the family *Mycobacteriaceae*. This group includes *Mycobacterium bovis* responsible for bovine tuberculosis, which is also capable of infecting a wide range of warm-blooded animals, including humans. In humans, infection with *M. bovis* causes a disease very similar to infections with *M. tuberculosis*, which is the primary agent of tuberculosis in humans. 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 animals. A number of wild life animals, such as deer, wild boars, badgers and the European bison might contribute to the spread and/or maintenance of *M. bovis* infection in cattle.

Other *Mycobacteria* present in animals, such as *M. avium* may also cause disease in humans, especially in persons immunocompromised by e.g. infection, cancer or transplants.

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

Table TB1. Overview of countries reporting data for Mycobacterium bovis

	Total number of MS reporting	Countries
Human	0	Data not available from EuroTB network
Animal	24	**MS:** All except MT **Non MS:** CH, NO and RO

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

3.5.1. M. bovis in humans

Mycobacterium bovis cases of 2006 were not reported to the EuroTB network by September 2007, thus what is depicted below is an update to 2005 figures using the latest EuroTB data.

The total number of cases reported in 2005 represented an increase of 25.3% compared with 2004 (Table TB2). These data demonstrate that the highest proportions of reported and confirmed cases occurred in Germany and the United Kingdom (77.3%), with the greatest burden and risk assumed by those aged 65 and older (Figure TB1).

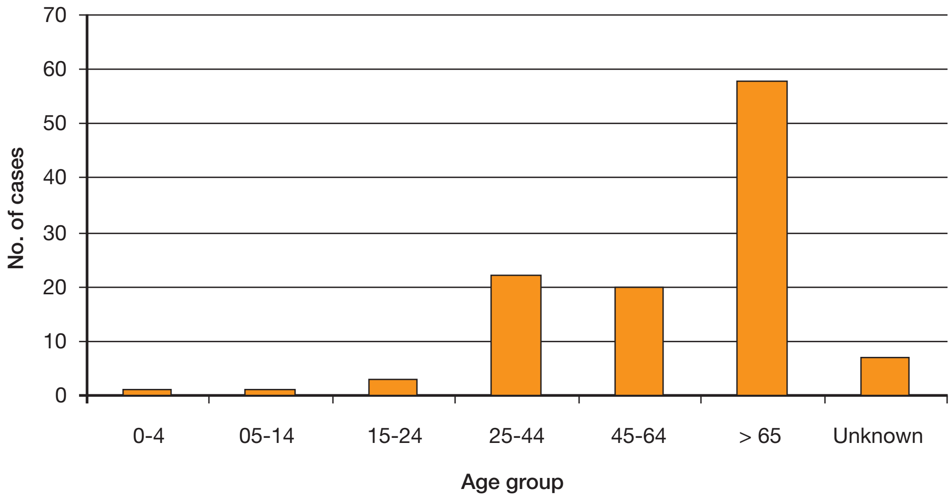
Wide variability in reporting exists between reporting countries, thereby precluding meaningful data interpretation.

Table TB2. Reported tuberculosis M. bovis cases in humans and incidence[1] for confirmed cases, 2005 (BSN), and reported cases in 2001-2004 (zoonoses report and EuroTB). OTF[2] status is indicated

	2005				2004	2003	2002	2001
	Report type[3]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases in zoonoses report (reported to EuroTB)			
Austria (OTF)	C	6	6	<0.1	4 (4)	4 (4)	4 (4)	5 (5)
Belgium (OTF)	-	-	-	-	5 (3)	5 (1)	2 (4)	2 (2)
Cyprus	C	0	0	0	1 (1)	-	-	-
Czech Republic (OTF)	-	2	2	<0.1	- (2)	- (1)	- (3)	- (3)
Denmark (OTF)	0	0	0	-	2 (2)	1 (0)	2 (2)	4 (0)
Estonia	0	0	0	0	0	-	-	-
France (OTF)	-	-	-	-	-	-	-	-
Finland (OTF)	0	0	0	0	0	0	0	0
Germany (OTF)	C	53	53	<0.1	51 (54)	- (43)	-	-
Greece	-	-	-	-	0	0	0	0
Hungary	-	-	-	-	0	-	-	-
Ireland	C	3	3	<0.1	2 (4)	6 (5)	7 (5)	3 (4)
Italy[4]	C	7	7	<0.1	5 (6)	1 (4)	4 (3)	0 (1)
Latvia	0	0	0	0	0	-	-	-
Lithuania	-	-	-	-	0	0	-	-
Luxembourg (OTF)	0	0	0	0	-	-	-	-
Malta	C	1	1	0.3	-	-	-	-
Netherlands (OTF)	-	-	-	-	- (13)	- (11)	8 (8)	10 (7)
Poland	-	-	-	-	-	-	-	-
Portugal	0	0	0	0	- (1)	- (1)	0	0
Slovakia (OTF)	C	0	0	0	0	0	0	0
Slovenia	-	-	-	-	0 (1)	0	0	0
Spain	C	4	4	<0.1	4	6	2	3
Sweden (OTF)	C	4	4	<0.1	4 (4)	5 (5)	7 (8)	5 (5)
United Kingdom	C	39	39	-	21	21	22	33
EU Total		**119**	**119**	**<0.1**	**95 (95)**	**43 (75)**	**56 (37)**	**62 (27)**
Iceland	0	0	0	0	-	-	-	-
Norway (OTF)	-	-	-	-	0 (0)	0 (0)	1 (1)	1 (1)

1. EU total is based on population in reporting countries
2. OTF: Officially Tuberculosis free
3. C: case-based report, 0: 0 cases reported, -: No report
4. In Italy, 11 provinces are OTF

Figure TB1. Distribution of confirmed tuberculosis M. bovis cases in humans by age group, 2005



3.5.2. Tuberculosis due to M. bovis in cattle

The status of the countries regarding freedom of the disease and occurrence of bovine tuberculosis MS and Norway in 2006 is presented in Figure TB2 and Figure TB3. As in 2005, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Slovakia, Sweden, Norway and Switzerland were officially bovine tuberculosis-free (OTF) in accordance with the Community legislation. In 2006, Italy had additional provinces declared to be OTF (Decision 2006/290/EC) and has now 11 OTF provinces. All reported data are presented in Level 3.

Trend indicators for tuberculosis
To assess the yearly Community trends in bovine tuberculosis and to complement the Member State-specific figures, two epidemiological trend indicators have been used since 2005.

A first indicator **"% existing herds infected/positive"** is the proportion of "the number of infected herds" or "the number of herds positive" from "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 proportion of "the number of herds positive" from "the number of tested herds". This indicator gives a more precise picture of the testing results, the period herd prevalence in the whole reporting year. This information is only available from countries with Community co-financed eradication programmes.

Infected herds mean all herds under control, which are not officially 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).

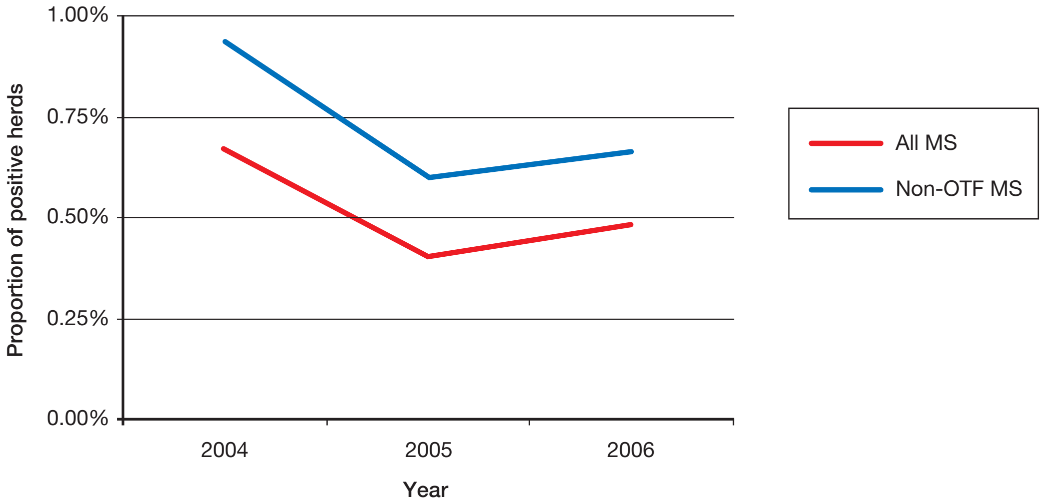
Positive herds mean a herd with at least one positive animal during the reporting year, independent of the number of times the herds has been checked.

Figure TB2. Status of bovine tuberculosis, 2006

Figure TB3. Proportion of M. bovis infected/positive cattle herds, country based data, 2006

During the last three years, the EU-proportion of positive existing herds has been less than 0.7%, and the proportion among the non-OTF MS has been less than 1%. Compared to 2005, the EU-proportion of existing herds positive has slightly increased from 0.40% to 0.48% in 2006. Also among the Non-OTF MS a slight increase from 0.60% to 0.66% was reported in the proportion existing herds positive (Figure TB4).

Figure TB4. Proportion of existing cattle herds positive for M. bovis, 2004-2006



Officially Tuberculosis Free (OTF) MS and non-MS

With the exception of Belgium, France and Germany, bovine tuberculosis was not detected in cattle herds in the 11 OTF MS and Norway, during 2006 (Table TB3). In total, 117 herds were tuberculin test positive in these three MS. These findings are comparable to those of 2005, where infected cattle herds were reported in Belgium (5 herds), France (88 herds) and Germany (2 herds).

Table TB3. Tuberculosis due to M. bovis in cattle herds in OTF MS and OTF non-MS, 2004-2006

	2006				2005	2004
Officially free MS	**No. of existing herds**	**No. of officially free herds**	**No. of infected herds**	**% existing herds infected**	**% existing herds infected**	**% existing herds infected**
Austria	80,257	80,257	0	0	0	0
Belgium[1]	40,640	40,632	8	0.02	0.01	0.01
Czech Republic	22,734	22,734	0	0	0	0
Denmark	27,832	27,832	-	-	0	0
Finland	20,098	20,098	0	0	0	0
France[1]	258,740	258,636	104	0.04	0.03	0.02
Germany	171,900	-	5	<0.01	<0.01	-
Luxembourg	1,520	1,520	0	0	0	0
Netherlands	51,714	51,714	0	0	0	0
Slovakia	11,618	11,618	0	0	0	0
Sweden	26,179	26,179	0	0	0	0
OTF MS Total	**713,232**	**541,220**	**117**	**0.02**	**0.01**	**0.01**
Norway	20,500	20,500	0	0	0	0

1. Herds tested bacteriological positive during 2004 - 2006

Non-OTF Member States

In total, 13 non-OTF MS reported 1,858,520 existing bovine herds and 0.66% were found infected or positive. This is a small increase compared to 2005 when the proportion was 0.60%. This increase is primarily due to more infected herds in Spain and Northern Ireland.

All reporting non-OTF MS have national eradication programmes for bovine tuberculosis. Table TB4 shows the MS without co-financed eradication programme, while Table TB5 shows the MS with eradication programmes co-financed by the Community. In 2006, five MS received co-financing (Commission Decision 2005/887/EC).

Five non-OTF MS: Cyprus, Estonia, Latvia, Lithuania and Slovenia, reported no test positive herds during 2006 (Table TB4 and TB5). Of these MS, Estonia and Slovenia have applied for OTF status, and Latvia is currently preparing the application for OTF status.

Amongst the non-co-financed non-OTF MS, the United Kingdom and Ireland reported clearly the highest proportion of existing herds infected, 4.05% and 3.04%, respectively. Compared to 2005, the numbers of infected herds reported by the United Kingdom increased, primarily due to more infected herds in Northern Ireland. The proportion of existing herds infected also increased slightly in Greece (Tables TB4 and TB5).

Table TB4. Tuberculosis due to M. bovis in cattle herds in non co-financed non-OTF countries, 2004-2006

Non-officially free MS	2006			2006	2005	2004
	No. of existing herds	No. of officially free herds	No. of infected herds	% existing herds infected		
Cyprus	349	148	0	0	-	0
Estonia	-	-	-	-	0	0
Greece	28,360	19,205	126	0.44	-	-
Hungary	22,943	22,928	7	0.03	-	<0.01
Ireland	122,392	118,288	3,720	3.04	3.07	3.0
Latvia	54,724	0	0	0	0	0
Lithuania	164,077	164,077	0	0	0	0
Malta	-	-	-	-	0	0
Slovenia	42,306	42,306	0	0	<0.01	0
Great Britain (UK)[1]	89,461	82,605	3,229	3.61	3.52	1.6
Northern Ireland (UK)[1]	27,694	-	1,513	5.46	2.14	-
Total	**552,306**	**449,557**	**8,595**	**1.56**	**1.42**	**0.96**
Romania	1,233,666	1,210,674	137	0.01	-	-

1 For UK, the total No. infected herds is 4.05% (4,742 herds out of 117,155 herds)

Table TB5. Tuberculosis due to M. bovis in cattle herds in co-financed non-OTF MS, 2004-2006

Non-officially free MS	2006					2005		2004	
	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	-	-	-	-	-	0	0	-	-
Estonia	9,267	9,267	0	0	0	-	-	-	-
Greece	-	-	-	-	-	0.24	0.97	0.36	1.12
Ireland	-	-	-	-	-	-	-	2.89	2.99
Italy[1]	162,154	90,449	1,001	0.62	1.11	0.63	1.17	0.58	1.23
Lithuania	-	-	-	-	-	-	-	0	0
Poland	909,544	253,552	107	0.01	0.04	0.01	0.05	0.02	0.05
Portugal[2]	62,200	56,295	104	0.17	0.18	0.16	0.22	0.2	0.26
Slovenia	-	-	-	-	-	-	-	0	0
Spain	163,049	135,536	2,403	1.47	1.77	1.3	1.52	1.77	1.8
Northern Ireland	-	-	-	-	-	-	-	0.06	0.82
Total	**1,306,214**	**545,099**	**3,615**	**0.28**	**0.66**	**0.16**	**0.69**	**0.61**	**0.78**

1. In Italy, data from provinces that are officially tuberculosis free are excluded.
2. Azores are OTF and therefore excluded

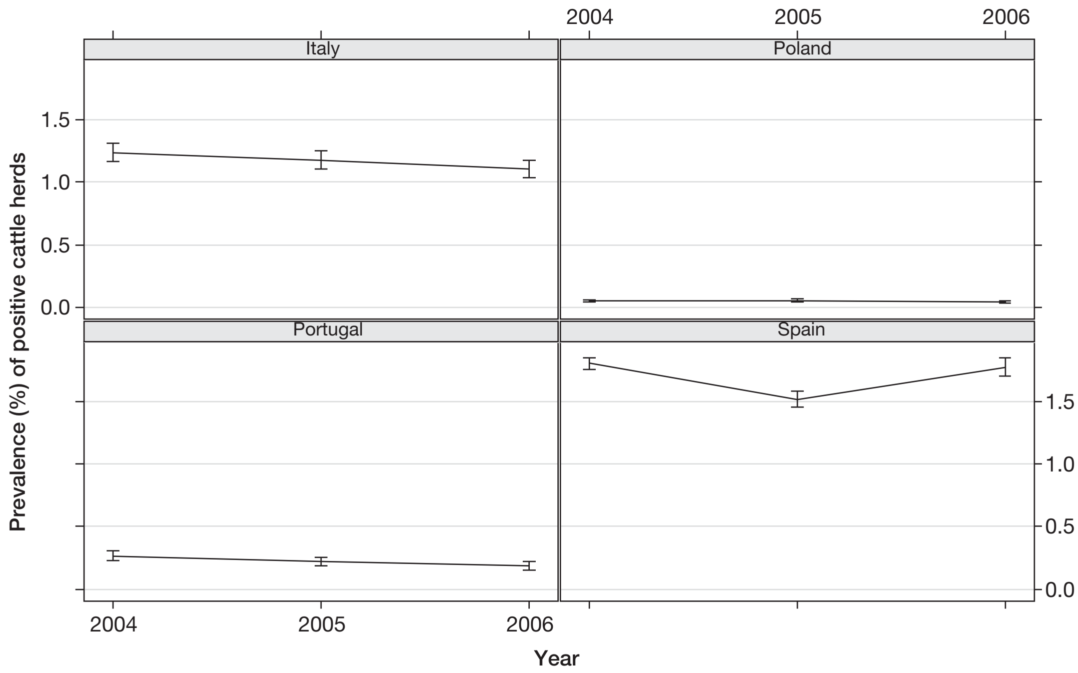
Amongst the five non-OTF MS co-financed in 2006, the overall occurrence of bovine tuberculosis remained approximately at the same level as in 2005. Spain reported the highest percentage of positive existing herds and positive tested herds (1.47% and 1.77%, respectively) and compared to 2005, an increase in both indicators was observed. In 2006, Spain implemented for the first time a more intensive surveillance programme. The other co-financed non-OTF MS reported approximately the same level or less positive cattle herds in 2006 compared to 2005 (Table TB5). In Estonia, bovine tuberculosis has not been detected since 1968, and the Community co-financing is used to document the OTF status of herds under control.

The herds tested positive for bovine tuberculosis were geographically clustered in the United Kingdom, Ireland, southern European MS and in some eastern European countries (Figure TB3).

An overview of the *M. bovis* status of cattle herds in co-financed non-OTF MS, at the end of 2006, is given in Level 3. The percentage of officially free herds amongst the existing herds varies from no OTF herds in Estonia to 99% in Portugal. When excluding Estonia, there has been an overall minor increase in the percentage of officially free herds amongst the existing herds from 2005 to 2006 (40.1% to 43.3%, respectively), primarily due to the increased number of OTF herds in Poland.

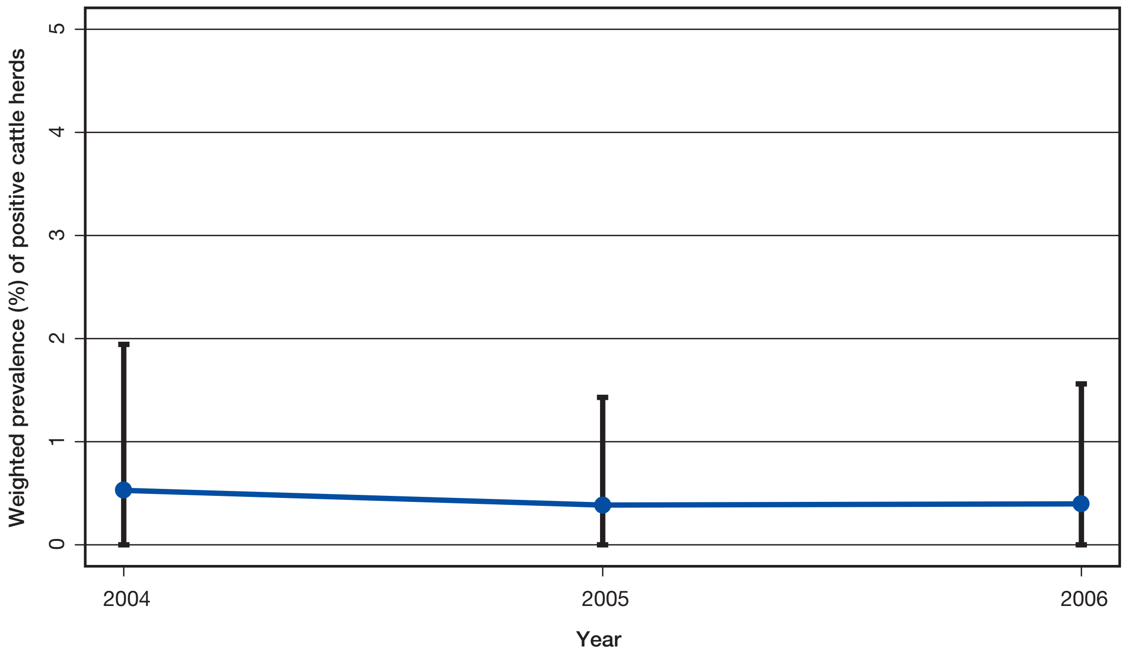
The MS specific trends in the prevalence of bovine tuberculosis in the co-financed non-OTF MS over the years 2004-2006 are presented in Figure TB4a**.** The prevalence of herds that tested positive for bovine tuberculosis appears to decrease in Italy and Portugal. Also the overall prevalence of the tuberculosis positive herds decreased significantly in the reporting co-financed non-OTF MS as demonstrated by logistic regression analysis ($P < 0.05$, Figure TB4b.). See Appendix 1 and the notes for FigureTB4 for descriptions of statistics.

Figure TB5a. Prevalence and 95% CI of cattle herds that tested positive for M. bovis in non-OTF co-financed MS, 2004-2006[2]



1. Vertical bars indicate exact binomial 95% confidence intervals.
2. Estonia is considered as free of bovine tuberculosis.

Figure TB5b. Weighted[1] mean prevalence and 95% CI of cattle herds that tested positive for M. bovis in co-financed non-OTF MS 2006, 2004 -2006[2]



1. Weight is the reciprocal of the sampling fraction, the ratio between the number of tested herds and the number of existing herds per MS per year.
2. Include data from: IT, PO, PT, ES

3.5.3. Tuberculosis due to M. bovis in animals other than cattle

Surveillance of tuberculosis in domestic animals other than cattle, e.g. sheep, goats, pigs and farmed deer is performed mostly by *post-mortem* meat inspection. In addition, results from other bacteriological investigations are sometimes reported. Findings of *M. bovis* in all animal species are notifiable in Finland, Ireland, Sweden and Norway.

In 2006, *M. bovis* was detected in sheep in Italy, and in goats in Ireland and Spain. During 2001 to 2005, *M. bovis* in sheep or goats was reported in several MS (ES, FR, IE, IT, PT and UK).

Findings of *M. bovis* in pigs are notifiable in Denmark, Finland, Sweden and Norway. In 2006, *M. bovis* was detected in pigs in France, Hungary and the United Kingdom. In 2005, *M. bovis* was detected in pigs only in the United Kingdom, as has been the case since 2002. *M. bovis* was also reported from farmed wild boar in the United Kingdom.

Surveillance of tuberculosis in farmed deer is also performed mostly by *post-mortem* meat inspection, but some MS also apply intradermal tuberculin tests in herds. *M. bovis* is notifiable in farmed deer in Denmark, Finland, Ireland, Sweden, the United Kingdom and Norway. As in the previous years, no positive herds of farmed deer were reported for 2006, however Hungary reported one infected animal.

With the exception of Finland, Sweden and Norway, tuberculosis in wildlife is not notifiable in the MS. In wildlife populations, *M. bovis* was reported in deer (ES, FR and IE), badgers (ES, IE and UK), foxes (ES) and in wild boars (ES, FR, HU, IT and PT) in 2006.

In 2006, *M. bovis* was diagnosed in a few zoo animals in the United Kingdom and Hungary, and cats were found infected in the United Kingdom.

All reported data from farmed deer and other animals are presented in Level 3.

Control strategies
In the United Kingdom, a three-year field study to evaluate the safety and efficacy of injectable Bacille Calmette-Guerin (BCG) vaccine in badgers commenced in 2006. Vaccination of cattle against bovine tuberculosis is prohibited in all reporting MS and non-MS.

3.5.4. Discussion

The information on human cases of *M. bovis* was lacking for 2006, but in the previous years, human infections have been rare.

Most MS are officially free of bovine tuberculosis and some of the non-free MS, which recently joined the EU, are in the process of applying this status.

Infected herds with bovine tuberculosis are geographically concentrated to certain MS. The United Kingdom and Ireland account for the highest prevalence in the national herds. Other infected areas include the Southern MS, Poland, Hungary and Romania.

At EU level there was a slight increase in the proportion of cattle herds infected/positive to *M. bovis*. This slight increase was primarily due to more positive herds in some non-free MS. Especially the United Kingdom (Northern Ireland) and Spain reported a higher percentage of positive herds compared to 2005. For Spain this increase was indicated to be because a more intensive and sensitive surveillance programme implemented for the first time in 2006. However, in the Community co-financed MS there was an overall significant decrease in the proportion of cattle herds tested positive.

Some findings of *M. bovis* in other domestic animals, wildlife and zoo animals were reported by several MS, indicating that some of these animal species can serve as a reservoir of bovine tuberculosis.

3. INFORMATION ON SPECIFIC ZOONOSES

3.6. *Brucella*

Brucellosis is an infectious disease caused by some bacterial species of the genus *Brucella.* There are five 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. maris* 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 systems or endocarditis may occur. Brucellosis can also cause long-lasting or chronic symptoms that include recurrent fever, joint pain and fatigue. Of the five species known to cause disease in humans, *B. melitensis* is the most virulent and causes the most severe illness. 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 2006.

Table BR1. Overview of countries reporting Brucella data, 2006

	Total number of MS reporting	Countries
Human	20	**MS:** All MS except CZ, DK, HU, LU, SI **Non MS:** BG, IC, LI, NO, RO
Food	3	**MS:** BE, IT, PT
Animal	24	**MS:** All except MT **Non MS:** CH, NO, RO

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

3.6.1. Brucellosis in humans

Of the 20 MS reporting data on human brucellosis, nine countries (CY, EE, FI, LT, LV, MT, NL, PL and SI) reported no confirmed cases. Austria and Lithuania provided aggregated data only.

A total of 1,033 human brucellosis cases were reported in EU in 2006, of which 72% were reported as confirmed cases. The MS, with the status as officially free of brucellosis in cattle (OBF) as well as sheep and goats (ObmF) reported low numbers of cases, whereas the non-OBF/non-ObmF MS, Greece, Italy, Portugal and Spain, together accounted for 88% of all confirmed cases reported in 2006 (Table BR2). A significant declining trend in the reported number of cases was observed in Spain over the past five years.

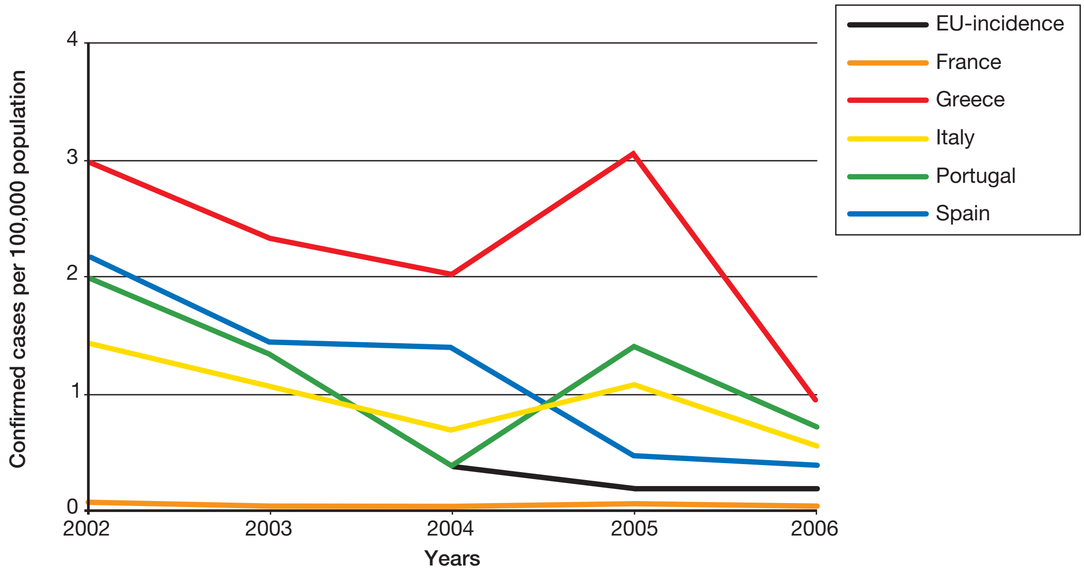
The incidence of brucellosis in 2006 remained approximately at the same level as in 2005 (0.20 vs. 0.17, respectively), and there is no significant trend in incidence over the past five years within the EU. Only Spain demonstrated a statistically significant and decreasing trend over the last five years (Figure BR1).

Table BR2. Reported brucellosis cases in humans, 2002-2006 and incidence[1] for confirmed cases in 2006, OBF and ObmF[2] status is indicated

	2006				2005	2004	2003	2002
	Report type[3]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases			
Austria (OBF/ObmF)	A	1	1	<0.1	2	2	5	4
Belgium (OBF/ObmF)	C	2	2	<0.1	2	8	0	1
Cyprus	0		0		2	1	5	7
Czech Republic (OBF/ObmF)	-	-	-	-	1	0	-	-
Denmark[4] (OBF/ObmF)	-	-	-	-	-	4	14	16
Estonia	0	-	0	-	0	0	0	0
Finland (OBF/ObmF)	0	-	0	-	1	1	1	0
France[5] (OBF)	C	30	24	<0.1	35	19	21	37
Germany (OBF/ObmF)	C	37	37	<0.1	31	32	27	35
Greece	C	258	104	0.9	337	223	255	327
Hungary (ObmF)	-	-	-	-	1	0	-	-
Ireland[6] (ObmF)	C	29	4	0.1	7	2	5	4
Italy[7]	C	318	318	0.5	632	398	-	820
Latvia	C	1	0	0	0	0	-	-
Lithuania	A	0	0	0	0	1	0	-
Luxembourg (OBF/ObmF)	-	-	-	-	0	-	-	-
Malta	0	-	0	-	0	-	-	-
Netherlands (OBF/ObmF)	C	7	0	0	2	8	4	5
Poland	0		0	-	3	1	4	2
Portugal[8]	C	95	76	0.7	147	39	139	206
Slovakia (OBF/ObmF)	-	-	-	-	0	0	1	0
Slovenia (ObmF)	0	-	0	-	-	0	1	-
Spain[9]	C	235	162	0.4	196	589	596	886
Sweden (OBF/ObmF)	C	4	4	0	6	3	3	5
United Kingdom[10] (OBF/ObmF)	C	16	16	0	12	31	21	37
EU Total		**1,033**	**748**	**0.2**	**1,417**	**1,362**	**1,102**	**2,392**
Bulgaria	C	11	3	0	-	-	-	-
Iceland	0	-	0	-	0	-	-	-
Liechtenstein	0	0	0	0	-	-	-	-
Norway (OBF/ObmF)	C	3	3	0.1	0	2	3	3
Romania	C	1	1	0	-	-	-	-

Note: Data for 2002-2004 include all cases. Data for 2005, confirmed cases only.
1. EU-total incidence is based on population in reporting countries
2. OBF/ObmF: Officially Brucellosis free/Officially B. melitensis free
3. A: aggregated data report, C: case-based report, 0: 0 case reported, -: No report
4. In Denmark, brucellosis in humans is not a notifiable disease
5. In France, 64 departments are ObmF
6. In Ireland in 2004, only confirmed cases. One additionally unspecified case and 57 probable cases were reported
7. In Italy, 48 provinces and one region are OBF and 47 provinces and one region are ObmF
8. In Portugal, the Azores are OBF/ObmF
9. In Spain, the Canary islands are ObmF
10. In The United Kingdom, only Great Britain is OBF

Figure BR1. Incidence of human brucellosis in selected non-OBF MS[1]. Estimated EU-trend in all MS, 2002-2006



Note: In 2004, several MS joined the Community, therefore data for a EU-incidence was only available for the period 2004 – 2006
1. During 2002-2006, a significant linear trend was observed in Greece and Spain

The highest incidence of human brucellosis was noted in 25-44 year old persons followed by 45-64 year old persons (35.7% and 28.4% of confirmed cases, respectively) (Figure BR2). *Brucella* possesses a strong seasonal distribution pattern with more cases occurring in the spring and summer than in the autumn and winter months. In 2006, 67.5% of confirmed brucellosis cases in humans occurred from March to August (Figure BR3).

Figure BR2. Age distribution of confirmed human cases of brucellosis, 2006

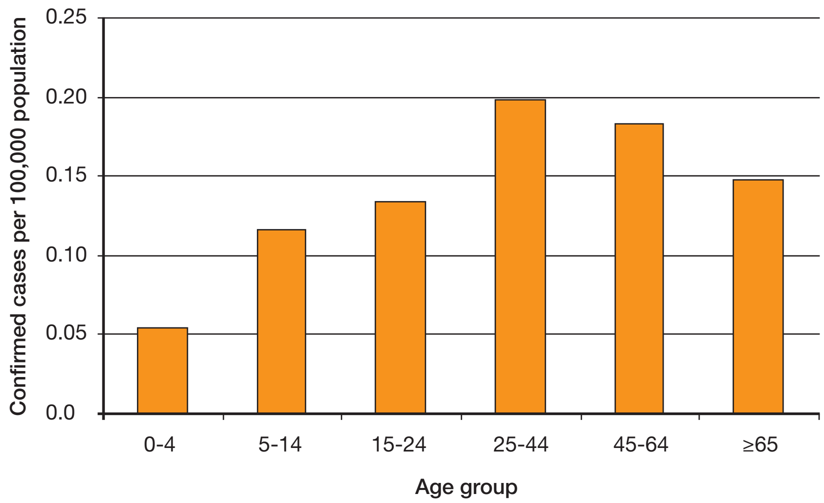
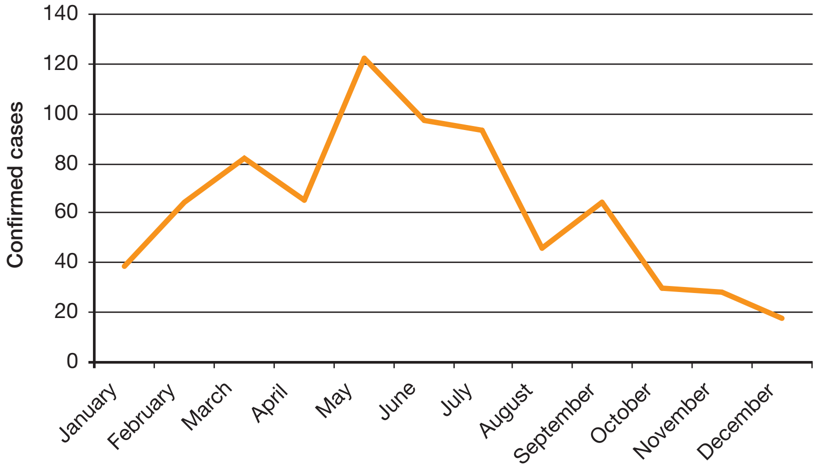


Figure BR3. Seasonal distribution of confirmed human cases of brucellosis, 2006



Six MS with confirmed cases reported whether cases were imported or domestically acquired. In these countries, imported cases accounted for 17.8% of confirmed cases. The majority of infections, however, remain of unknown origin.

In previous years, *B. melitensis* was the species most commonly associated with human cases of brucellosis, however in 2006 very little information was available on species distribution.

3.6.2. Brucella in food

Only Belgium and Italy reported results from more than 25 samples of milk and cheese for the presence of *Brucella*. The majority of samples were of raw milk, and *Brucella* was only detected in samples from Italy, where less than 1% were positive (Table BR3). A few positive samples of raw cow's milk have previously been reported by Italy (2001, 2003 and 2004).

Overall, since 2001 *Brucella* in raw cow milk has only been reported by Greece, Italy and Portugal.

All data on *Brucella* in food are presented in Level 3.

Table BR3. Milk and cheese samples tested for Brucella, 2006

	Description	N	Pos	% Pos
Raw milk from cows				
Belgium	Milk for manufacture	73,482	0	0
Italy[1]		12,845	109	0.8
Cheese made from milk from cows				
Italy[2]	Soft and semi-soft	192	0	0
Italy		52	0	0
Cheese made from milk from sheep/other animals/unspecified				
Italy[3]	Goats' milk, soft and semi soft	40	0	0
Italy[4]	Sheep's milk, soft and semi soft	42	0	0
Italy	Buffalo	217	0	0
Italy	Unspecified milk	104	0	0

Note: Data are only presented for sample size ≥25
1. *B. Melitensis* was detected in 95 samples, the rest were reported as unspecified
2. Include 15 samples of cheese made from raw or low heat-treated milk
3. Include 1 sample of cheese made from raw or low heat-treated milk
4. Include 17 samples of cheese made from raw or low heat-treated milk

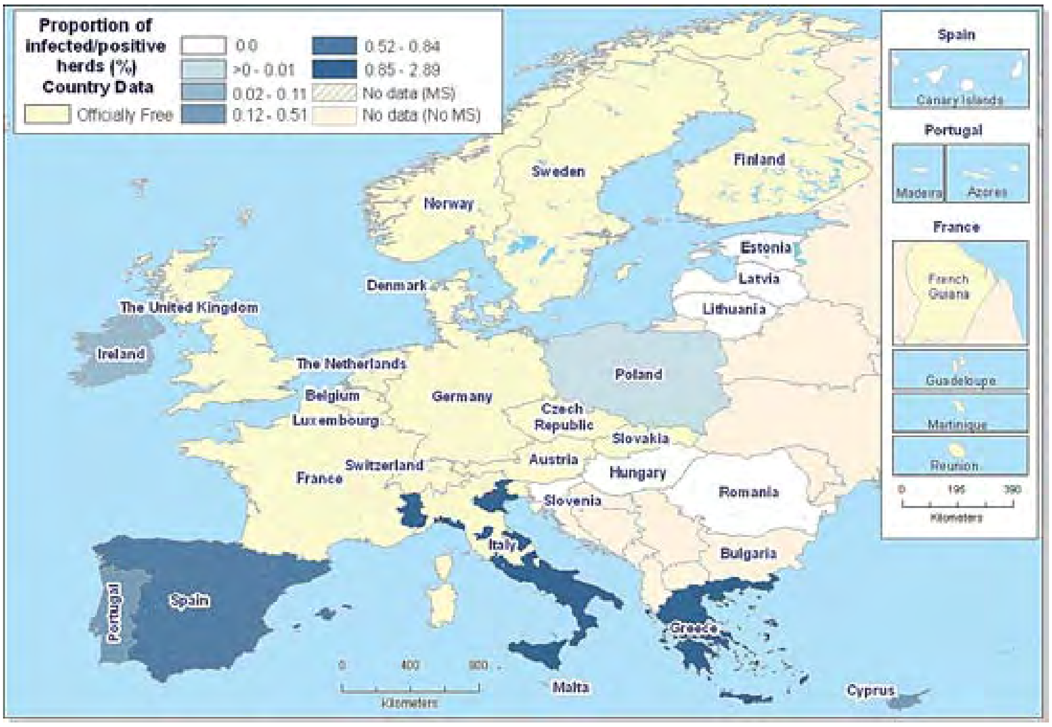
3.6.3. *Brucella* in animals

Cattle

The status of the countries regarding freedom of the disease and occurrence of bovine brucellosis in MS and non-MS in 2006 is presented in Figure BR4 and Figure BR5.

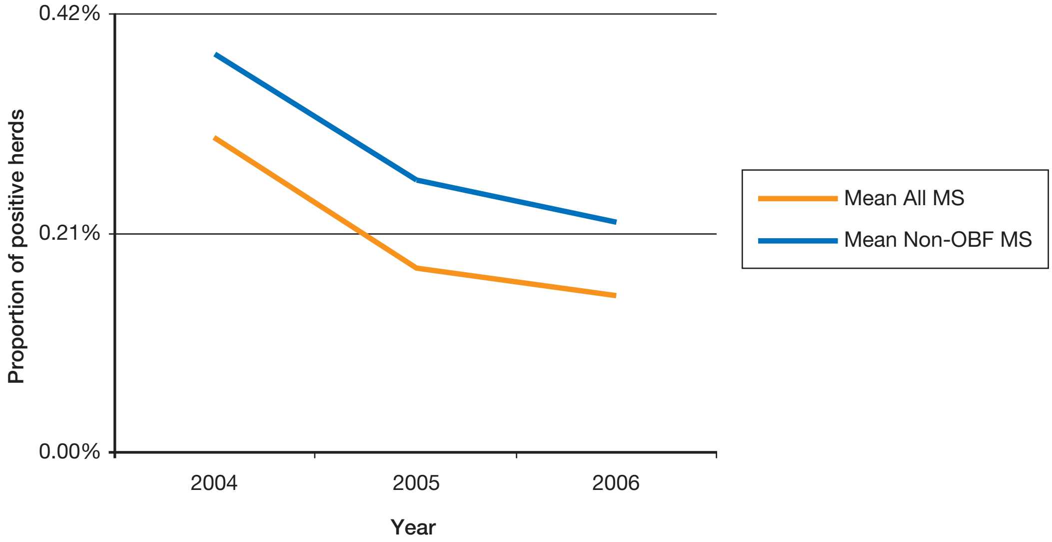
Figure BR4. Status of bovine brucellosis, 2006

Figure BR5. Proportion of Brucella infected/positive cattle herds, country based data, 2006



Since 2005, the EU-proportion of existing herds positive has decreased from 0.18% to 0.15% in 2006, and the proportion among the non-OBF MS decreased from 0.26% to 0.22%, respectively (Figure BR6).

Figure BR6. Proportion of existing cattle herds positive for Brucella, 2004-2006[1]



1. Missing data from OBF MS: Germany (2004, 2005), Luxemburg (2004) and Non-OBF MS: Hungary (2005), Malta (2006)

Trend indicators for brucellosis
To assess the yearly Community trends in bovine and ovine/caprine brucellosis and to complement the Member State-specific figures, two epidemiological trend indicators have been used since 2005.

The first indicator **"% existing herds infected/positive"** is the proportion of "the number of infected herds" or "the number of herds positive" from "the number of existing herds in the country". This indicator describes the situation in the whole country in the reporting year.

The second indicator **"% tested herds positive"** is the proportion of "the number of herds positive" from "the number of tested herds". This indicator gives a more precise picture of the testing results, the period herd prevalence over the reporting year. This information is only available from countries with Community 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).

Positive herds are a herd with at least one positive animal during the reporting year, independent of the number of times the herds has been checked.

Officially Brucellosis Free (OBF) Member States and non-MS
As in 2005, Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Norway, Switzerland, Slovakia, Sweden and the United Kingdom (Great Britain) were officially free of brucellosis in cattle (OBF). In 2006, Italy had seven additional provinces and a region declared OBF. In 2006, bovine brucellosis was not detected in cattle herds in any of the 12 OBF MS and two OBF non-MS.

Non-OBF Member States and non-MS

In 2006, 13 non-OBF MS reported a total population of 1,708,645 bovine herds, of which 0.22% were found infected or positive for bovine brucellosis. The prevalence of the disease had decreased when compared to the prevalence reported in 2005 (0.26%).

Six of the non-OBF MS (EE, HU, LV, LT, MT and SI) did not have Community co-financed eradication programmes in 2006, and reported no positive cattle herds out of their total 293,317 existing bovine herds in 2006. These MS entered the Community in 2004, and several of these MS are free of the disease according to OIE standards (EE, HU, LT and SI) or reported that no herds have been found infected over several decades. Estonia has applied for OBF status, and Latvia is preparing their application. Also the non-MS Romania did report no positive herds out of their 1,233,666 existing bovine herds.

Table BR4. Brucella in cattle herds in co-financed non-OBF MS, 2004-2006

Non-officially free MS	2006					2005		2004	
	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	349	312	1	0.29	0.32	1.41	1.53	2.03	2.03
Greece	28,178	9,128	264	0.94	2.89	0.85	4.30	1.16	4.19
Ireland	122,392	118,925	132	0.11	0.11	0.12	0.12	0.05	0.05
Italy[1]	106,102	72,405	1,394	1.31	1.93	1.57	2.17	0.92	1.78
Lithuania	-	-	-	-	-	-	-	0	0
Poland	909,597	246,566	24	<0.01	0.01	<0.01	0.01	0.00	0.01
Portugal[2]	65,065	52,635	266	0.41	0.51	0.66	0.79	0.78	0.98
Slovenia	-	-	-	-	-	-	-	0	0
Spain	143,514	139,722	1,168	0.81	0.84	1.07	1.26	1.51	1.54
Northern Ireland (UK)	27,694	24,423	120	0.43	0.49	0.33	0.37	0.53	0.71
Non-OBF MS Total	**1,402,891**	**664,116**	**3,369**	**0.24**	**0.51**	**0.32**	**0.70**	**0.29**	**0.82**

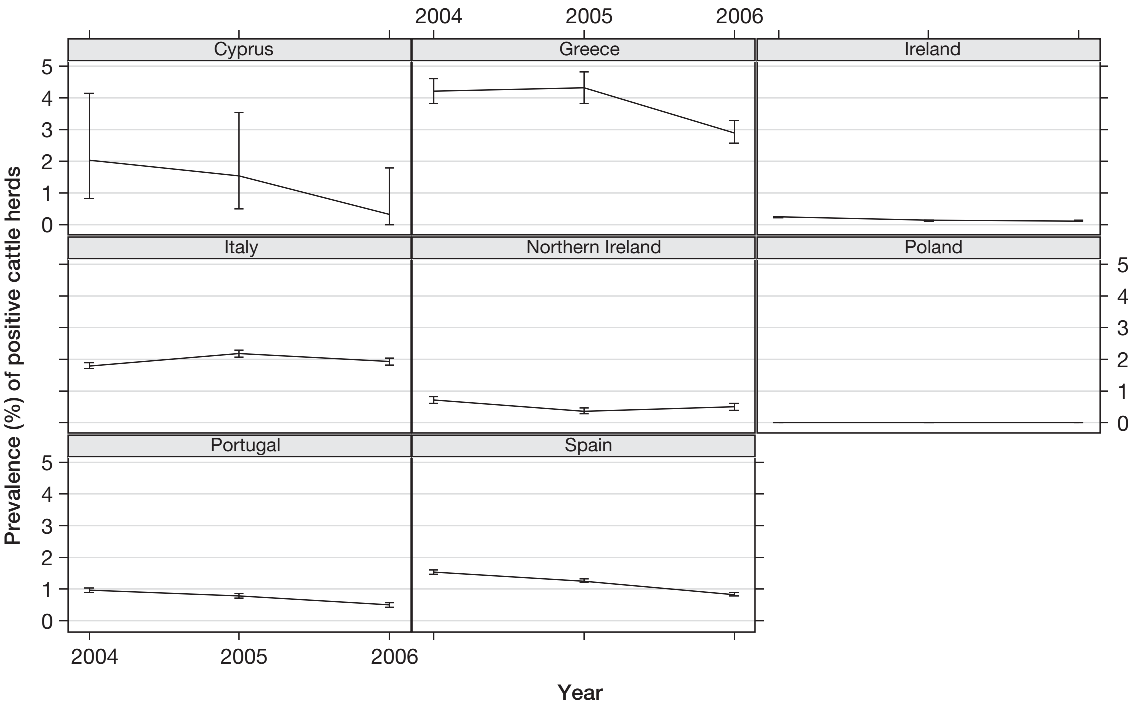
1. Data from Italian OBF regions and provinces has been excluded
2. The Azores are OBF, and these herds are excluded from the number of existing herds

All non-OBF MS with Community co-financed eradication programmes reported positive cattle herds in 2006 (Table BR4). Generally, for these MS, the decrease in the percentage of tested herds positive observed in 2005 (from 0.82% to 0.70%) continued during 2006 (0.51%). Overall, 0.24% of the existing herds were positive, and the highest proportions were reported by Greece, Italy and Spain. In most of the co-financed non-OBF MS, the majority (62-100%) of the existing cattle herds, were under the control programmes in 2006, however, this only applied to approximately 27% of the cattle herds in Poland. For further details see level 3.

The herds tested positive for bovine brucellosis were geographically clustered in southern Europe, the island of Ireland and Poland, Greece having the highest country prevalence (Figure BR5).

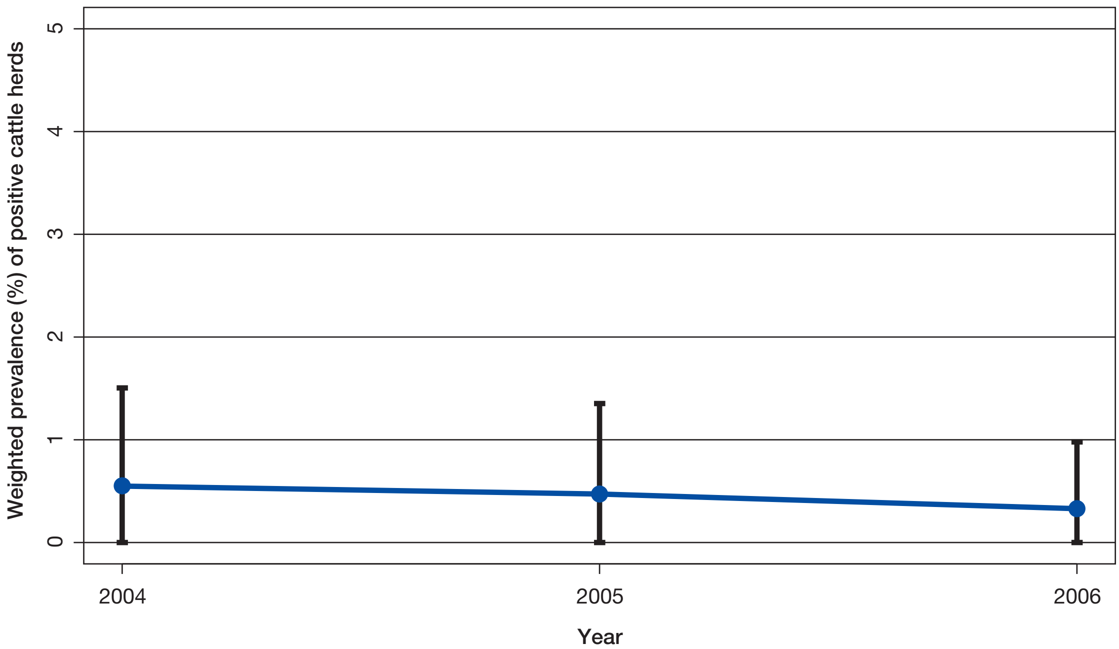
Since 2004, the prevalence of herds that tested positive for bovine brucellosis appears to have decreased in most of the co-financed non-OBF MS, including Greece, Ireland, Northern Ireland, Portugal and Spain (Figure BR7a). Also, the logistic regression analysis indicates that the overall prevalence of brucellosis positive tested herds decreased approximately 20% from 2004 to 2006 (significant, $P < 0{,}001$) in the eight reporting co-financed MS (Figure BR7b). See Appendix 1 and notes to FigureBR7 for descriptions of statistics.

Figure BR7a. Prevalence and 95% CI[1] of cattle herds that tested positive for brucellosis in the eight co-financed MS, 2004-2006



1. Vertical bars indicate exact binomial 95% confidence intervals.

Figure BR7a. Weighted[1] mean prevalence and 95% CI of cattle herds that tested positive for brucellosis in the eight co-financed non-OBF MS, 2004 - 2006[2]



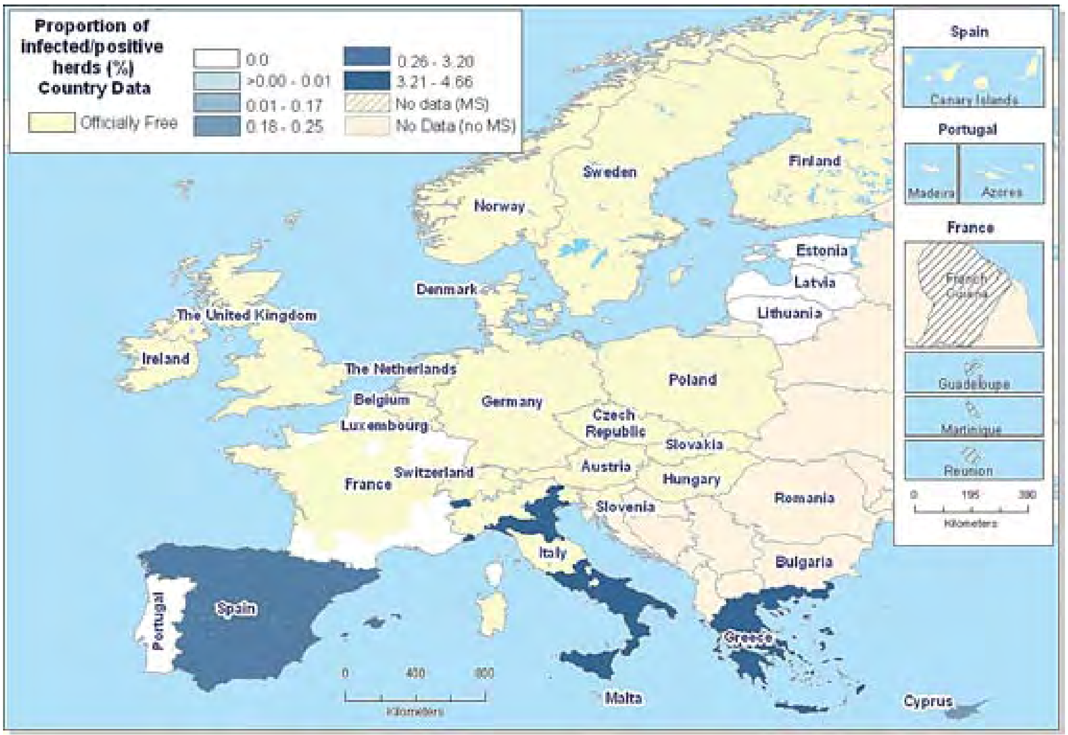
1. Weight is the reciprocal of the ratio between the number of tested herds per MS per year, and the number of existing herds per MS in 2006.
2. Includes data from: CY, GR, IE, IT, Northern Ireland, PO, PT, ES.

Sheep and goats

The status of the countries regarding freedom of the disease and occurrence of ovine and caprine brucellosis (*B. melitensis*) in MS and non-MS in 2006 is presented in Figure BR8 and Figure BR9.

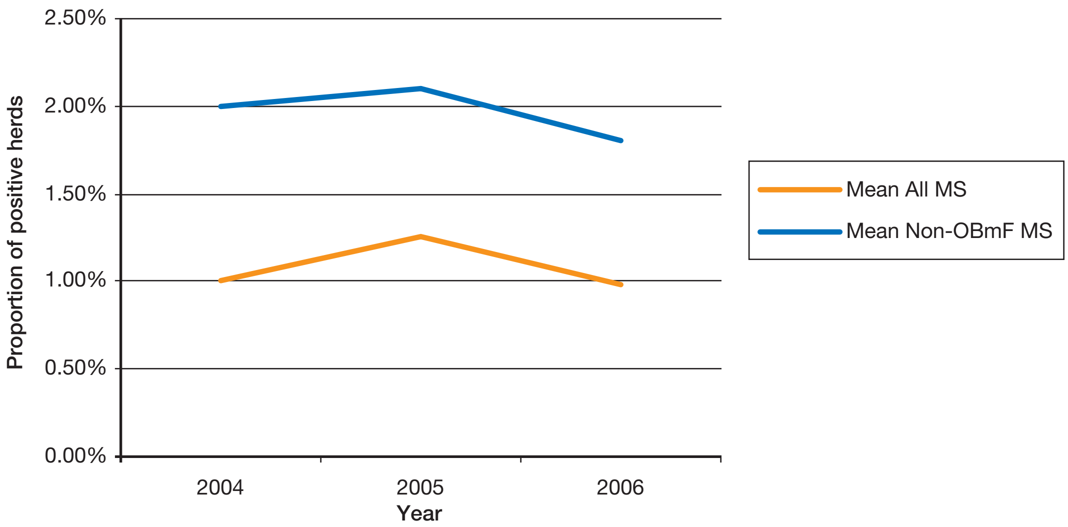
Figure BR8. Status of ovine and caprine brucellosis (B. melitensis), 2006

Figure BR9. Proportion of Brucella infected/positive sheep and goat herds, country based data, 2006



Since 2005, the EU-proportion of existing herds positive has decreased from 1.3% to 1.0%, and the proportion among the Non-ObmF MS decreased since 2004 from 2.1% to 1.8%, respectively (Figure BR10). In 2006, the proportions of existing herds positive were also lower than observed in 2004.

Figure BR10. Proportion of existing sheep and goat herds positive for Brucella, 2004-2006[1]



1. For 2004, the number of existing herds was based on the number of herds under control

Officially B. melitensis Free (ObmF) Member States and non-MS

In 2006, Austria, Belgium, the Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, the Netherlands, Norway, Slovakia, Slovenia, Sweden and the United Kingdom were officially free of ovine and caprine brucellosis caused by *B. melitensis* (ObmF). Poland obtained ObmF status in 2006, and Italy had three additional provinces and a region declared ObmF. In the 14 ObmF MS, positive herds were only detected in Austria and Germany (one herd, respectively).

Non-ObmF Member States

In 2006, nine non-ObmF MS reported a total population of 413,184 sheep and goat herds, of which 1.8% was found infected with or positive for *B. melitensis*. This was a decrease compared to the overall occurrence observed in 2005 (2.1%).

In 2006, the three non-ObmF MS without Community co-financed eradication programme (EE, LV and LT), reported no infected herds out of their total 12,039 existing ovine and caprine herds. It should be noted that *B. melitensis* has never been detected in Latvia or Lithuania, and has not been detected since the 1960's in Estonia. Estonia has applied for ObmF status, and Latvia is preparing their application.

Of the non-ObmF MS with Community co-financed eradication programmes, only France did not report positive sheep or goat herds in 2006. Overall, both indicators, "% existing herds positive" and "% tested herds positive", were lower in 2006 compared to 2004 and 2005. Both indicators were for most MS lower in 2006 compared to 2005, except for Italy where both indicators increased and for Greece that observed a comparable proportion of positive herds among the relatively few herds tested (5% of existing herds were tested). Italy, Portugal and Spain reported the highest proportions of positive existing herds in 2006 (Table BR5).

The herds tested positive for ovine/caprine brucellosis were geographically clustered in Southern Europe (Figure BR9).

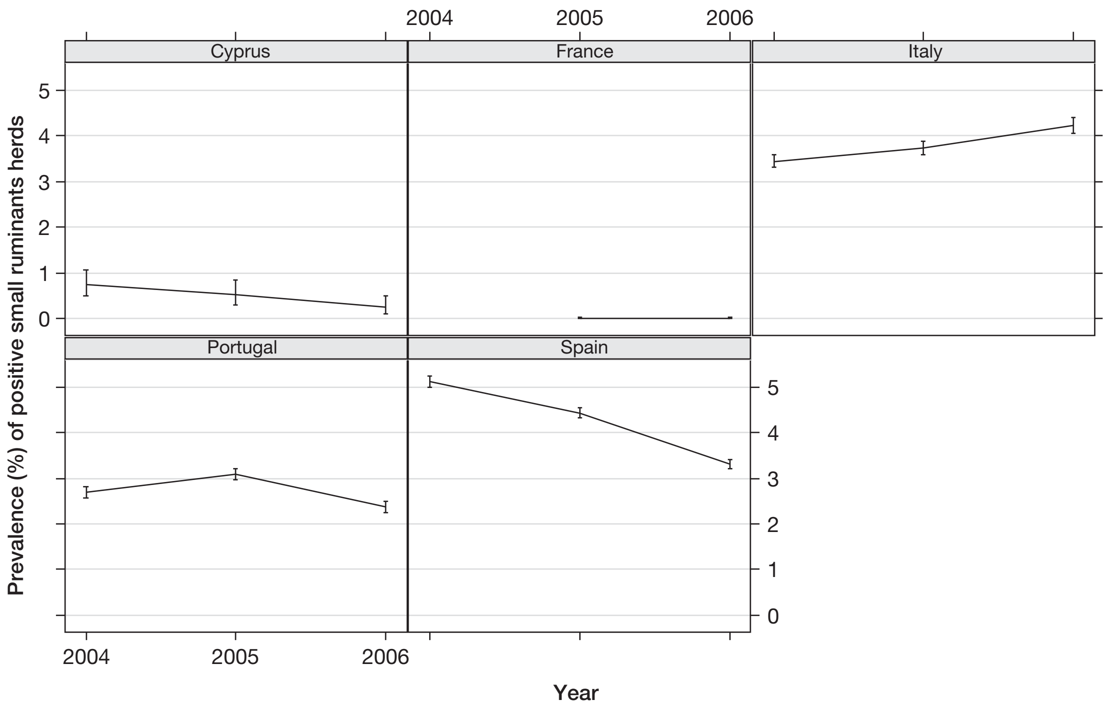
Table BR5. Brucella in sheep and goat herds in co-financed non-ObmF MS, 2004-2006

Non-officially free MS	2006					2005		2004	
	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	3,855	3,210	8	0.21	0.25	0.39	0.52	0.57	0.57
France[1]	121,631	13,766	0	0	0	0	0	0	0
Greece	21,969	1095	51	0.23	4.66	0.23	5.13	0.18	5.63
Italy[2]	56,518	47,883	2,025	3.58	4.23	3.31	3.74	2.47	3.11
Portugal[3]	69,501	63,461	1,505	2.17	2.37	3.07	3.08	2.49	2.68
Spain[4]	127,671	113,938	3,772	2.95	3.31	4.04	4.43	4.85	5.12
Total	**401,145**	**243,353**	**7,361**	**1.83**	**3.02**	**2.43**	**3.69**	**2.49**	**3.67**

1. Data from the ObmF *départements* is not excluded
2. Data from the ObmF provinces is not excluded
3. The Azores are ObmF, and these herds are excluded from the number of existing herds
4. The Canary Islands are Ombf, and these herds are excluded from the number of existing herds

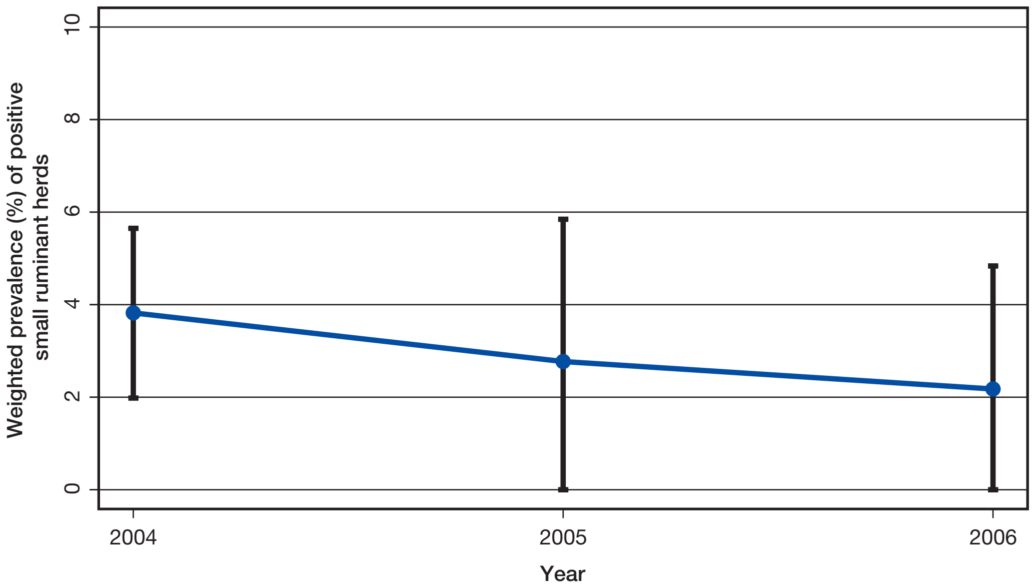
Since 2004, the prevalence of sheep and goat herds that tested positive for *B. melitensis* seems to decrease in Cyprus, Portugal and Spain, while it appears to increase in Italy (Figure BR11a). A decreasing trend in the overall prevalence was observed in the 7 reporting co-financed non-ObmF MS, but the logistic regression analysis indicated that this trend was not statistically significant (Figure BR11b). See Appendix 1 and notes to Figure BR11 for descriptions of statistics.

Figure BR11a. Prevalence and 95% CI[1] of sheep and goat herds that tested positive for brucellosis (B. melitensis), in non-OBF co-financed MS, 2004 -2006



1. Vertical bars indicate exact binomial 95% confidence intervals.

Figure BR11b. Weighted[1] mean prevalence and 95% CI of sheep and goat herds that tested positive for B. melitensis in non-OBF co-financed MS, 2004-2006[2]



1. Weight is the reciprocal of the ratio between the number of tested herds per MS per year, and the number of existing herds per MS in 2006.
2. Includes data from: CY, FR, IT, PT, ES.

Pigs and other animals

Porcine brucellosis is a rarely reported disease in the EU Community. Seventeen MS reported testing of 37,819,547 pigs, of which 21 pigs were positive for *Brucella* spp. (Table BR6). In Hungary, *Brucella* was not detected in 5,730 tested pig herds.

Table BR6. Brucella spp. in pigs, 2006

	N	Pos	% Pos
Austria	1,088	0	0
Belgium	236	1	0.4
Czech Republic	112,568	0	0
Denmark	23,064	0	0
Estonia	1,095	0	0
Finland	12,832	0	0
Germany	24,472	20	0.1
Italy	282	0	0
Latvia	8,154	0	0
Lithuania	8,854	0	0
Luxembourg	32	0	0
Netherlands	6,816	0	0
Poland	4,683	0	0
Slovakia	9,520	0	0
Sweden	1,801	0	0
United Kingdom	2,427	0	0
Total	**217,924**	**21**	**0.01**
Norway	1,002	0	0
Switzerland	630	0	0

In 2006, *B. suis* was isolated from domestic pigs by bacteriological tests in Belgium and Germany. In addition, *B. suis* was also detected in hares in the Czech Republic, Hungary and Spain and from wild boars in Italy.

A variety of other animals were also tested for *Brucella* spp., including deer, reindeer, solipeds, wild boars, zoo animals and dogs. The majority (99%) of samples tested negative. *Brucella* positive results were reported from deer (0.4% - 2.1%, ES), mountain goats (0.3%, ES), dogs (12.8% - 62.5%, IT), rabbits (*B. abortus* in one animal, LT) and in marine mammals (3,6%, UK).

For details please refer to Level 3.

3.6.4. Discussion

In 2006, most of the human brucellosis cases in EU were reported by MS, which are not officially free of bovine or ovine/caprine brucellosis. This indicates that infected herds are still important sources of human infections. There was no significant trend at the EU level in the number of human cases, but Greece and Spain had a significant decreasing trend over the last five years. This may be an effect of the successful control and eradication programmes in animal populations in these MS.

The non-officially free MS accounted for all the six reported brucellosis outbreaks in humans during 2006 (see the chapter on food borne outbreaks). Cheese was identified as the vehicle in these outbreaks.

Most MS are officially free of bovine or ovine/caprine brucellosis and some of the non-free MS, which recently joined the EU are in the process of applying OBF/ObmF status.

Infected herds of both bovine and ovine/caprine brucellosis are geographically concentrated in the southern European MS (and for bovine brucellosis also in Ireland, Northern Ireland and Poland). At the EU level there is a decreasing trend of both diseases in the non-free MS. This is an indication of the success of the national control and eradication programmes. However, in Northern Ireland the proportion of positive existing cattle herds and the proportion of positive tested cattle herds increased slightly in 2006, compared to 2005. Italy reported slightly higher positive proportions of existing sheep and goat herds and of tested sheep and goat herds in 2006, compared to 2005.

In most MS vaccination is forbidden. In Spain vaccination is also generally forbidden, but in areas with high occurrences of bovine or ovine/caprine brucellosis vaccination is applied to control the disease. Vaccination programs are also run among cattle herds in Thessaloniki prefecture in Greece, and among sheep herds in Sicily, Italy.

3.7. *Yersinia*

Yersinia enterocolitica - rod prokaryote
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3. INFORMATION ON SPECIFIC ZOONOSES

3.7. *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 deals only with *Y. enterocolitica* and *Y. pseudotuberculosis* infections.

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 may last for one to three weeks (or longer). In older children and adults, right-sided abdominal pain and fever may be the predominant symptoms and is therefore often confused with appendicitis. Complications such as a rash, joint pain and/or bacteraemia can occur. Infection is most often acquired by eating contaminated food, particularly raw or undercooked pig meat. The ability of the organism to grow at +4ºC makes refrigerated food with a relatively long shelf life a probable source of infection. Drinking contaminated unpasteurised milk or untreated water can also transmit the organism. On rare occasions, transmission may occur by direct contact with infected animals or humans.

Yersiniosis caused by *Y. pseudotuberculosis* shows many similarities with the disease pattern of *Y. enterocolitica*. Infections are caused by ingestion of the bacteria from raw vegetables, fruit or other foodstuffs via water or direct contact with infected animals.

Pigs have been considered to be the primary reservoir for the human pathogenic types of *Y. enterocolitica*; however other animal species, e.g. cattle, sheep, deer, small rodents, cats and dogs may also carry pathogenic serotypes. Clinical disease in animals is uncommon.

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 whether or not isolates are pathogenic to humans, and this method is ideally complimented by serotyping. In Europe, the majority of human pathogenic *Y. enterocolitica* belong to biotype 4 (serotype O:3) or less commonly biotype 2 (serotype O:9).

Table YE1 presents the countries reporting *Yersinia* data for 2006.

Table YE1. Overview of countries reporting data on Yersinia spp., 2006

	Total number of MS reporting	Countries
Human	20	**All MS** except CY, GR, ML, NL, PT **Non-MS:** BG,NO
Food	9	**MS:** AT, BE, EE, FI, DE, IT, SK, SI, ES
Animal	13	**MS:** AT, EE, FI, DE, IE, IT, LV, LT, NL, PO, SK **Non-MS:** CH

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

3.7.1. Yersiniosis in humans

In 2006, 8,979 confirmed cases of yersiniosis were reported in EU (Table YE2). This represented a 5.8% decrease from the 9,533 cases in 2005, and a decrease in incidence from 2.6 to 2.1 cases per 100,000 population. This decrease represents a statistically non-significant overall trend in EU countries over the past five years. Eighty percent of the decrease is due to 463 fewer cases reported by Germany in 2006 compared to 2005. As in 2005, Germany still accounted for more than half (57.5%) of all infections reported in 2006. Variable and mixed country trends over the past five years were observed, with statistically significant increases observed in Austria and the Czech Republic and decreases observed in Germany and Ireland.

Table YE2. Reported cases of yersiniosis in humans, 2002-2006 and confirmed cases and incidence in 2006

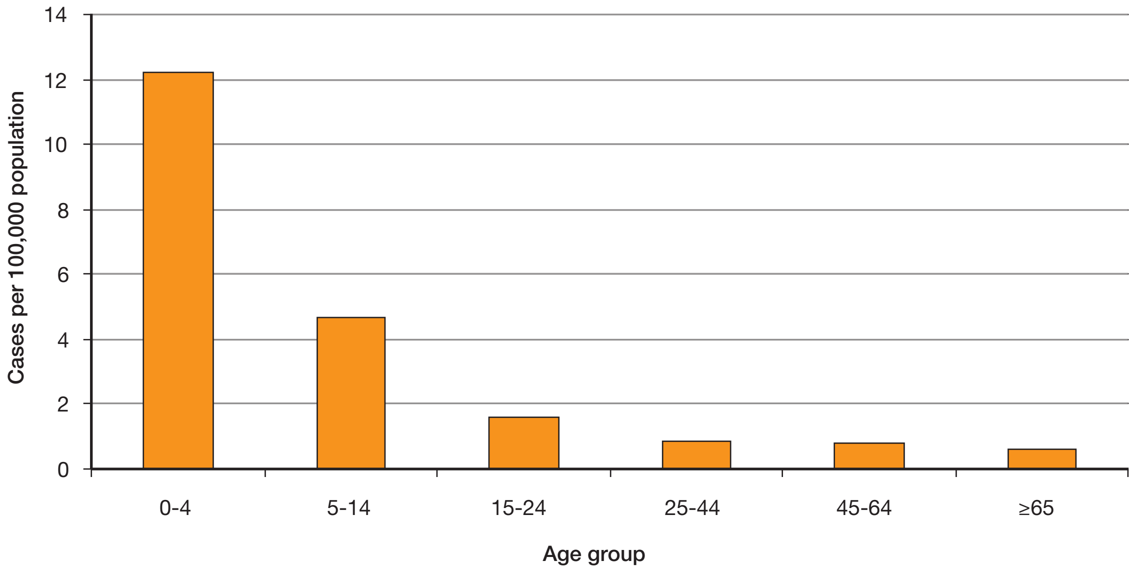
	2006				2005	2004	2003	2002
	Report type[2]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases			
Austria	C	158	158	1.9	143	110	58	58
Belgium	C	264	264	2.5	328	494	338	330
Czech Republic	C	535	534	5.2	498	498	372	403
Denmark	C	215	215	4.0	241	227	243	240
Estonia	C	42	42	3.1	31	15	31	20
Finland	C	795	795	15.1	638	686	646	695
France		0	0	0.0	171	249	218	-
Germany	C	5,161	5,161	6.3	5,624	6,182	6,571	7,515
Greece	-	-	-	-	0	39	1	-
Hungary	C	38	38	0.4	41	68	-	-
Ireland	C	1	1	<0.1	3	6	6	12
Italy		0	0	0.0		0	0	2
Latvia	C	94	92	4.0	51	25	28	63
Lithuania	A	411	411	12.1	501	470	273	214
Luxembourg	C	5	5	1.1	1	-	-	-
Malta	-	-	-	-	0	-	-	-
Poland	C	110	110	0.3	132	84	-	-
Portugal	-	-	-	-	-	3	6	-
Slovakia	C	83	82	1.5	63	78	-	-
Slovenia	C	80	80	4.0	0	38	69	74
Spain	C	375	375	0.9	318	231	417	528
Sweden	C	558	558	6.2	684	804	714	610
United Kingdom	C	58	58	0.1	65	74	95	43
EU Total		**8,983**	**8,979**	**2.1**	**9,533**	**10,381**	**10,086**	**10,807**
Bulgaria[1]	C	5	5	0.1	-	-	-	-
Norway	C	86	86	1.9	125	-	-	-

1. EU membership began in 2007
A: aggregated data report; C: case-based report; 0:0 cases reported

As in 2005, the majority of yersinosis cases were reported as being domestically acquired (Level 3). Also, *Yersinia* appears to follow a almost uniform seasonal distribution, with a few more reported cases in the summer and early fall months.

The age distribution of cases showed that most cases were found among those 0-4 and 5-14 years of age, representing 32% and 20% of all reported cases, respectively (Figure YE1).

Figure YE1. Community incidence of Yersinia infections by age groups, 2006



For additional information on human cases, please refer to Level 3.

3.7.2. Yersinia enterocolitica in food

In total, seven MS reported data on *Yersinia* spp. in foodstuffs. Six MS provided data on *Y. enterocolitica* in meat and products thereof, from investigations in which at least 25 samples were tested. In Table YE3 information on investigations in pig meat are presented. Generally, MS reported low proportions of positive samples of *Y. enterocolitica* in pig meat and pig meat products (0%-2.8%), with the exception of Austria and Germany, who reported investigations with higher percentage of positive samples: 26.0% and 10.1%, respectively. Germany reported the detection of the human pathogenic O:3 serotype from fresh pig meat.

Table YE3. Y. enterocolitica in pig meat and products thereof[1], 2006

	Description	Sample size	N	Pos	% Pos	Human pathogenic serotypes
Slaughter						
Spain	Fresh	25 g	86	0	0	-
Retail						
Austria[2]	Fresh	25 g	96	25	26.0	ND
Spain	Fresh	Not specified	43	0	0	-
	Meat products	Not specified	40	0	0	-
Unknown						
Germany	Fresh	25 g	149	15	10.1	1 (O:3), 14 (O:5)
	Minced meat	25 g	36	1	2.8	ND
Italy	Fresh	25 g	81	0	0	ND
	Minced meat	25 g	65	0	0	-
	Meat products	25 g	256	1	0.4	ND
EU Total			**852**	**42**	**4.9**	

1. Data are only presented for sample size >25
2. *Yersinia* spp.

In Table YE4 information on investigations on *Y. enterocolitica* in bovine meat, cow milk and dairy products are presented. Four MS provided information and *Y. enterocolitica* were found only in Austrian and Italian investigations. As for pig meat, Austria reported the largest proportion of positive samples in meat preparations (9.8%).

Table YE4. Y. enterocolitica in bovine meat, and milk and dairy products[1], 2006

		Sample size	N	Pos	% Pos	Human pathogenic serotypes
Bovine meat and products thereof						
Retail						
Austria[2]	Meat preparation	25 g	112	11	9.8	ND
Spain	Fresh	25 g	37	0	0	-
	Meat Products	25 g	32	0	0	-
Unknown						
Italy	Fresh	25 g	83	3	3.6	ND
	Minced meat	25 g	28	0	0	-
	Meat Products	25 g	61	0	0	-
Milk and dairy products						
Germany	Raw cows milk for direct consumption	25 g	98	0	0	-
Italy	Dairy products, unspecified, not cheese	25 g	35	2	5.7	ND
Spain	UHT milk		562	0	0	-
EU Total			**1,048**	**16**	**1.5**	

1. Data are only presented for sample size >25
2. Yersinia spp.

Spain was the only MS to report findings of *Y. enterocolitica* in poultry meat; 10.4% of the investigated samples were positive.

In the majority of reported investigations of foodstuffs, no information on biotypes and serotypes of the *Y. enterocolitica* strains was available. Such characterisation is essential if any inference is to be made concerning to the human pathogenicity of the obtained strains. Therefore, the reported information was insufficient to ascertain the pathogenicity of the isolated strains to humans within the EU.

Very little data were reported on *Y. pseudotuberculosis*. Finland reported several investigations on *Y. pseudotuberculosis* in vegetables and no positive findings were found in investigations at retail (15 samples of raw carrots) or at farm level (50 samples). Another investigation on pre-cut salad, in which 162 samples were collected from 19 processing plants yielded no positive findings. For additional information on data reported on *Yersinia* in food, please refer to Level 3.

3.7.3. Yersinia enterocolitica in animals

In 2006, eight MS and one non-MS reported data on *Y. enterocolitica* in domestic animals. Results from these investigations are presented in Table YE5. Investigations on pigs were reported by six MS, and the proportion of samples positive for *Y. enterocolitica* was generally low, ranging from no findings to 3.0%. However, Finland reported high proportions of positives in tonsilla samples from pigs (91.7%) and moderate proportions of positive intestinal samples (21.1%). Human pathogenic strains (biotype 4, serotype O:3) were isolated in both investigations.

Very low to low proportions of *Y. enterocolitica* positive samples were reported in cattle, sheep, goats, solipeds and poultry. However, almost no information concerning serotype and biotype was available for these findings. Only Germany reported rare findings of serotype O:3 in cattle, sheep, goats and solipeds, but provided no information on biotypes.

Table YE5. Y. enterocolitica in domestic animals[1], animal based data, 2006

	N	*Yersinia* spp.	*Y. enterocolitica* (All serotypes)	Human pathogenic serotypes
	N	% Pos	% Pos	Pos
Pigs				
Austria	104	0	-	-
Finland[2]	128	75.0	75.0	87 (O:3)
Germany	3,587	3.0	3.0	103 (O:3)
Ireland	310	0	-	-
Italy	101	4.0	0	-
Slovakia	75	0	-	-
Cattle				
Austria	231	0	-	-
Germany	8,038	0.2	0.2	2 (O:3)
Ireland	7,069	0.1	0.1	-
Italy[3]	1,148	10.5	8.9	-
Netherlands	763	0	0	-
Slovakia	91	0	-	-
Sheep				
Austria	49	0	-	-
Estonia	43	4.7	0	-
Germany	3,776	0.1	0.1	5 (O:3)
Ireland	1,044	0	-	-
Italy	76	31.6	0	-
Netherlands	110	1.8	0	-
Slovakia	57	0	-	-
Goats				
Germany	615	0.2	0.2	1 (O:3)
Ireland	51	0	-	-
Netherlands	65	1.5	0	-
Solipeds				
Austria	28	0	0	-
Germany	2,126	0.3	0.3	6 (O:3)
Ireland	1,111	0	-	-
Switzerland	74		-	-
Poultry				
Austria	74	0	-	-
Ireland	397	0	-	-
Netherlands	71	1.4	0	-
Slovakia	74	0	-	-
EU Total	**31,486**	**1.3**	**1.1**	**204**
Switzerland	255		0	-

1. Data are only presented for sample size >25
2. 27/128 intestinal samples positive for *Y. enterocolitica* O:3, biotype 4 , 77/84 tonsilla samples positive for *Y. enterocolitica* O:3, biotype 4
3. Two investigations

Pets (dogs and cats) have been reported to carry human pathogenic serotypes of *Yersinia*. In 2006, three MS and one non-MS provided data from studies in dogs and cats. Germany and Switzerland reported a very small percentage of dogs positive for *Y. enterocolitica* and Germany reported the serotype to be O:3 (biotype not reported). All investigations of cats were negative for *Y. enterocolitica* except in Switzerland where 1 of 729 animals was positive (Table YE6).

Table YE6. Y. enterocolitica in dogs and cats[1], 2006

		Y. enterocolitica (All serotypes)		Human pathogenic serotypes
		N	Pos	Pos
Austria	Dogs	96	0	0
Germany	Dogs	1,627	9	5 (O:3), biotype ND
Ireland	Dogs	535	0	0
Austria	Cats	57	0	0
Germany	Cats	1,037	0	0
Ireland	Cats	30	0	0
EU Total		**3,382**	**9**	**5**
Switzerland	Dogs	951	1	ND
Switzerland	Cats	729	1	ND

1. Data are only presented for sample size >25

A number of investigations of wildlife animal species were reported by Austria, Italy, Ireland and the non-MS Switzerland. *Y. enterocolitica* was found in very low proportions in birds (0.8%) and hares (4.0%) in Italy and in swans in Ireland (2.3%). However, Italy also reported 8.6% of samples from wild boar positive for *Yersinia* spp., and 6.6% of the samples were found to be positive for *Y. enterocolitica* and 0.7% were reported to be *Y. enterocolitica* O:9, a human pathogenic serotype. For additional information, please, refer to Level 3.

3.7.4. Discussion

In 2006, a total of 8,979 cases of human yersiniosis were reported by MS. Yersiniosis remained the third most frequently reported zoonosis in EU, even though there seems to be an overall decreasing trend over the last years. The highest incidences were reported in Northern European countries which is similar to observations in previous years.

From the investigations on the occurrence of *Yersinia* spp. in various types of animals and foodstuffs, including pig meat and bovine meat, *Y. enterocolitica* were generally found in low proportions. As in previous years, the highest proportions of positive samples were reported in pigs and pig meat. Two MS provided information on the isolated *Yersinia* serotypes and finding the potentially human pathogenic O:3 serotype from fresh pig meat and various farm animal species.

Isolation and identification of *Y. enterocolitica* is problematic. Identification of strains virulent to humans requires the identification of both the biotype and the serotype to determine if the strain is potentially pathogenic. An alternative is to verify the presence of the virulence plasmid. In many cases, notifications from MS did not provide the information necessary to allow evaluation of the relevance of the results in relation to public health. Therefore, countries should be encouraged to perform and report results on biotyping and serotyping of obtained strains to allow for evaluation of possible human pathogenicity.

EFSA's Scientific Panel on Biological Hazards will issue an opinion on monitoring and identification of human enteropathogenic *Yersinia* spp. in December 2007. This opinion provides recommendations on the monitoring and identification of the human pathogenic *Yersinia* strains in food and animals. The opinion will be published on EFSA web site by end 2007 (www.efsa.europa.eu).

3.8. *Trichinella*

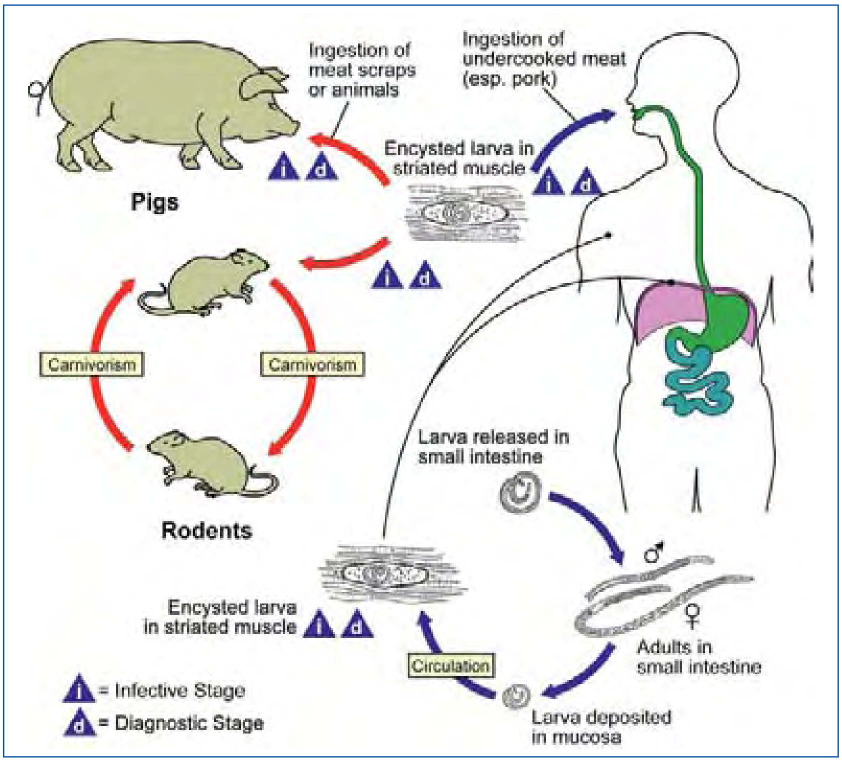
Muscle larva of *Trichinella britovi* after digestion, i.e. the larva free of the muscle cell kindly provided by the Community Reference Laboratory for Parasites, Instituto Superiore di Sanità, Italy

3. INFORMATION ON SPECIFIC ZOONOSES

3.8. *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* 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 are described: *T. spiralis, T. nativa, T. britovi, T. murelli, T. nelsoni, T. pseudospiralis, T. papuae* and *T. zimbabwensis.* The majority of human infections in Europe are caused by *T. spiralis, T. nativa,* and *T. britovi,* while a few cases caused by *T. pseudospiralis* and *T. murelli* (species endemic to the New World) 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 the late 1990s, 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. native, T. britovi* and *Trichinella* genotype T6) have demonstrated resistance to freezing in wild 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. 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.

Table TR1 presents an overview of countries reporting data in 2006.

Table TR1. Overview of countries reporting data on Trichinella spp., 2006

	Total number of MS reporting	Countries
Human	9	**MS:** AT, FR, DE, LT, LV, PL, SK, SI, ES, UK
		Non-MS: BG, RO
Animal	23	**All MS** except Cyprus and Malta
		Non-MS: BG, NO, RO, CH

3.8.1. Trichinellosis in humans

In 2006, only 11 MS and two non-MS reported data on trichinellosis. In total, 11 MS reported 231 cases of trichinellosis with an incidence of 0.04 per 100,000 population (Table TR2). This yields a 32% increase in reported cases as compared to 2005, yet a figure similar to the number of reported cases in 2004. This change over time may be partly explained by Poland reporting large outbreaks of trichinellosis involving 163 and 127 cases in 2004 and 2006, respectively. Germany and Spain also reported large increases in the number of reported cases in 2006 as compared to 2005 as a result of outbreaks involving 16 and 30 cases, respectively. In 2006, most human cases occurred in the late winter and early spring. No significant trends in trichinellosis infections in EU over the past five years were appreciated, and no significant trends per country were observed.

In total, 75.8% of the reported cases were laboratory confirmed; France, Poland and Spain were the only MS not to have laboratory confirmation on all cases. Germany was the only MS providing information on imported cases.

In 2006, Bulgaria and Romania reported data for the first time. They reported 180 and 350 confirmed cases, respectively, representing 75.1% of all confirmed cases reported in 2006. As a result, the incidence for these countries is the highest reported in Europe (2.3 per 100,000 population in Bulgaria and 1.6 per 100,000 population in Romania).

Table TR2. Reported cases of trichinellosis in humans 2002-2006, and incidence for confirmed cases, 2006[1]

	2006				2005	2004	2003	2002
	Report type[2]	Confirmed cases per 100,000 population	No. of cases	Confirmed cases (imported)	No. of cases: Total (imported)			
Austria	A	0	0	0	0	0	3	1
Belgium	-	-	-	-	0	0	-	-
Cyprus	-	-	-	-	0	0	-	-
Czech Republic	-	-	-	-	0	0	-	-
Denmark	-	-	-	-	-	9 (9)	0	0
Estonia	-	-	-	-	1	0	-	-
Finland	-	-	-	-	0	0	0	0
France	C	0.02	12	10	20(20)	3 (3)	6	4 (4)
Germany	C	<0.01	22	22(1)	0	5 (4)	3 (3)	10
Greece	-	-	-	-	-	0	0	0
Hungary	-	-	-	-	0	0	-	-
Ireland	C	0	0	0	0	0	0	0
Italy	-	-	-	-	-	0	0	2
Latvia	C	0.5	11	11	62	24	22	20
Lithuania	A	0.6	20	20	13	22	19	-
Luxembourg	-	-	-	-	0	-	-	-
Malta	-	-	-	-	0	-	-	-
Netherlands	-	-	-	-	0	0	5 (4)	4 (2)
Poland	C	0.2	135	89	70	163	40	42
Portugal	-	-	-	-	0	-	0	1
Slovakia	C	<0.01	5	5	0	1	1	4
Slovenia	C	<0.01	1	1[3]	-	0	-	-
Spain	C	0.04	25	18	9(3)	33(1)	39	26
Sweden	-	-	-	-	0	1 (1)	0	0
United Kingdom	C	0	0	0	0	0	0	0
EU Total	**-**	**0.04**	**231**	**176**	**175**	**261**	**138**	**114**
Bulgaria	A	2.3	180	180				
Iceland	-	-	-	-	0	-	-	-
Norway	-	-	-	-	0	0	0	0
Romania	A	1.6	350	350				

Note: Figures in brackets are reported imported cases; values are included in the total number of cases
1. EU Total incidence is based on population in reporting countries
2: A: aggregated data report, C: case-based report, -: no report
3. In Slovenia, information concerning origin of the infection was not provided

For additional information on data provided on *Trichinella* in humans, please refer to Level 3.

3.8.2. *Trichinella* in animals

All MS except Cyprus and Malta, and four non-MS reported data on *Trichinella* in animals. In 2006, nine MS reported no findings of *Trichinella* in animals, which is fewer compared to 2005 where 13 MS had no positive findings (Table TR3). The information on *Trichinella* is mainly derived from the obligatory checks for the parasite conducted during meat inspection. An overview of the *Trichinella* findings in pigs and wildlife since 2002 is given in Table TR3.

Table TR3. Trichinella in animals, 2002-2006

	2006		2005		2004		2003		2002	
	Pigs	Wildlife	Pigs	Wildlife	Pigs	Wildlife	Pigs	Wildlife	Pigs	Wildlife
Austria	0	-	0	0	0	0	0	+	0	+
Belgium	0	0	0	0	0	+	0	-	0	0
Cyprus	-	-	-	0	0	-	0	0		
Czech Republic	0	+	0	0	0	0				
Denmark	0	-	0	0	0	-	0	0	0	0
Estonia	0	+	0	+	0	+				
Finland	0	+	0	+	+	+	+	+	+	+
France	0	0	0	0	+[1]	+	0	+	0	+
Germany	-	+	-	+	-	+	-	+	+	+
Greece	0	0	0	-	0	0	0	0	0	0
Hungary	0	+	-	-	0	+				
Ireland	0	-	0	-	0	0	0	-	0	+
Italy	+	+	+	0	0	0	0	+	0	+
Latvia	0	+	0	+	0	+	+	+		
Lithuania	0	+	+	+	+	+	+	+		
Luxembourg	0	0	0	0	0	0	0	0	0	0
Malta	-	-	0	-	0	-				
Netherlands	0	0	+	+	0	+[2]	0	+[2]	+	+[2]
Poland	+	+	+	+	+	+				
Portugal	0	0	0	-	0	0	0	-	0	0
Slovakia	0	+	0	+	+	+	0	-		
Slovenia	0	+	0	0	0	+	0	-		
Spain	+	+	+	+	+	+	+	+	+	+
Sweden	0	+	0	+	0	+	0	+	0	+
United Kingdom	0	0	0	0	0	0	-	0	0	0
Bulgaria	+	+								
Norway	0	0	0	0	0	0	0	+	0	+
Romania	+	+								
Switzerland	0	0	0	0						

+: Trichinella detected; -: No data reported; 0: Trichinella not detected
Blank: MS were not EU members at the time and therefore reported no data. LT, LV, SK and SI reported on a voluntary basis in 2003.
1. In France, Corsican outdoor pigs
2. In the Netherlands, positives cases in wildlife refer to serology testing results, only in 2004 was 1 positive sample recorded using digestion method

The majority of MS has not reported positive findings in pigs for many years. In 2006, Italy, Poland and Spain were the only MS to report findings of *Trichinella* in domestic pigs although at a very low prevalence of <0,001%. The two non-MS Bulgaria and Romania reported much higher proportions of positive samples, 0.01% and 0.03%, respectively (Table TR4). During the last three years no positive samples were reported in farmed wild boar in EU and since the middle of the 1990's *Trichinella* have only been reported twice in horses by MS.

In non-farmed wild boars, *Trichinella* was reported in 0.2% of the samples taken. Positive samples from non-farmed wild boars represented 63.8% of the total number positive samples reported in the MS. Poland and Spain reported the majority (82.4%) of these positive samples, although only 40.8% of the examined non-farmed wild boars were from these countries (Table TR4). This is similar to the reporting from 2005.

Table TR4. Number of reported Trichinella findings in animals, 2006

	Pigs		Wild boar - farmed		Wild boar - not farmed		Bears	
	N	Pos	N	Pos	N	Pos	N	Pos
Austria	5,361,710	0	-	-	-	-	-	-
Belgium	10,158,164	0	-	-	9,284	0	-	-
Czech Republic	3,884,275	0	335	0	27,554	1	-	-
Denmark	21,106,788	0	1,324	0	-	-	-	-
Estonia	438,181	0	-	-	2,581	12	28	7
Finland	2,422,590	0	638	0	2	0	59	3
France	192,444	0	1,339	0	28,458	0	-	-
Germany	-	-	-	-	85,719	3	-	-
Greece	575,124	0	168	0	-	-	-	-
Hungary	4,333,000	0	-	-	30,000	10	-	-
Ireland	3,743	0	-	-	-	-	-	-
Italy	8,704,937	5	935	0	30,108[1]	0	-	-
Latvia	493,683	0	-	-	1,262	11	-	-
Lithuania	987,137	0	-	-	9,285	60	-	-
Luxembourg	2,541	0	-	-	270	0	-	-
Netherlands	13,959,723	0	-	-	793[2]	0	-	-
Poland	21,985,532	28	-	-	78,650	321	1	1
Portugal	15,183	0	1,466	0	10	0	-	-
Slovakia	1,111,082	0	-	-	10,106	7	9	0
Slovenia	428,552	0	1	0	475	1	56	0
Spain	37,734,413	9	-	-	70,566	172	-	-
Sweden	3,033,740	0	-	-	11,226	0	108	0
United Kingdom	1,043,516	0	2,488	0	-	-	-	-
EU Total	**137,976,058**	**42**	**8,694**	**0**	**396,349**	**598**	**261**	**11**
Bulgaria	210,913	22	-	-	2,511	8	-	-
Norway	1,527,500	0	-	-	-	-	-	-
Romania	2,372,120	670	-	-	4,179	27	73	7
Switzerland	1,249,091	0	-	-	1,883	0	-	-

1. In Italy, an additional 821 wild boars with no information on farmed/not farmed were examined, all were negative
2. In the Netherlands, an additional 482 wild boars with no information on farmed/not farmed were examined, all were negative
3. In Finland, four positive samples out of 16 samples from marten, two positive samples out of 12 samples from badgers and two positive samples out of 5 samples from otters
4. In Latvia, one positive sample out of two samples from beaver
5. In Bulgaria, one positive sample out of three samples from badger

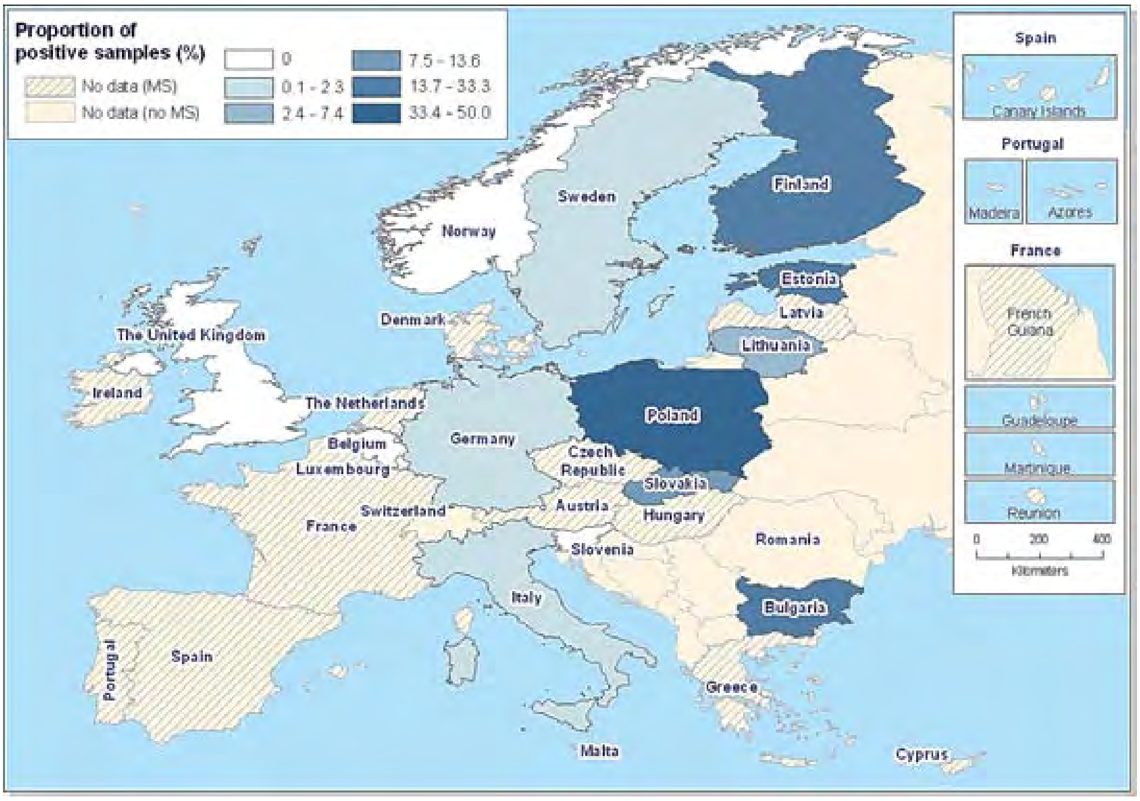
Foxes		Lynx		Raccoon dogs		Wolves		Other wildlife	
N	Pos	N	Pos	N	Pos	N	Pos	N	Pos
-	-	-	-	-	-	-	-	-	-
42	0	-	-	-	-	-	-	15	0
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	2	2	-	-	-	-	-	-
215	45	100	47	212	55	37	7	33	8[3]
-	-	-	-	-	-	-	-	-	-
1359	1	-	-	-	-	-	-	2871	0
-	-	-	-	-	-	-	-	9	0
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
408	7	-	-	-	-	21	3	144	0
-	-	-	-	-	-	-	-	3	1[4]
54	4	-	-	-	-	-	-	-	-
23	0	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	1	0
-	-	-	-	-	-	-	-	6	0
723	99	-	-	-	-	1	1	2	0
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
202	2	70	3	-	-	9	2	-	-
700	0	-	-	-	-	-	-	-	-
3,726	**158**	**172**	**52**	**212**	**55**	**68**	**13**	**3,084**	**9**
-	-	-	-	-	-			3	1[5]
-	-	1	0	-	-			-	-
-	-	-	-	-	-			-	-
-	-	-	-	-	-			-	-

Wildlife species have a much higher proportion of *Trichinella* positive samples than the domestic animal population, this is particularly the case for the carnivorous animal species (Table TR4).

In wildlife animal species other than non-farmed wild boar, positive findings were reported from nine MS and two non-MS, mostly from the eastern and north-eastern part of EU (Fig TR2). As in previous years, Finland reported the majority of positive samples, mainly from foxes, lynx, raccoon dogs and wolves, followed by Slovakia that reported 33.6% of the total positive samples, mainly in foxes. For additional information on data provided on *Trichinella* in domestic animals and wildlife, please refer to Level 3.

Unfortunately, information concerning the subspecies of *Trichinella* was not provided in 73.7% of the positive samples. Six countries reported samples positive with *T. spiralis* in non-farmed wild boars, foxes, badgers and pigs, in total 15.5% of all positive samples. Four MS: Czech Republic, Slovakia, Slovenia and Spain reported findings of *T. britovi* in non-farmed wild boars and foxes, representing 10.8% of all samples.

Figure TR2. Findings of Trichinella in selected omnivorous and carnivorous wildlife species (excluding wild boar), 2006



Note. Findings in the following species are included: badgers, bears, foxes, lynx, marten, otter, raccoon dogs, racoons, rodents and wolves
In the map, a natural breaks classification method is used.

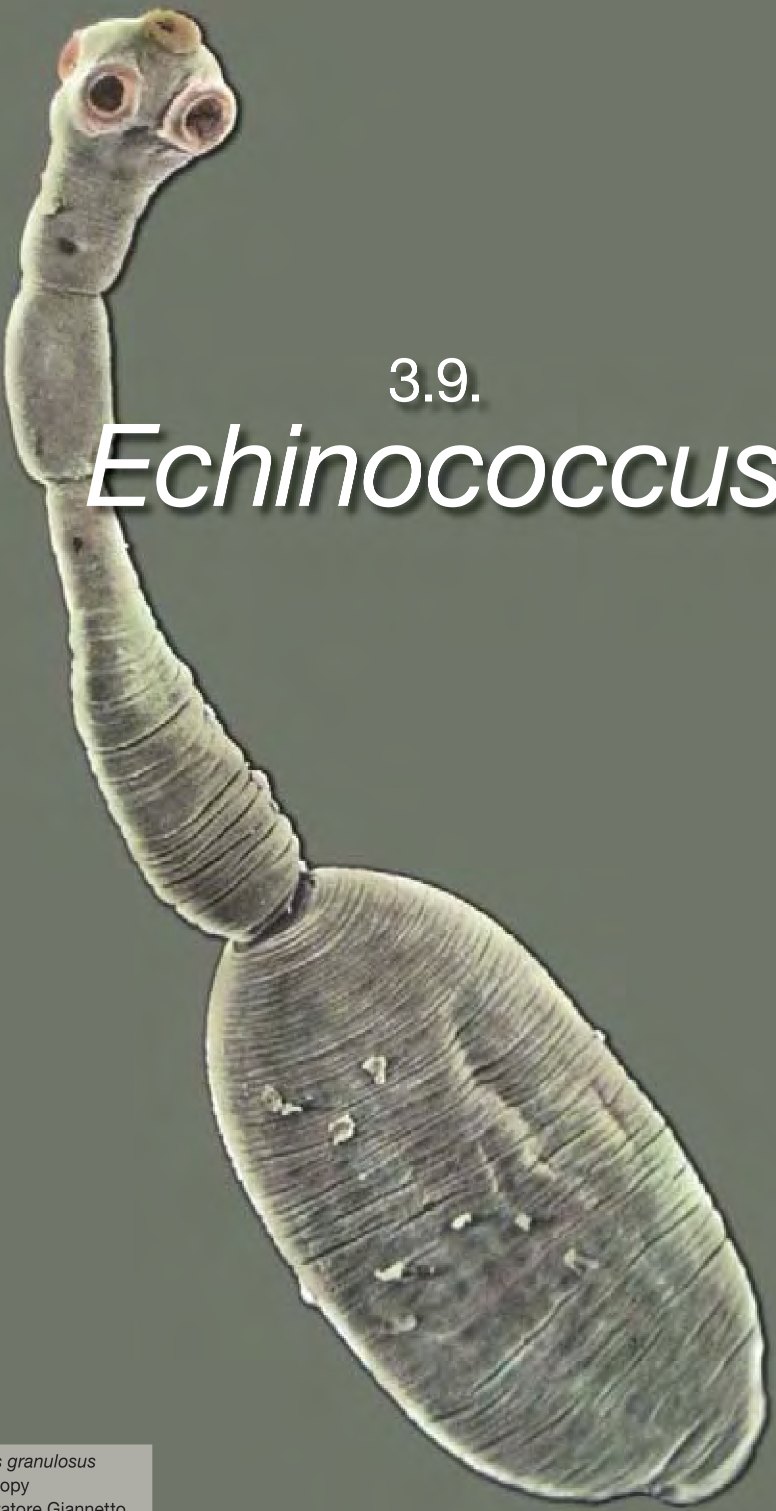
3.8.3. Discussion

Generally, few cases of *Trichinella* in humans are reported in MS and the increase observed in 2006 was mainly due to substantial outbreaks in Poland, Germany, Lithuania and Spain. In the previous years, several MS have reported the majority of human cases to be a result of consumption of raw or improperly cooked meat that has not been subjected to *Trichinella* examination, or of privately imported meat infected with *Trichinella*. According to Community legislation, carcasses found positive for *Trichinella* in meat inspection are destroyed to avoid the human health risk. In 2006, the reported *Trichinella* outbreaks were related to unspecified meat, pig meat and meat from wild boar (see chapter 5 on Foodborne outbreaks).

A very high number of human cases and positive samples from pigs were reported by the new MS Bulgaria and Romania, and trichinellosis must be considered a relevant zoonotic disease in these countries.

A much higher proportion of *Trichinella* positive samples are observed in the wildlife population compared to the domestic animals, indicating that the wildlife serves as a reservoir of the parasite. Indeed, most of the positive animals were found in countries investigating carnivorous wildlife species. Hunting of non-farmed wild boars and carnivorous wildlife species represents a special risk for consumers if the meat of the animals is not properly investigated for the parasite. Therefore, it is important that the population (in particular hunters and their families) is informed of this foodborne health hazard related to game meat not subject to meat inspection.

3.9. *Echinococcus*



Adult worm of *Echinococcus granulosus* by scanner electron microscopy kindly provided by Prof. Salvatore Giannetto, Messina University, Italy

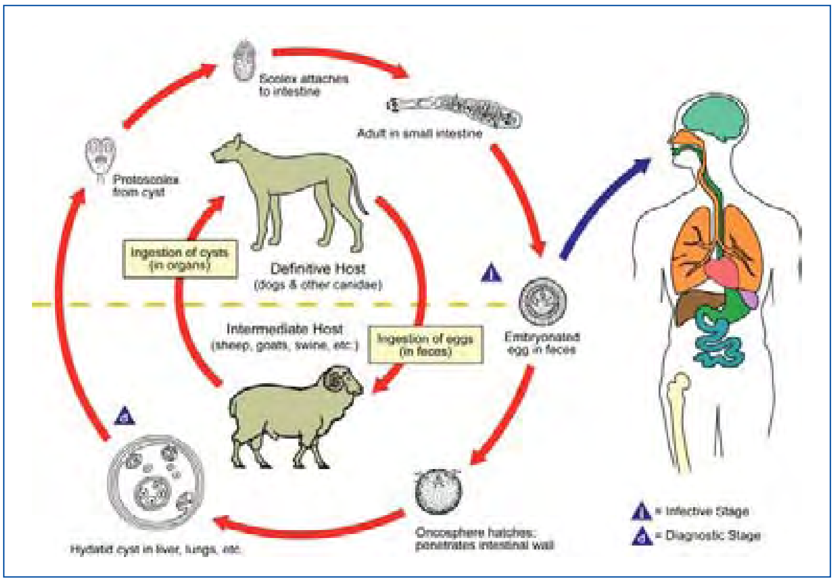
3. INFORMATION ON SPECIFIC ZOONOSES

3.9. *Echinococcus*

Human echinococcosis (also known as hydatid disease) is caused by the larval stages of the small tapeworms of the genus *Echinococcus.* In Europe, this disease is caused by two of the four recognised species, namely *E. granulosus* or *E. multilocularis*.

E. granulosus lives in the small intestines of dogs and other canids. Sheep and goats are the main hosts of the larval stage of the parasite, and also cattle may be particularly prone to this infection. Humans may become infected through accidental ingestion of the eggs of the tapeworm, shed in the faeces of infected dogs or other canids. The eggs hatch in the digestive tract releasing oncospheres which may enter the bloodstream and migrate to the liver, lungs and other tissues to develop into cysts. These cysts may develop unnoticed over many years, and ultimately rupture (Figure EH1). Clinical symptoms and signs of the disease (cystic echinococcosis) 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 have the same life cycle as *E. granulosus.* However, the definitive hosts are foxes, raccoon dogs and to a lesser extent dogs, 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 also acquire *E. multilocularis* infection by ingesting eggs shed by the definitive host.

E. multilocularis is the causative agent of highly pathogenic alveolar echinococcosis in man and other mammals. Although a rare disease in humans, alveolar echinococcosis is a chronic cancer-like disease of considerable public health importance since it is fatal in up to 100% of untreated patients.

Table EH1 presents an overview of countries reporting data in 2006.

Table EH1. Overview of countries reporting data on Echinococcus spp., 2006

	Total number of MS reporting	Countries
Human	23	**All MS** except DK and LU **Non-MS:** BG and NO
Animals	20	**All MS** except BE, CY, IE, LT and MT **Non-MS:** NO, RO and CH

3.9.1. Echinococcosis in humans

In 2006, 23 MS and two non-MS reported data on echinococcosis. The MS reported a total of 458 cases, of which only three cases were not laboratory confirmed. In total, the number of cases has increased by almost 50% since 2005, mainly due to increased number of cases reported by Austria, Germany, Latvia, Poland and Spain. In many MS the reported numbers of cases fluctuate over the years and consequently no statistically significant trend across Europe or within MS has been observed. Bulgaria reported data for the first time in 2006. With a total of 543 cases, Bulgaria reported more cases than the EU MS together (Table EH2)

Table EH2. Reported cases of echinococcosis in humans, 2002-2006, incidence[1] for confirmed cases and distribution on Echinococcus species, 2006

	2006							2005	2004	2003	2002
	Report type[2]	Conf. cases per 100,000 population	Species distribution of confirmed cases			Echinococcus spp. No. of cases		Echinococcus spp. No. of cases			
			E. g.[3]	E. m.[4]	*E.*spp. unknown	Total	Confirmed	Total	Total	Total	Total
Austria	A	0.3	-	-	26	26	26	9	25	34	-
Belgium	A	0.1	-	-	6	6	6	0	1	-	-
Cyprus	C	0.8	-	-	6	6	6	1	0	2	2
Czech Republic	C	0	-	-	2	2	2	2	-	-	-
Denmark	-	-	-	-	-	-	-	-	9	0	0
Estonia	-	0	-	-	-	0	0	0	0	1	0
Finland	-	0	-	-	-	0	0	-	4	2	0
France	C	0	0	11	0	11	11	17	17	6	-
Germany	C	0.2	76	30	18	124	124	109	97	86	-
Greece	C	0	-	-	5	6	5	-	26	17	24
Hungary	C	0.1	1	-	5	7	6	5	11	-	-
Ireland	C	0	-	-	-	0	0	0	-	-	-
Italy	-	0	-	-	-	0	0	-	-	1	-
Latvia	C	1.0	14	6	2	22	22	5	2	4	6
Lithuania	A	0.4	-	-	15	15	15	15	15	2	-
Luxembourg	-	-	-	-	-	-	-	0	-	-	-
Malta	-	0	-	-	-	0	0	0	-	-	-
Netherlands	C	0.2	30	1	-	31	31	-	34	36	32
Poland	C	0.2	25	9	31	65	65	34	21	34	40
Portugal	C	0.1	0	0	9	10	9	9	57	10	11
Slovakia	C	0.1	-	-	6	6	6	2	0	1	10
Slovenia	C	0.1	-	-	3	3	3	0	1	1	-
Spain	C	0.2	0	0	98	98	98	78	6	167	175
Sweden	C	0.1	0	0	7	7	7	4	9	4	14
United Kingdom	C	0	12	0	1	13	13	14	8	6	15
EU Total		**0.1**	**158**	**57**	**240**	**458**	**455**	**304**	**343**	**414**	**329**
Bulgaria	A	7.0	-	-	543	543	543				
Norway		0	-	-	-	-	0	1	0	0	0

1. EU-Total incidence is based on population in reporting countries
2. A: Aggregated, C: Case based, -: no report
3. *E. granulosus*
4. *E. multilocularis*

In the EU, the reported incidence ranged from <0.1 to 1.0 per 100,000 population with the highest incidence reported by Latvia. Germany, Poland and Spain were the three MS reporting most cases in 2006 and they accounted for 63.1% of all confirmed cases in the EU, similar to 2005. As expected, *E. granulosus* was the most frequently reported species (34.7% of the confirmed cases). *E. multilocularis* was reported in 12.5% of the confirmed cases, and in 52.7% of the cases the species was unknown (Table EH2). Bulgaria reported an incidence of 7.0 per 100,000 population which was by far the highest incidence reported by any country.

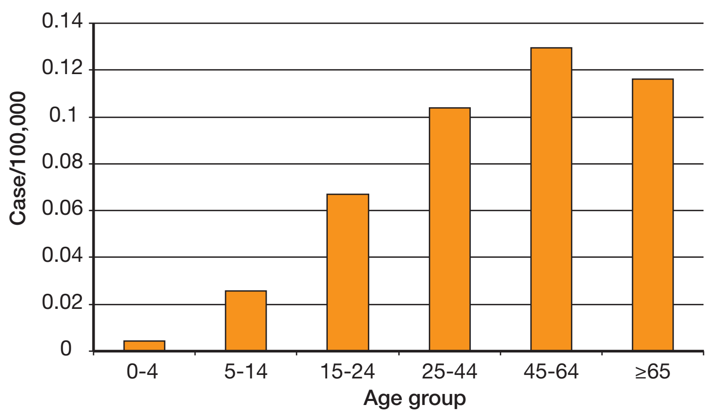
Unfortunately, the quality of the data concerning the country of origin of *Echinococcus* infections is generally limited. In 2006, only 10 countries reported the origin of the cases and 67.3% of the cases were domestic. Germany, Sweden and the United Kingdom were the only MS to report imported cases (Table EH3). In 31.1% of the confirmed cases the origin was unknown.

Table EH3. Distribution of confirmed echinococcosis cases in humans by country and origin of cases (import/domestic) in MS providing the information, TESSy data, 2006

	Domestic	Imported	Unknown	Total
Cyprus	6	0	0	6
Czech Republic	2	0	0	2
France	0	0	11	11
Germany	40	84	0	124
Greece	0	0	5	5
Hungary	6	0	0	6
Latvia	22	0	0	22
Netherlands	0	0	31	31
Poland	0	0	65	65
Portugal	9	0	0	9
Slovakia	6	0	0	6
Slovenia	0	0	3	3
Spain	98	0	0	98
Sweden	0	6	1	7
United Kingdom	0	2	11	13
EU Total	**189**	**92**	**127**	**408**

For MS not reporting aggregated data, the age distribution of cases was similar to 2005, with most cases distributed among the age groups 25-44, 45-64 and ≥ 65 years (Figure EH2). It typically takes an infected person 10-15 years to develop clinical symptoms, which at least in part explains the lower number of cases reported in the younger age groups. In general, no particular seasonality to the distribution of cases is observed, although in 2006 more cases were reported in the winter months.

Figure EH2. Incidence of confirmed echinococcosis cases in humans by age group, 2006



3.9.2. *Echinococcus* in animals

In 2006, 20 MS and three non-MS provided information concerning *Echinococcus* in animals. Austria, Denmark, Estonia, Slovakia and Sweden were the only MS with no positive findings. Spain and the United Kingdom reported positive findings both in farmed animals and wildlife and France, Germany and Switzerland reported positive findings in pets and wildlife (Table EH4).

Table EH4. *Echinococcus* in animals, 2005-2006

	2006			2005		
	Farm	Pets	Wildlife	Farm	Pets	Wildlife
Austria	0	-	-	0	-	+
Belgium	-	-	-	+	-	-
Cyprus	-	-	-	+	0	+
Czech Republic	-	-	+	-	-	+
Denmark	0	-	-	0	-	-
Estonia	0	-	0	0	-	+
Finland	0	0	+	0	0	+
France	-	+	+	-	0	+
Germany	0	+	+	0	0	+
Greece	+	-	-	+	-	-
Hungary	+	-	-	+	-	-
Italy	+	-	0	+	-	-
Latvia	+	-	-	0	-	-
Luxembourg	-	-	+	-	-	+
Netherlands	0	-	+	-	-	+
Poland	+	-	-	+	0	-
Portugal	+	0	-	+	0	-
Slovakia	0	0	0	+	0	+
Slovenia	+	-	0	+	-	+
Spain	+	-	+	+	-	+
Sweden	0	-	0	0	0	0
United Kingdom	+	-	+	+	-	-
Norway	0	-	+[1]	0	-	+[1]
Romania	+	-	0	-	-	-
Switzerland	0	+	+	+	+	+

+: *Echinococcus* cases registered
0: No registered *Echinococcus* cases
-: No information provided
1. In Norway, wildlife in the archipelago of Svalbard

Echinococcus in domestic animals

In total, nine MS and one non-MS reported positive findings in farm animals (Table EH5). The information was derived from samples taken during meat inspection at slaughterhouses. As in previous years, the prevalence of *Echinococcus* in farm animals was generally low, except for Romania, which reported 21.0% samples positive in cattle and 5.9% positive samples in sheep. Unfortunately, Romania did not provide information on the incidence of echinococcosis in humans; however, considering the higher infection level in the farm animals, echinococcosis may be an important threat in the country. Greece, Italy, Spain and the United Kingdom were the only MS to report positive cases in cattle, pigs, goats and sheep, whereas Italy, Spain and Romania were the only countries to report *Echinococcus* spp. in solipeds.

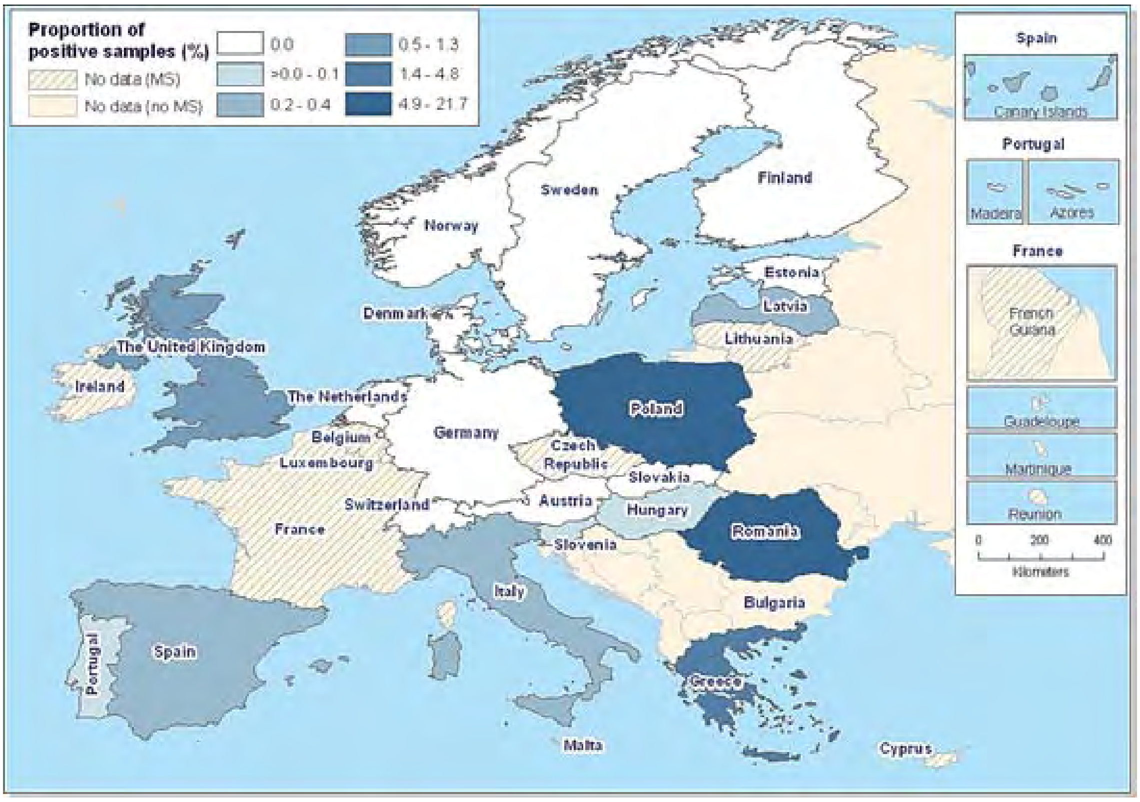
Table EH5. Echinococcus in farm animals, 2006

	Cattle		Goats		Pigs		Sheep		Solipeds	
	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos
Greece	170,940	1,669	797,992	3,297	837,165	208	2,261,210	45,900	-	-
Hungary	125,840	0	-	-	4,333,000	392[1]	50,000	0	-	-
Italy	1,889,730	9,794[2]	61,433	419[3]	9,240,856	125[4]	504,880[5]	8,992	66,038	13
Latvia	113,443	-	-	-	493,683	721	6,247	-	429	0
Poland	1,426,765	16	111	0	21,985,532	744,260	21,266	1,309	-	-
Portugal	177,764	95	-	-	2,105,456	8	1	0	-	-
Slovenia	140,430	9[1]	315	0	428,552	14[1]	10,263	0	1,497	0
Spain	2,606,899	19,612	-	-	37,734,413	18,167	16,014,018[6]	71,476	27,251	41
United Kingdom	1,830,241[7]	1,275	6,625	3	7,898,653	38	15,462,285	96,243	-	-
EU Total	**8,482,052**	**32,470**	**866,476**	**3,719**	**85,057,310**	**763,933**	**34,330,170**	**223,920**	**95,215**	**54**
Romania	195,409	40,948	231	0	1,644,893	44,246	293,645	17,211	16,163	7

1. *E. granulosus*
2. In Italy, 2,870 positive samples reported as *E. granulosus* and 11 as *E. multilocularis*
3. In Italy, 19 positive samples reported as *E. granulosus*
4. In Italy, four positive samples reported as *E.granulosus*
5. In Italy, 410,462 samples from sheep and 3,419 samples out of 4,344 positive samples were reported as *E. granulosus*. An additional 94,418 animals were reported as "sheep and goats" and 3,648 were positive
6. In Spain, sheep and goats reported together.
7. In the United Kingdom, additional 161,732 OTMS/OCDS cattle (not for human consumption) were tested and 3,066 were positive for *Echinococcus spp.*(1.9%)

As in previous years, several of the Mediterranean MS had the highest *Echinococcus* prevalence in farm animals as illustrated in Figure EH3. This map is presented for *Echinococcus* spp., even though, from an epidemiological perspective it would be better to have distinct maps for the two *Echinococcus* species. Unfortunately, the available data does not facilitate that. Very little information is provided concerning the *Echinococcus* species distribution in farmed animals, but the few available reports refer to *E. granulosus*. The United Kingdom reported that *E. granulosus* is present in their sheep population while *E. multilocularis* has never been found the country.

Figure EH3. Findings of Echinococcus spp. in farm animals, 2006



Note: include data from cattle, dear, goats, pigs, sheep, solipeds, farmed wild boars
In the map, a natural breaks classification method is used.

The possible trends at EU level in the prevalence of *Echinococcus* in cattle, sheep and goats were assessed statistically. A regression analysis was performed to investigate the proportion positive *Echinococcus* samples in cattle in the reporting countries. The analysis included information from Greece, Italy and Spain that provided data from the years 2002-2006 and additionally Slovenia providing data from 2004-2006. Data were analysed in two groups (Northern Europe and Southern Europe) and means were estimated by weighting the proportion of positive samples per year with inverse proportion of "number of animals tested per MS per year" divided by "the total population of cattle per MS per year" (reported by the MS in the National report). No significant EU trends were observed.

A similar regression analysis was performed to study the reported proportion positive *Echinococcus* samples in sheep and goats. This included data from Greece, Italy and Spain reporting data from 2002-2006 and additionally Poland, Portugal, Slovakia and Slovenia providing data from 2004-2006. No significant EU level trends were observed either in sheep and goats.

Five MS and one non-MS reported information from pets. France found four out of 420 dogs positive for *E. multilocularis* and Switzerland reported *Echinococcus* spp. in 10 out of 41 dogs examined. Germany found two out of 96 investigated cats positive for *Echinococcus* spp.

Echinococcus in wildlife
In 2006, five MS reported positive findings of *E. multilocularis* in foxes (Table EH6). The largest number of foxes was examined in Germany and 25% were found positive. This finding is similar to German reports from previous years. In Luxembourg and France, 30% and 24% of the tested animals were positive for *E. multilocularis*, respectively. Finland and Sweden examined 209 and 300 foxes, respectively, all of which were found negative. In previous years, Finland and Sweden have also reported no findings in foxes. The majority of findings in wildlife were reported by central European countries Figure EH4.

Table EH6. Echinococcus in foxes, 2002-2006

	2006			2005		2004		2003		2002	
		E. spp.[1]	*E. m.*[2]								
	N	Pos	Pos	N	Pos	N	Pos	N	Pos	N	Pos
Austria	-	-	-	19	1	86	7	807	45	592	40
Denmark	-	-	-	-	-	-	-	34	0	-	-
Czech Republic	958	-	107	833	62	-	-	-	-	-	-
Finland	209	-	0	281	-	355	0	-	-	-	-
France	131	-	31	172	10	986	75	-	-	-	-
Germany	3,605	37	869	7,764	2,305	5,398	1,324	4,483	1,497	7,860	2,234
Luxembourg	23	-	7	329	69	35	0	29	8	58	22
Netherlands	49	-	3	45	3	-	-	171	22	-	-
Slovakia	-	-	-	289	108	490	148				
Sweden	300	-	0	300	-	300	-	300	-	-	-
EU Total	**5,275**	**37**	**1,017**	**10,032**	**2,558**	**7,350**	**1,554**	**5,824**	**1,572**	**8,510**	**2,296**
Norway	-	-	-	327[3]	0	-	-	-	-	-	-
Switzerland	14	2	-	33	13						

-: No data reported, blank: country not a member of EU
1. *E.spp.*: *Echinococcus* unspecified
2. *E.m.*: *E. multilocularis*
3. Includes foxes killed during period 2002-2005

Figure EH4. Findings of E. multilocularis in foxes, 2005-2006[1]

1. For Austria and Slovakia 2005 data was used.
In the map, a natural breaks classification method is used.

Over the past ten years, the population of red foxes has increased in the EU and these animals are progressing into urban zones. The red fox is the most important definitive host of *E. multilocularis* and increased contact between foxes and humans in urban areas will increase the risk of humans becoming infected in the areas where foxes are infected.

In wildlife other than foxes, *E. granulosus* was reported in reindeer and wolves from Finland and *E. multilocularis* was reported in voles from Norway (Archipelago of Svalbard). Spain reported unspecified *Echinococcus* spp. in deer and wild boars and the United Kingdom reported unspecified *Echinococcus* spp. in deer (Table EH7).

Control strategies and information campaigns
As a part of the strategy to control the spread of *Echinococcus*, Finland recommends treating hunting dogs with antihelmintic drugs before and after the hunting season. Since 1999, Belgium has had an information campaign running in the parks and woodlands where consumption of berries is discouraged by warning messages.

Table EH7. Echinococcus in wildlife other than foxes, 2006

	E. granulosus		E. multilocularis		Echinococcus spp.	
	N	Pos	N	Pos	N	Pos
Alpine chamois	-	-	-	-	14	0
Bears	-	-	-	-	10	0
Deer	-	-	-	-	238,047	20
Ferrets	-	-	-	-	1	0
Moose	-	-	-	-	1,466	0
Mouflons	-	-	-	-	64	0
Raccoon dogs	-	-	-	-	189	0
Reindeers	89,749	9	-	-	103,556	0
Voles	-	-	14	2	2,100	0
Wild boars	-	-	-	-	75,397	41
Wolves	33	2	-	-	5	0
Total	**89,782**	**11**	**14**	**2**	**420,849**	**61**

For additional information on data provided on *Echinococcus* in animals please refer to Level 3.

3.9.3. Discussion

In 2006, the total number of human echinococcosis cases reported by the countries increased by more than 200% compared to 2005, mainly due to the Bulgarian data, which were reported for the first time. Bulgaria reported 543 confirmed cases which exceeded the total number of cases reported by all the MS together in 2006, thus echinococcosis appears to be an important zoonosis in the country. Unfortunately, Bulgaria did not submit any information on the *Echinococcus* prevalence in animals. Germany, Latvia and Poland reported increased numbers of cases in 2006 compared to the previous years.

E. multilocularis, the cause of alveolar echinococcosis in humans which may be fatal in untreated patients, was reported in foxes mainly in many central European MS. With the increasing population of foxes in the Community, and the migration of these animals into urban areas, there may be an increased risk of humans becoming infected through accidental ingestion of food contaminated with fox faeces.

In farm animals, the majority of positive *Echinococcus* findings were reported in the Mediterranean MS. No significant trends in the prevalence were observed. The farm animals act as intermediate hosts of the parasite and do not pose an infection risk for humans.

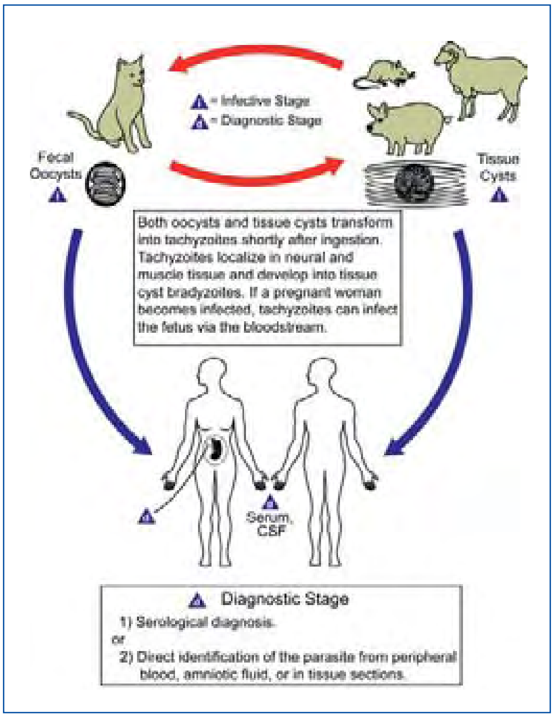
Unfortunately, in most of the reported findings in animals, information on the species of *Echinococcus* was not provided. Since both *E. multilocularis* and *E. granulosus* have their own distinctive epidemiology, and because the form of risk posed to human health by the individual species differs, it would be useful to have more information concerning the species distribution. This would facilitate a more thorough analysis of the situation in the EU.

3. INFORMATION ON SPECIFIC ZOONOSES

3.10. *Toxoplasma*

Toxoplasmosis is a common and cosmopolitan infection in animals and humans. It is caused by an obligate intracellular protozoan parasite, *Toxoplasma gondii*. Many species of warm-blooded animals can act as intermediate hosts, and seemingly all animals may be carriers of tissue cysts of this parasite. The parasite, however, only matures in cats and felids which are the definitive hosts (Figure TO1). The infection may be acquired by humans through the consumption of undercooked meat contaminated with parasite cysts or food and water contaminated with cat faeces or from handling contaminated soil or cat litter trays. Assisting sheep during lambing is also a known risk factor.

Figure TO1. Lifecycle of Toxoplasma gondii



Source: Centre for Disease Control and Prevention – U.S.A. - http://www.dpd.cdc.gov/dpdx

In humans, the majority of infections are asymptomatic or cause mild flu-like symptoms. However, toxoplasmosis can be life threatening especially for immunocompromised individuals. If acquired during pregnancy, toxoplasmosis can cause abortion or congenital malformation affecting the brain, eyes or other organs of the foetus.

In animals, *T. gondii* is an important cause of abortion in sheep and goats, yet it may be controlled by proper management practices and vaccination. The parasite is most frequently reported in cats, dogs, sheep, goats and pigs.

Table TO1 provides an overview of countries reporting data in 2006.

Table TO1. Overview of countries reporting data on Toxoplasma spp., 2006

	Total number of MS reporting	Countries
Animal	16	**MS:** AT, EE, FI, FR, DE, GR, HU, IE, IT, LV, LT, NL, PO, PT, SK, UK
		Non-MS: NO, CH

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

3.10.1. Toxoplasmosis in humans

In 2006, no data on human cases were available through the networks on communicable disease epidemiological surveillance and control. Eight MS and one non-MS, however, submitted data on human infections in their national reports, covering human toxoplasmosis and congenital cases. A number of factors may influence the observed proportion of human cases, such as differences in cooking habits, hygiene, parasite prevalence in local animal populations and status of active monitoring programmes. A few countries perform routine surveillance for toxoplasmosis in pregnant women or newborn babies. Denmark is the only country providing data from a nationwide screening system for congenital toxoplasmosis. Every newborn baby has been tested since the programme was initiated in 1999 (50,000-60,000 per year) resulting in nine to 15 cases being diagnosed every year.

3.10.2. *Toxoplasma* in animals

Data on *T. gondii* in animals were provided from 16 MS and two non-MS (Table TO1). Most MS have no active surveillance programmes and the majority of samples collected was based on clinical suspicion, thus results reflect neither the general prevalence in animal populations nor the overall risk of human exposure. Additionally, results are not readily comparable between MS due to differences in the sampling and testing schemes. Italy was the only MS to report monitoring data. Information from investigations covering 25 or more samples are summarised in Table TO2.

In 2006, 15 countries provided data on *T. gondii* in domestic animals, whereof nine provided data on *T. gondii* in sheep. This animal species had the highest proportion of positive samples (43.0%), which was similar to the findings in 2005. Seven countries reported data on cattle and six countries reported data on goats and 22.9% of the samples were positive for both animal species. However, for sheep, goats and cattle large variations in the proportion of positive samples between countries were reported (Table TO2). Occasional findings of *T. gondii* from pigs were also recorded.

Nine countries provided data on cats and 23.7% of the samples were positive. Five MS provided data on dogs and 9.2% of the samples were positive. Furthermore, some findings of *T. gondii* were also recorded from hares, pigeons and rabbits. All reported data are available in Level 3.

Table TO2. *Toxoplasma* in domestic animals, 2006[1]

	Cattle		Goats		Pigs		Sheep		Cats		Dogs	
	N	% pos	N	% pos	N	% pos	N	% pos	N	% pos	N	% pos
Austria	-	-	64	17.2	48	16.7	98	32.7	-	-	-	-
Finland	468	0	-	-	1,010	0	132	0.8	254	0	493	0
France	364	69.0	400	25.5	-	-	2,959	51.1	1,010	49.2	-	-
Germany	461	0	26	0	648	0	552	31.5	435	1.2	216	0.9
Greece	-	-	53	69.8	-	-	-	-	-	-	-	-
Ireland	37	0	-	-	-	-	371	17.8	-	-	-	-
Italy	222	6.3	728	19.4	33	12.1	4,412	43.2	159[2]	30.8	120	26.7
Latvia	-	-	-	-	-	-	-	-	79	15.2	116	28.4
Lithuania	-	-	-	-	-	-	46	0	42	4.8	-	-
Netherlands	1,793	28.2	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	88	3.4	-	-
Portugal	28	14.3	32	37.5	-	-	41	19.5	-	-	-	-
Slovakia	-	-	-	-	-	-	-	-	147	19.0	75	37.3
EU Total	**3,373**	**22.9**	**1,303**	**23.3**	**1,739**	**0.7**	**8,611**	**43.0**	**2,214**	**26.9**	**1,020**	**9.2**
Norway	-	-	-	-	-	-	50	52.0	-	-	-	-
Switzerland	-	-	-	-	-	-	-	-	304	0.7	-	-

1. Data are only presented for sample size equal or greater than 25
2. Two investigations pooled

3.10.3. Discussion

As in 2005, no human data on toxoplasmosis was available for 2006 through the EU Communicable Disease Networks. However, some MS included information on human infections in their national reports. There are great differences in the MS surveillance systems for toxoplasmosis, and some MS do not currently have a system in place.

In 2006, data from animals were mainly results from diagnostic investigations. Consequently, the prevalence of analysed samples does not reflect the general prevalence in animal populations. In general, the focus on toxoplasmosis in animals may be explained rather by the fact that it may cause abortions in sheep and goats, than being a food safety issue. Information on the method for detection of *Toxoplasma* in animals is lacking from several MS.

Recently increased attention has been given to the human health aspect of toxoplasmosis, due to the serious complications that may be associated with the disease. In the end 2007, EFSA's Scientific Panel on Biological Hazards issued an opinion on surveillance and monitoring of *Toxoplasma* in humans, food and animals. This opinion also addresses several aspects of the *Toxoplasma* parasite and human toxoplasmosis. The opinion is published on EFSA website (www.efsa.europa.eu).

3.11. Rabies

3. INFORMATION ON SPECIFIC ZOONOSES

3.11. 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 the rabies cases are caused by the classical rabies virus (genotype 1). In addition, two sub-types of rabies virus, *Lyssavirus* genotypes 5 and 6, 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 swallowing, irritability, strange behaviour, alternating rage, apathy and increasing paralysis of lower jaw and hind parts. Animals may excrete the virus during the incubation period, prior to the onset of clinical symptoms.

Table RA1 presents countries reporting data in 2006.

Table RA1. Overview of countries reporting data on Lyssavirus, 2006

	Total number of MS reporting	Countries
Humans	-	No cases in 2006
Animals	22	**All MS** except for CY, IE, MT **Non-MS:** BG, NO, RO, CH

3.11.1. Rabies in humans

Generally, very few rabies cases in humans are reported in the EU, and most MS have not had any indigenous cases for decades. No cases were reported in 2006 (Table RA2).

Table RA2. Human rabies cases, 2001-2006

Year	Country	Case
2001	United Kingdom	1 visitor from Philippines
2002	United Kingdom	1 registered bat handler died from EBLV[1]
2003	France	1 visitor from Gabon
2004	Austria	1 case imported from Morocco
	Germany	1 imported case
2005	Germany	4 cases in total. Three patients became ill after receiving organs from a rabies infected donor. The donor was infected during a trip to India
2006		-

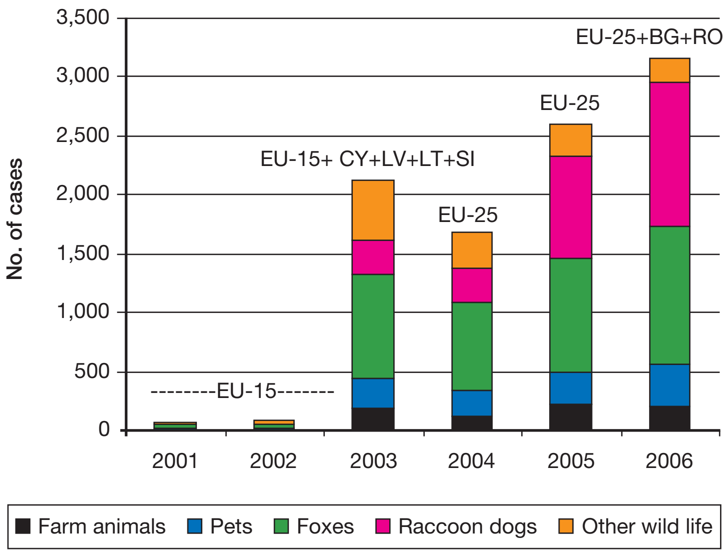
1. EBLV = European Bat Lyssavirus

3.11.2. Rabies in animals

At least since 2001, seven MS; Belgium, Finland, Greece, Italy, Luxembourg, Portugal, Sweden, and Norway (mainland) have had no reports of rabies in animals (classical rabies or EBLV). Malta has been free from rabies since 1911. Denmark, France and the United Kingdom have not reported indigenous cases of classical rabies for many years, but EBLV has been reported in bats, and in Denmark also in sheep. Most of the samples are analysed based on suspicion.

In 2006, 14 MS and two non-MS reported classical rabies in various animal species. Most of the cases were reported from raccoon dogs (38.5%) and foxes (37.1%) (Figure RA1). Six Baltic and Eastern European countries reported cases both in farmed animals, pets and in wildlife. The total number of positive animal cases increased by 22.1% compared to 2005. This was mainly due to cases reported by Romania, who reported for the first time in 2006. The majority of rabies cases are reported by Baltic and Eastern European countries and explains the large increase in number of positive samples since 2003, when these MS reported for the first time. As in previous years, the majority of cases were reported by Lithuania (70.3% of the cases in 2006), while Latvia, Romania and Estonia reported 14.8%, 8.2% and 3.9% of the cases, respectively.

Figure RA1. Reported cases of classical rabies or unspecified Lyssavirus in animals, 2001-2006



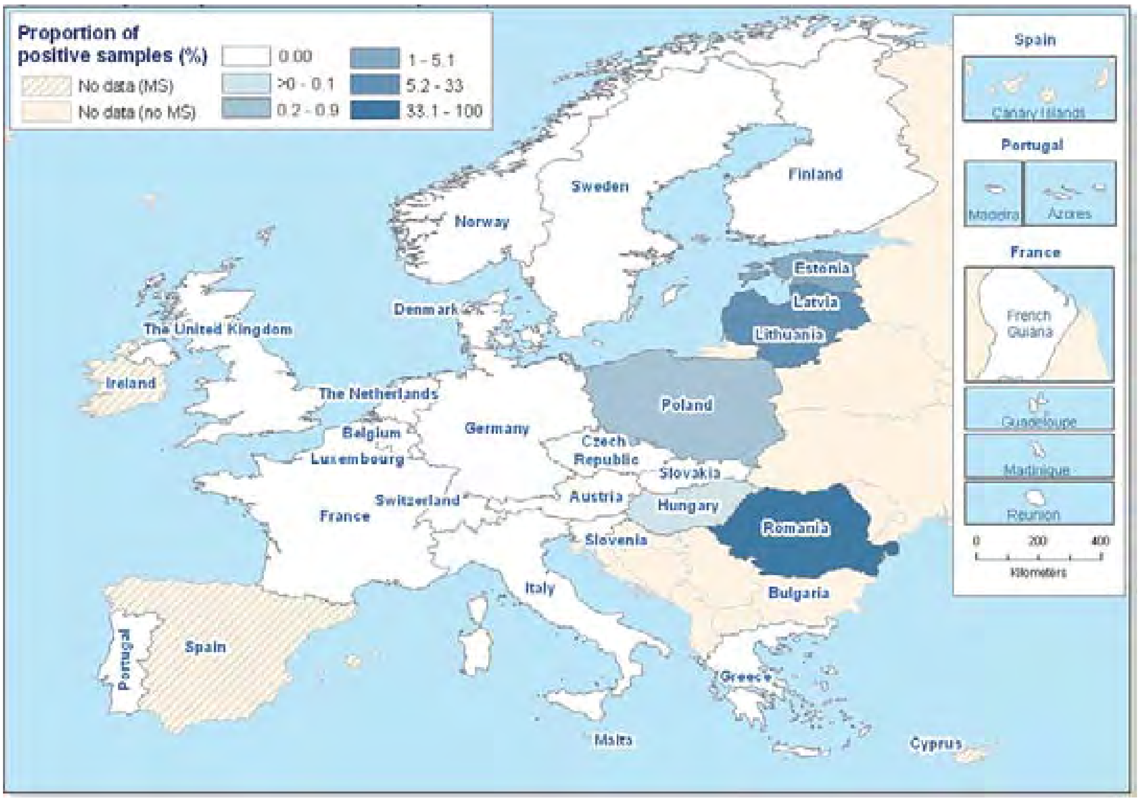
As in the previous years, all cases of rabies in domestic animals were reported from the Baltic and Eastern European MS. In 2006, 177 cases of rabies in farm animals were detected, whereof 77.4% of the cases were from cattle in Lithuania. In cats and dogs, 56.3% of the cases were reported by Lithuania (Table RA3 and Figure RA2). Spain reported one case of classical rabies in a dog imported from Morocco.

Table RA3. Reported cases of classical rabies or unspecified Lyssavirus in domestic animals, 2006

	Farm animals[1]		Pets			
			Cats		Dogs	
	N	Pos	N	Pos	N	Pos
Austria	19	0	77	0	68	0
Belgium	284	0	8	0	5	0
Czech Republic	9	0	307	0	252	0
Denmark	-	-	3	0	-	-
Estonia	69	4[2]	130	4	56	5
Finland	3	0	9	0	8	0
France	14	0	442	0	724	0
Germany	189	0	417	0	123	0
Greece	-	-	2	0	10	0
Hungary	58	1[3]	401	0	270	0
Italy	-	-	170	0	345	0
Latvia	30	13[4]	171	44	156	31
Lithuania	264	150[5]	341	88	452	111
Luxembourg	3	0	-	-	2	0
Netherlands	-	-	4	0	1	0
Poland	85	9[6]	1,184	6	815	4
Portugal	-	-	1	0	16	0
Slovakia	15	0	191	0	294	0
Slovenia	29	0	65	0	63	0
Spain	-	-	-	-	-	1[7]
Sweden	1	0	4	0	4	0
United Kingdom	-	-	23	0	21	0
EU Total	**1,072**	**177**	**3,950**	**142**	**3,685**	**152**
Norway	-	-	-	-	1	0
Bulgaria	-	1	-	4	-	1
Romania[8]	24	24	21	21	33	33
Switzerland	3	0	15	0	17	0

1. Include cattle (70-0% of the samples), sheep (15-7%), goats (7-5%), solipeds (6-2%) and pigs (0-5%)
2. In Estonia, 3 cows out of 44 and one soliped out of 7 were positive
3. In Hungary, one cow out of 31 was positive
4. In Latvia, 13 cows out of 27 were positive
5. In Lithuania, 137 cows out of 237, one goat out of one, three sheep out of eight and nine solipeds out of 18 were positive
6. In Poland, nine cows out of 76 were positive
7. In Spain, one positive dog imported from Morocco to the North African territory Melilla
8. In Romania, all data are from outbreaks

Figure RA2. Proportion of positive classical rabies or unspecified Lyssavirus cases in domestic animals, 2006



Note: Findings in the following species are included: Cattle (bovine animals), pigs, sheep, goats, solipeds, cats, dogs, hamsters (pet animals), and rabbits (pet animals)
In the map, a natural breaks classification method is used.

All MS with domestic cases of classical rabies have implemented rabies eradication programmes focusing on the wildlife population, mainly foxes, and in some MS also raccoon dogs. Austria, Czech Republic, Estonia, Finland (along the south eastern border), Germany, Latvia, Poland, Slovakia and Slovenia all have programmes approved and co-financed by the European Commission (Decision 2005/873/EC). Furthermore, Hungary, Italy (Region Friuli-Venezia-Giulia) and Lithuania had similar eradication programmes in 2006. Vaccination of carnivorous pets is compulsory in 12 countries. See the Appendix, Table RA1 for more information.

Samples collected in 2006 from wildlife were mainly from foxes (90.0%) and 1.9% of these samples were positive, representing 45.0% of all positive samples from wildlife. Samples from raccoon dogs represented only 2.9% of the total samples collected from wildlife, however, 46.7% of the total positive samples was from raccoon dogs. As for domestic animals, the majority of positive cases in the wildlife population were reported from the Baltic and Eastern European countries (Table RA4 and Figure RA3). Austria reported one positive fox diagnosed with the laboratory vaccine strain.

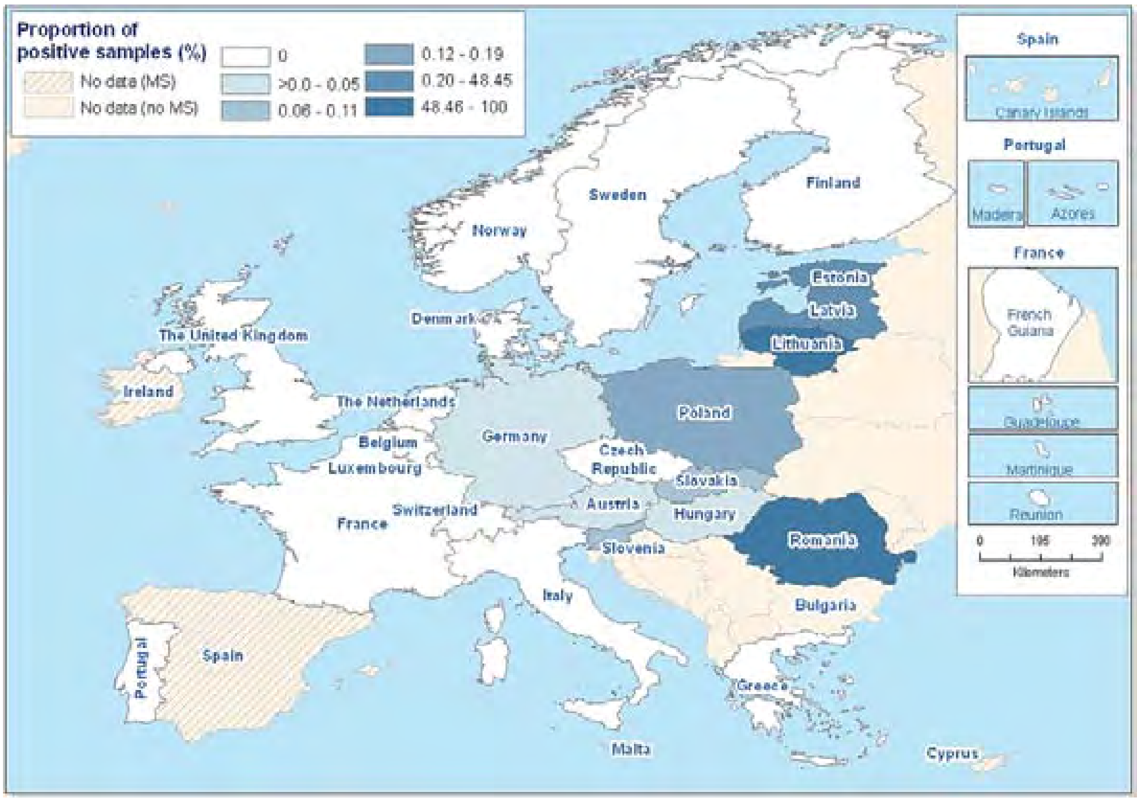
Table RA4. Reported rabies cases in wildlife, 2006

,

	Classical rabies virus or unspecified Lyssavirus												Unspecified European Bat Lyssavirus	
	Foxes		Raccoon dogs		Marten		Badgers		Wild boars		Other		Bats	
	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos
Austria	7,215	1[1]	-	-	713	0	83	0	2	0	16	0	2	0
Belgium	94	0	-	-	-	-	-	-	-	-	76	0	21	0
Czech Republic	7,066	0	6	0	86	0	23	0	8	0	135	0	12	0
Denmark	8	0	-	-	-	-	-	-	-	-	-	-	49	10
Estonia	111	38	165	60	5	0	1	1	2	0	45	2[2]	1	0
Finland	230	0	225	0	22	0	12	0	-	-	44	0	1	0
France	336	0	-	-	13	0	4	0	1	0	35	0	199	3
Germany	13,763	3	147	0	391	0	147	0	88	0	929	0	70	93
Greece	1	0	-	-	-	-	-	-	-	-	4	0	-	-
Hungary	3,601	2	-	-	12	0	58	0	9	0	47	0	4	0
Italy	2,303	0	-	-	178	0	131	0	8	0	29	0	2	0
Latvia	336	187	203	153	31	6	16	8	4	1	94	274	-	-
Lithuania	824	687	1,109	987	284	139	18	12	3	1	28	105	-	-
Luxembourg	21	0	-	-	2	0	-	-	-	-	1	0	-	-
Netherlands	3	0	-	-	-	-	-	-	-	-	-	-	120	9
Poland	21,908	43	170	15	255	1	59	0	17	0	661	0	124	4
Portugal	41	0	-	-	-	-	-	-	-	-	1	0	-	-
Slovakia	3,630	4	-	-	29	0	4	0	10	0	52	0	14	0
Slovenia	1,645	2	-	-	43	0	20	0	-	-	43	0	-	-
Sweden	1	0	-	-	-	-	-	-	-	-	3	0	26	0
United Kingdom	1	0	-	-	-	-	-	-	-	-	-	-	859	16
EU Total	**63,138**	**967**	**2,025**	**1,215**	**2,064**	**146**	**576**	**21**	**152**	**2**	**2,243**	**39**	**2,390**	**36**
Bulgaria	-	3	-	-	-	-	-	-	-	-	-	17	-	-
Norway	19	0	-	-	-	-	-	-	-	-	-	-	2	0
Romania	204	204	5	5	-	-	6	6	-	-	-	-	-	-
Switzerland	52	0	-	-	-	-	2	0	-	-	1	0	12	0

1. In Austria, 1 fox positive with the vaccination strain not the wild strain
2. In Estonia, one lynx positive out of three and one weasel positive out of 10
3. In Germany, the positive cases were reported as unspecified Lyssavirus
4. In Latvia, three beavers positive out of 7, nine deer positive out of 33, one hedgehog positive out of one, three moose positive out of four, one otter out of four, nine polecats out of 27 and one wolf out of one
5. In Lithuania, 10 deer positive out of 25
6. In the United Kingdom, the positive case was a EBLV type 2
7. In Bulgaria, one positive environmental sample from jackel

Figure RA3. Proportion of positive classical rabies or unspecified Lyssavirus cases in wild animals other than bats, 2006

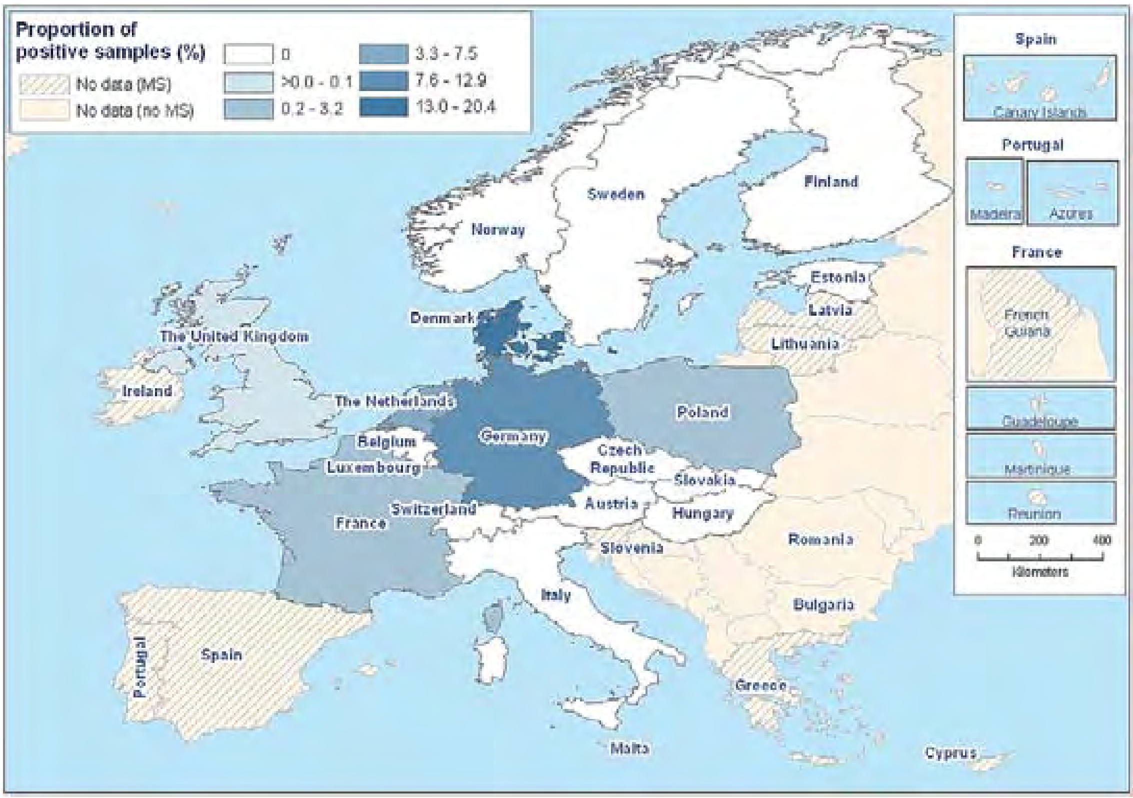


Note. Findings in the following species are included: Badgers, beavers, bears, deer, dormice, ferrets, foxes, geese, hamsters, hares, hedgehogs, jackals, lynx, marten, mice, mink, moles, moose, other carnivores, other ruminants, otter, pigeons, rabbits, raccoons, raccoon dogs, rats, rodents, squirrels, voles, weasels, wild animals, wild boars and wolves

In the map, a natural breaks classification method is used.

In 2006, EBLV was reported from bats in five MS; Denmark, France, the Netherlands, Poland and the United Kingdom (Table RA4). All these MS reported unspecified EBLV except the United Kingdom, who specified the cases to be EBLV type 2. Germany reported positive cases in bats as unspecified *Lyssavirus*. Generally, EBLV cases are reported by MS with no or very little classical rabies (Figure RA4).

Figure RA4. Proportion of positive European Bat Lyssavirus (EBLV) or unspecified Lyssavirus cases in bats, 2006



Note: In the map, a natural breaks classification method is used.

For additional information on data on rabies in animals and the historical overview of findings, please refer to Level 3.

3.11.3. Discussion

In 2006, no human cases of rabies were reported by the countries. Rabies is a very rare disease in humans in the EU and all potential human cases, i.e. persons that have been bitten by animals which might have been carrying rabies virus, are given prophylactic treatment after the exposure.

In most countries except the Baltic and some Eastern and Southern European countries (Estonia, Latvia, Lithuania, Poland and Romania), rabies infections in animals are very rare or have been absent for many years. The significant increase in total number of cases observed during the last four years is mainly due to new reporting countries providing information each year.

Eradication programmes against rabies where vaccine baits are distributed by airplanes have proven effective in MS with classical rabies in the wildlife, and all MS with classical rabies cases have eradication programmes in action. In order to eradicate classical rabies throughout the EU, and to avoid reintroduction of rabies from countries east of the EU, continuous programmes are important in high risk areas.

The Baltic and Eastern European MS reported the majority of rabies cases in animals, where wildlife (especially foxes and raccoon dogs) was frequently infected. Many MS collected large numbers of samples from foxes, however, only few MS collected samples from raccoon dogs. The reported data on raccoon dogs showed the highest proportion of positive samples, thus the importance of this animal species as a reservoir must not be underestimated.

The European Bat *Lyssavirus* is mostly recorded from bats, however only sporadic information is provided by the MS. There is a need for more information on the prevalence of this infection throughout Europe, since it is known to infect humans.

3.12. Other zoonoses

3. INFORMATION ON SPECIFIC ZOONOSES

3.12. Other zoonoses

Table OZ1. Overview of countries reporting data for 2006

	Total number of MS reporting	Countries
TSE	25	**All MS** **Non-MS:** BG, RO, NO
AI	25	**All MS**
Cysticerci	3	**MS:** BE, EE, LU
Sarcocystis	1	**MS:** LU
Q fever	9	**MS:** AT, BE, DK, DE, HU, IT, PL, PT, SK
Clamydia	1	**MS:** FR
Leptospira	1	**MS:** PT

3.12.1. Bovine Transmissible Spongiform Encephalopathy

Transmissible Spongiform Encephalopathies (TSEs) a group of diseases that occur in man and animals characterised by a degeneration of brain tissue resulting in a sponge-like appearance of the brain. This group includes diseases such as Creutzfeldt-Jakob Disease (CJD) in humans, Bovine Spongiform Encephalopathy (BSE) in cattle and scrapie in sheep and goats. BSE has only recently been identified, and the current view is that one form of CJD (variant CJD) seen in humans has resulted from transmission of BSE from cattle to humans, via infected food. In contrast, scrapie has been known for centuries and is presently not considered to be transmissible to humans or to pose a risk to man.

BSE in animals

The following information was derived from the Report on The Monitoring and Testing of Ruminants for the Presence of Transmissible Spongiform Encephalopathy (TSE) in the EU in 2006, published by the European Commission, Health and Consumer Protection Directorate General (http://ec.europa.eu/food/food/biosafety/bse/annual_reps_en.htm).

In 2006, all MS and three non-MS provided information on the TSE testing of cattle, sheep and goats. A total of 10,047,240 cattle, 1,035,065 sheep and 309,246 goats were tested in the EU under the framework of the TSE monitoring programmes. In total, 320 cattle, 3,507 sheep and 791 goats were positive.

1,465,090 cattle at risk and 8,574,888 healthy cattle slaughtered for human consumption were tested by rapid tests. 2,344 cattle were tested under the framework of passive surveillance (animals reported as official BSE suspects) and 4,918 cattle were tested under the framework of culling of animals with an epidemiological connection to a BSE case. In total, 90% of positive cases were detected by the active monitoring (testing of cattle at risk, healthy slaughtered cattle and culled cattle) and 10% were detected by passive surveillance.

No BSE cases were found in Cyprus, Denmark, Estonia, Finland, Greece, Hungary, Latvia, Lithuania, Luxembourg, Malta and Slovakia and the three non-MS (Table OZ2). Overall, the number of BSE cases decreased by 42.9% in 2006 compared to 2005 and the prevalence in tested animals decreased by 43%.

Table OZ2. Total number of BSE positive cases per number of cattle tested or present in the adult population (> 24 months of age)

	Adult cattle[1]	No. of tests	No. of pos	Ratio[2]	Prevalence[3]	
					Passive surveillance	Total monitoring
Austria	936,399	223,211	2	0.09	0	2.14
Belgium	1,379,464	364,795	2	0.05	0	1.45
Cyprus	24,016	8,238	0	0	0	0
Czech Republic	655,100	174,467	3	0.17	0	4.58
Denmark	745,000	241,031	0	0	0	0
Estonia	127,700	33,748	0	0	0	0
Finland	377,869	124,579	0	0	0	0
France	10,349,000	2,514,361	8	0.03	0	0.77
Germany	5,712,700	1,892,842	16	0.08	0	2.8
Greece	348,000	32,694	0	0	0	0
Hungary	362,000	83,893	0	0	0	0
Ireland	3,069,600	854,187	38	0.45	1.3	12.38
Italy	2,760,254	655,941	7	0.11	0	2.54
Latvia	206,761	39,395	0	0	0	0
Lithuania	457,100	87,406	0	0	0	0
Luxembourg	93,444	14,562	0	0	0	0
Malta	8,693	2,752	0	0	0	0
Netherlands	1,629,000	486,247	2	0.04	0.61	1.23
Poland	2,990,700	625,438	10	0.16	0	3.34
Portugal	816,528	100,512	33	3.28	1.22	40.42
Slovakia	256,000	66,321	0	0	0	0
Slovenia	196,588	32,667	1	0.31	0	5.09
Spain	3,470,187	536,192	68	1.27	2.59	19.6
Sweden	660,509	132,232	1	0.08	0	1.51
United Kingdom	4,731,047	728,538	129	1.77	3.8	27.27
Total EU 25	**42,363,659**	**10,047,240**	**320**	**0.32**	**0.78**	**7.55**
Bulgaria	389,147	10,676	0	0	0	0
Romania	1,811,740	73,444	0	0	0	0
Norway	404,000	20,975	0	0	0	0

1. Eurostat December 2006
2. BSE positives per 10,000 cattle tested
3. Cases over the last 12 months per 1 Million adult cattle

In 2006, 1,032,408 sheep and 308,117 goats were tested by active monitoring; 2,657 sheep and 1,129 goats were reported as official TSE suspects and tested under the framework of passive surveillance. In total, 1,421 and 76 confirmed TSE cases in sheep and goats, respectively, was subjected to discriminatory testing. None of them have been confirmed to be BSE.

3.12.2. Avian Influenza

Avian influenza is a serious contagious disease of poultry. Two groups of viruses are recognised on the basis of their ability to cause disease: highly pathogenic avian influenza (HPAI) which spreads rapidly causing serious disease with high mortality (up to 100% within 48 hours) and low pathogenic avian influenza (LPAI) causing generally a mild disease which may easily go undetected. Experience has shown that some LPAI strains of H5 and H7 subtype have the ability to mutate to HPAI strains after having circulated in the poultry population for some time. It is therefore crucial that presence of these viruses in poultry populations is detected early to allow a swift control of such precursor strains, before such a mutation might occur. As clinical signs might be inapparent active surveillance is imperative.

The Asian strain of HPAI H5N1 subtype that spread during 2005 and 2006 from South East Asia within Asia, to Europe and Africa, affected more than 50 countries in these three continents. By mid February 2006 it reached the European Union (EU) and was subsequently detected in wild birds in 14 Member States. In 5 Member States 33 domestic poultry holdings and 1 zoo became infected by that virus. No HPAI outbreaks of other subtypes have been recorded in 2006. Information on the animal health aspects is available on the European Commission, Health and Consumer Protection Directorate-General's website:
http://ec.europa.eu/food/animal/diseases/controlmeasures/avian/index_en.htm
and http://ec.europa.eu/food/animal/resources/animal_health_activity_report_final.pdf

In 2006, 7 LPAI outbreaks in poultry have been notified by 3 Member States concerning the following subtypes: H5N2, H5N3, H7N3 and H7N7.

Humans are not commonly affected by avian influenza viruses, but infection of humans with HPAI H5N1 has proven to be fatal in more than 50% of the laboratory confirmed cases: 79 deaths /115 cases in 2006 in 9 countries in Asia and Africa with Indonesia being the most affected country. World Health Organisation (WHO) website: http://www.who.int/csr/disease/avian_influenza/en/).

HPAI H5N1 has become endemic in several Asian and African countries, which increases the opportunities for human exposure and infection. In relation to a LPAI outbreak of H7N3 subtype in the UK one poultry worker, presenting conjunctivitis tested positive for that virus and was given Oseltamivir treatment as a precautionary measure; however hospitalisation was not required. Apart from this one incidence there was no sickness or fatality in humans due to infection with avian influenza viruses in 2006. Information on the public health aspects of avian influenza is available at the European Commission, Health and Consumer Protection Directorate-General's website:
http://ec.europa.eu/dgs/health_consumer/dyna/influenza/index.cfm
and the website of the European Centre for Disease Control and Prevention (ECDC):
http://www.ecdc.eu.int/Health_topics/influenza/news.html

The following information on surveillance for AI in the EU is derived from the Annual Reports of the Community Reference Laboratory for AI in Weybridge, UK on the EU surveillance for AI in poultry and wild birds during 2006, which are available at the European Commission, Health and Consumer Protection Directorate-General's website:
http://ec.europa.eu/food/animal/diseases/controlmeasures/avian/eu_resp_surveillance_en.htm

Avian influenza surveillance in poultry

EU-wide surveys for AI in poultry were first carried out in 2003 and have since then been performed annually. The surveys are based upon serological examination of all categories of poultry in each Member State. Based on the results obtained from the previous surveys and regional risk assessment in Member States, surveillance guidelines have been refined to target specific "at risk" poultry categories such as poultry in free range, backyard flocks, game birds and taking into account other factors such as multi-age flocks, a relatively longer life span, the presence of more than one species on the holding and wild bird migration periods.

In 2006, a total of 29,005 poultry holdings for the following categories were sampled by the 25 Member States: Chicken breeders (2130 holdings), laying hens (8537), broilers (2383), fattening turkeys (1981), turkey breeders (150), poultry backyard flocks (9051), ducks and geese (2176), game birds (1500), ratites (448) and zoo birds (649 in one Member State). In total 91 holdings tested positive for H5 or H7 subtypes: 81 holdings tested positive for H5 in seven Member States and 10 for subtype H7 in six Member States (one holding tested positive for both subtypes). Other than H5 or H7, other LPAI subtypes have been detected in 54 holdings.

The results of the 2006 AI survey showed considerable variation amongst Member States. However, one feature with few exceptions is that almost all Member States that included ducks and geese in their surveillance detected positive holdings in this poultry sector. In two Member States (Poland and the United Kingdom) ducks and geese were the only type of poultry detected with H5 or H7 AI. Although the total number of duck and geese holdings tested accounted only for 7% of the overall number of holdings tested, almost half of all AI infections were detected in this poultry sector. More than half of the serologically positive duck holdings were found in France. These results are consistent with those of the 2005 survey. Predominantly positives in ducks (84%) were attributed to H5 subtype, with less to H7 subtype (11%).

The proportion of positive holdings amongst those sampled in the 2006 survey did not increase in the majority of poultry categories and Member States compared to 2005 and 2004. Assuming that the survey design in Member States and categories has not changed, this could be an indication that there is no obvious increase of an overall AI prevalence. However it should be kept in mind that the sample numbers calculated for this survey were calculated with the objective to detect infection if it were to be present and not to estimate the prevalence so these results should be interpreted with care. In case of a positive serological result follow up investigations have to be performed in order to confirm or rule out the presence of virus. The results are presented in table OZ3.

Table OZ3. Total number of sampled positive[1] holdings and upper 95% confidence limit for

Member States	Chicken Breeders	Laying Hens	Broilers	Turkey Fatteners	Turkey breeders
AT		60 4.8%		80 3.3%	
BE	208 1.2%	2/ 405 0.8% (H5)		37 6.8%	
CY	17 14.2%	30 0%	6 39.2%	7 32.1%	
CZ		51 5.2%		7 26.7%	3 0%
DE	5 45.1%	16/ 251 9.52% (other)	8 31.23%	1/ 188 2.5% (other)	2 77.6%
DK	142 1.8%	1/ 133 (H5) 1/ 133# (H7) 3.5%	2 71.4%	17 15.2%	
EE		13 0%			
EL	6 39.3%	70 3.9%	78 3.7%	26 9.7%	
ES	268 1.0%	1/ 861 (H5) 9/ 861 (other) 1.6%	993 0.3%	456 0.6%	4 50%
FI	66 0%	55 5.3%		53 5.2%	
FR		70 4.1%	120 2.5%	1/ 157 (H5) 3/ 157 (other) 5.43%	8/ 53 24.1% (other)
HU		67 4.3%		91 3.1%	
IE	77 3.3%	141 1.8%		77 3.4%	9 26.2%
IT	244 1.0%	1100 0.2%		408 0.6%	56 4.4%
LT	2 77.6%	12 20.6%	9 26.9%	2 77.6%	
LU		14 0%			
LV		26 0%		1 0%	
MT		71 3.6%			
NL	1/ 919 0.3% (H7)	4696 0%	943 0%		4 0%
PL	29 8.8%	102 2.5%		93 2.8%	
PT	18 0%	78 3.5%	101 2.9%	95 2.9%	
SE	40 0%	60 4.7%	7 33.9%	26 0%	4 0%
SI	12 0%	61 4.5%		53 4.8%	
SK	20 13.1%	30 8.5%	116 2.2%	12 19.9%	4 0%
UK	57 5.1%	80 3.6%		95 3.0%	11 23.6%
EU Total	**2130**	**8537**	**2383**	**1981**	**150**
% Of EU total	**7.38**	**29.57**	**8.25**	**6.83**	**0.52**
EU Total positive holdings	**1**	**30**	**0**	**5**	**8**
% Positive holdings (95% CI)	0,049 (0.15%)	0.35 (0.42%)	0 (0.11%)	0.25 (0.43%)	5.3 (8.76%)

1. Virological positives as a consequence of follow-up investigations: Spain(ES): 1 positive for H5 and 1 positive for H7
(H5) = Positive H5 (H7) = Positive H7 (other) = Positive for subtypes other than H5 or H7
*DK 1 mallard holding positive for both H5 and H7

overall prevalence of H5 and H7 by Member States and poultry category

Backyard Flocks	Ducks & Geese	Game Birds	Ratites	Others	Total
	27 9.5%		21 0%		188
9 4.2%	2/ 33 12.2% (H5)	21 11.8%	36 7.2%		749
93 3.16%	1 0%	5 28.6%	9 0%		168
	33 0%	33 7.5%			127
10/ 78 20.8% (other)	2/ 435 (H5) 1/ 435 (H7) 1.8%	1/ 10 39.4% (other)	47 6.18%		1024
	3/ 41 (H5) 1/ 41 (H7)	5/298* (H5) 2/298* (H7) 6/ 298			611
	5 45.07%				18
	140 2.12%	22 12.73%	18 15.33%		360
2/ 3514 0.15% (H%)	4/ 175 (H5) 2/ 175 #(H7) 6.7%	381 0.7%	2/ 89 6.4% (H5)	6/ 649 1.71% (H5)	7390
	2/ 6 62.5%	11 23.1%	2 77.6%		193
	40/ 451 11.2% (H5)	4/ 220 4.1% (H5)	4 52.7%		1075
2294 0.13%	174 1.6%	53 5.1%			2679
	2 0%				306
	1/ 104 3.1% (H5)	1/ 325 0.95% (H5)	98 2.8%		2335
65 4.5%	74 3.97%	11 23.84%			175
			1 0%		15
91 3.24%	3 0%	9 0%	3 0%		133
					71
	61 4.1%				6623
	1/ 205^^ 1.6% (H7)	14 0%	15 17.0%		458
2726 0.11%	13 18.5%	23 0%	40 6.4%		3094
	29 8.4%		15 0%		181
		9 25.6%	15 17.2%		150
181 1.6%	20 11.1%	24 10.4%	23 10.8%		430
	2/ 166 (H5) 1/ 166~ (H7) 4.0%	31 8.8%	12 21.9%		452
9051	**2176**	**1500**	**448**	**649**	**29005**
31.36	**7.50**	**5.17**	**1.55**	**2.25**	
12	**62**	**18**	**2**	**6**	**144**
0.13 (0.21%)	2.87 (3.38%)	0.61 (0.73%)	0.45 (0.99%)	0.93 (1.71%)	

x no confidence limit calculated as some holdings tested several times
^^ Positive holding doubtful
~ UK 3 positive holdings (1 holding was positive for both H5 and H7)

Avian influenza surveillance in wild birds

Since 2003 surveillance for detection and isolation of influenza A subtypes in wild birds was carried out to serve as an “early warning” for an eventually increased risk for domestic poultry. It was implemented as a voluntary measure in particular in Member States where liaisons with bird conservation/watching institutions and ringing stations already existed. It focused on active surveillance of live caught birds. Due to the threat and subsequent introduction of HPAI H5N1 into the EU, surveillance priorities were modified to increase passive surveillance in wild birds found dead, primarily when abnormal mortality or significant disease outbreaks occurred in specific species of migratory birds considered of being at a higher risk for virus infection, particularly those proceeding from areas where infection in poultry or wild birds was present. The list of these target species has then been enlarged based on work carried out by EFSA (http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1178620793179.htm) and the Commission’s Directorate-General for Environment: http://ec.europa.eu/environment/nature/conservation/wildbirds/birdflue/index_en.htm.

In 2006, intensive surveillance was carried out in all Member States including the Acceding State Bulgaria by laboratory testing of 144, 805 wild birds. The testing results for Romania referred to different types of samples (cloacal/tracheal swabs, tissue/blood) rather than numbers of birds. They are reported separately; however it can be extrapolated from these figures that more than 5000 birds have been investigated during 2006.

The sampling numbers in EU 25 was approximately three times greater than the number of birds tested in the EU in 2005. Half of the total number of birds tested was sampled in just three Member States (Germany, the Netherlands and Spain). In total, 590 cases of H5N1/ H5 HPAI were reported in the period between February and May 2006. Due to incompleteness some surveillance data could not be included in the analysis. The number of wild birds positive to HPAI of H5 subtype reported via the ADNS (Animal disease notification system) is therefore different with a total of 748. http://ec.europa.eu/food/animal/diseases/adns/adns_wildbirds2006.pdf.

A large heterogeneity occurred between Member States in respect to their surveillance programmes and especially the number of birds tested. While some Member States focused on the active surveillance of live birds, others focused on passive surveillance of dead or diseased birds. The degree of targeting of risk species and sample types varied also between Member States. As these factors impact on the probability of obtaining positive results, the positive proportion of birds cannot be directly compared.

Overall, the proportion of swans (*Cygnus spp*., predominately *Cygnus olor)* positive for H5N1/ H5 HPAI out of the swans tested was 6.1%, which is very high when compared to the proportion of positive samples in all other species (excluding swans) in which 0.3% of tested birds gave a positive result. Overall 71% of all reported H5N1/ H5 HPAI infections were detected in swans. 13% of the total sampled diving ducks *(Aythya spp.)* tested positive for H5N1/ H5 HPAI. The proportion of H5N1/ H5 HPAI infected Tufted Ducks *(Aythya fuligula)* was especially high in Denmark (66%) and Sweden (19.7%).

Since the introduction of H5N1 HPAI viruses into Europe, West Asia, the Middle East and Africa a number of distinguishable subgroups have emerged, indicating a dynamic situation in which the viruses continue to evolve. The so called ‘clade 2’ viruses that derive directly from viruses associated with spread from Northern China through Mongolia and the Russian Federation in late 2005 are the progenitors for all of the strains detected in Europe to date. Further subdivisions within this clade are possible and reflect the closely related but heterogenous population of H5N1 HPAI viruses. Detailed analysis of the data can lead to the conclusion that there have been several independent introductions before local spread within wild bird populations. The presence of virus in wild birds in many countries in the absence of reports of disease in poultry provided further evidence for probable introduction of virus to countries via wild birds.

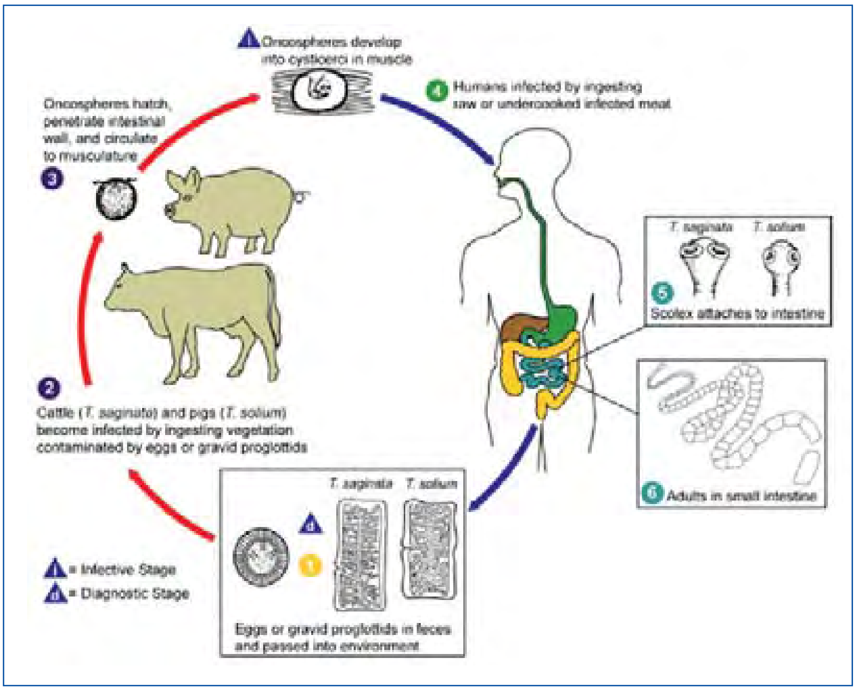
Ecosystems where there is close functional connection between domestic poultry, higher risk migratory species and endemic populations of wild birds that are susceptible to the virus continue to pose a higher risk for further virus introduction and may also contribute to the future rates of virus evolution that may have consequences for future control approaches. The current safeguard measures would therefore appear highly appropriate given the continued risk and key knowledge gaps about the virus ecology and epidemiology in wild bird populations.

Wild birds are now recognised as having played a role in the long distance spread of H5N1 HPAI, although, the relative contributions of migratory birds and anthropogenic factors associated with the poultry industry remain unclear. This uncertainty is compounded by limited knowledge of wild bird host factors including the range of susceptible species, infection dynamics in these birds and precise details of their migratory and other movement patterns. However, the spread of virus via movement of live poultry, their products, contaminated vehicles and equipment, persons and fomites as well as illegal trade remains a critical mode of spread.

3.12.3. Cysticerci

Cysticercus infections in animals are caused by the larval forms of the tapeworms *Taenia saginata* and *T. solium*. These infections are most commonly seen in cattle and pigs. The related diseases in humans are taeniosis, caused by the adult form of *T. saginata* or *T. solium*, and cysticercosis, caused by the larval form of *T. solium* only. Cattle and pigs become infected mostly through the ingestion of vegetation contaminated with the *T. saginata* eggs shed in human faeces. Infection is established in the animal by hatching of the eggs in the stomach releasing oncospheres, which penetrates the intestinal wall and develop into cysticerci in the muscles of the animal. Humans may become infected through consumption of raw or undercooked contaminated meat, and the taeniae develop in the intestine (Figure OZ1). In humans, symptoms are mild abdominal discomfort to which effective drug treatments exist.

Figure OZ1. Lifecycle of Taenia saginata and T. solium



Source: http://www.dpd.cdc.gov/dpdx

In 2006, Belgium, Estonia and Luxembourg reported data on the presence of cysticerci observed at post-mortem visual inspection of carcasses at slaughterhouses. In total, 0.1% of all carcasses were positive (Table OZ4).

Table OZ4. Taenia spp. in animals, 2006

		Species	N	Pos	% pos
Belgium	Cattle	*Taenia saginata*	823,648	1,824	0.2
Estonia	Cattle		54,264	0	0
	Pigs	*Taenia saginata cysticerci and Cysticercus tenuicollis*	438,228	8[1]	<0.01
	Wild boars	*Cysticercus tenuicollis*	1,809	1	0.1
Luxembourg	Cattle	*Taenia saginata*	24,739	41	0.2

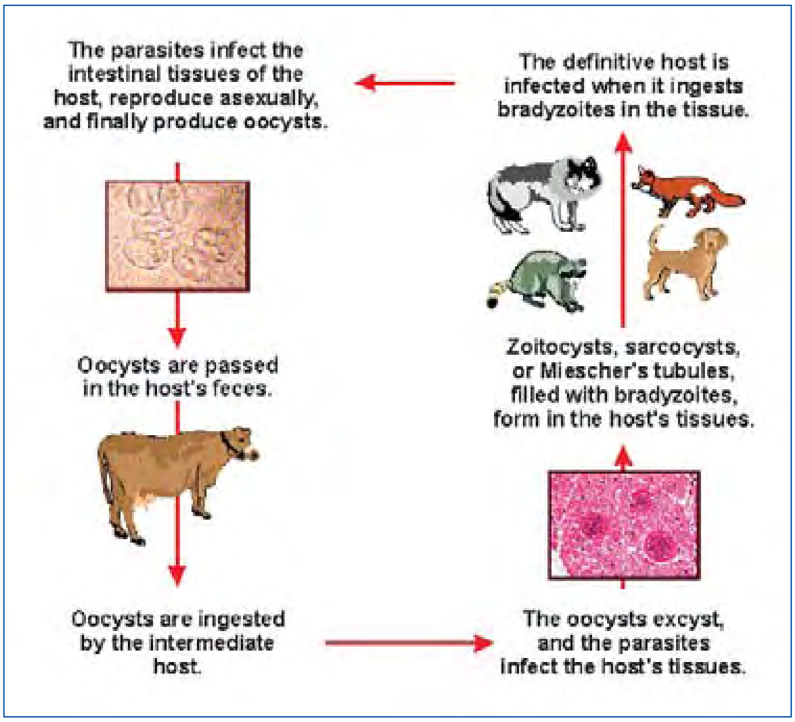
1. In Estonia, three of the positive samples were laboratory confirmed to be Cysticercus tenuicollis.

In Belgium, the number of positive bovine carcasses has decreased every year since the first year of reporting in 2002. In 2006, the proportion of positive samples decreased by 23.7% compared to 2005. The majority (98%) of the infected carcasses had a low parasitic load and were treated by freezing prior to human consumption, while the remaining carcasses were destroyed.

3.12.4. Sarcocystis

Disease in humans may be caused by several parasite species of *Sarcocystis,* all of which have a life cycle requiring two hosts Figure OZ2. Humans become infected through the ingestion of infected meat or excreted oocysts and develop symptoms including diarrhoea and headache. In addition, abortion and congenital disorders can also occur in rare cases.

Figure OZ2. Lifecycle of Sarcocystis



Source: http://www.biosci.ohio-state.edu/~parasite/sarcocystis.html

Luxembourg was the only MS providing information about the presence of lesions caused by *Sarcocystis* from post-mortem inspection of bovine carcasses at slaughterhouses. In total, 24,739 carcasses were inspected and 3 (0.01%) tested positive for S*arcocystis*.

3.12.5. 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. Infection by ingestion of contaminated milk has been reported as well, but is less common.

Only 50% of people infected with *C. burnetii* show clinical signs. Clinical signs and symptoms of acute Q fever the symptoms 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 1 to 2 weeks and may result in a life-long immunisation. Acute Q fever is fatal in approximately 2% of the 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 the cases.

In 2006, nine MS provided information about *C. burnetii* in animals (Table OZ5). The majority of samples was taken due to clinical suspicion or after abortion and was examined using serological tests.

Table OZ5. Coxiella burnetii (Q fever) in animals, 2006

	Cattle		Goats		Pigs		Sheep		Total	
	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos
Austria	863	72	20	6	-	-	78	18	961	96
Belgium	166	4	2	0	-	-	4	0	172	4
Denmark	236	59	-	-	-	-	-	-	236	59
Germany	11,397	998	227	17	293	0	1,425	96	13,342	1,111
Hungary	510	33	50	1	4	2	70	3	634	39
Italy	552	86	291	15	-	-	1,856	182	2,699	283
Poland	51	0	-	-	-	-	-	-	51	0
Portugal	170	0	7	4	-	-	55	1	232	5
Slovakia	7,334	373	176	0	3	0	3,200	19	10,724	392
EU Total	**21,279**	**1,625**	**773**	**43**	**300**	**2**	**6,688**	**319**	**29,051**	**1,989**

In total, 6.9% of the animals were positive and the majority of positive samples originated from cattle (81%). Denmark reported the highest proportion of positive samples in cattle (25%). During the last two years Denmark have had a special focus on sampling of animals suspected of being infected with *C. burnetii.* This fact may, in part, explain the high number of positive findings.

Additionally, Italy and Slovakia analysed samples from alpine chamois, buffalo, dogs, poultry and solipeds; none of the samples were positive.

3.12.6. Psittacosis and leptospirosis

In 2006, France provided information on psittacosis, also known as ornithosis, zoonotic clamydiosis. A total of 15 human chlamydiosis cases were detected and most of these cases seemed to be related to *Chlamydia* infected duck flocks (*foie gras* production). In total, 35.9% of the duck flocks (234 flocks out of 652) suspected to be the source of infection for the human cases were positive for *Chlamydia,* while the corresponding figure was 1.5% in non-suspect duck flocks (3 flocks out of 200). Wild birds were sampled in connection with Avian Influenza monitoring and 10.6% of samples were positive for *Chlamydia* spp. (45 samples out of 423).

Portugal was the only MS to report on *Leptospira* spp. in animal populations. The data originated from clinical investigations and 29.2% of investigated cattle samples were positive. In total, 92 cattle isolates were reported to be *Leptospira interrogans* serovar Saxkoebing and eight serovar *icterohaemorrhagiae.* Positive samples were also reported from pigs at AI station (3/9 positive) and from dogs.

3.12.7. Discussion

The Zoonoses Directive 2003/99/EC provides a framework for monitoring and reporting of information on all zoonoses (except TSE/BSE). The zoonoses, which are not to be monitored on a mandatory basis, should be included in the monitoring if the epidemiological situation in the MS so warrants. From the Community perspective it is interesting to widen the reporting to other zoonoses of public health importance to have a better overall picture of the Community situation.

Delightfully, the number of MS reporting of Q-fever increased in 2006, and eight out of the nine reporting MS recorded positive cases. It would be useful to further explore what is the prevalence of this disease and the public health importance in the EU.

TSE and BSE as well Avian Influenza cases are reported directly to the Commission in a framework of other Community legislation. However, it is useful to have a short overview of the results in this report as well, since they are important zoonotic diseases in the EU, which have all received substantial political and media attention in recent years.

3.12. Other zoonoses

In 2006, Avian Influenza virus subtypes H5 and H7 were detected in 91 poultry holdings in EU, most often from ducks and geese. These virus subtypes are able to mutate into highly pathogenic virus types, which have a potential to infect also humans. In wild birds, MS reported 590 cases of Highly Pathogenic Avian Influenza H5 type. The majority of the findings were from swans.

In 2006, 14 MS reported positive BSE cases on bovine animals accounting in total 320 cases. No BSE cases were found from sheep and goats.

Kindly provided by the National Food Institute, Denmark - Photographer: Mikkel Adsbøl

4. INFORMATION ON ANTIMICROBIAL RESISTANCE IN SPECIFIC INDICATORS

4. INFORMATION ON ANTIMICROBIAL RESISTANCE IN SPECIFIC INDICATORS

The use of indicator bacteria to follow trends in the occurrence of antimicrobial resistance allows resistance to be monitored particularly in cases where the prevalence of zoonotic bacteria (*Salmonella*, *Campylobacter)* is low. *Escherichia coli* and *Enterococci* can be used as indicators for Gram-negative and Gram-positive bacteria, respectively. For information on breakpoints used in testing of antimicrobial resistance by MS, see Appendix 1, Table AB EC BP.

Table AB EC 1. Overview of countries reporting data for 2006

	Total number of MS reporting	Countries
AB resistance in *E. coli*	16	**MS:** All MS except BE, CY, CZ, GR, LT, LV, LU, MT, SK
		Non-MS: NO, CH
AB resistance in *Enterococci*	2	**MS:** NL, SE
		Non-MS: CH

Note: In the following chapter, only countries reporting 10 or more samples have been included for analyses

4.1. *Enterococcus faecium* and *E. faecalis* indicators

For 2006, only two MS and one non-MS reported data on *Enterococci* from animals. Please refer to tables in Level 3 for more information.

4.2. *E. coli* indicators

Data on the occurrence of antimicrobial resistance in *E. coli* indicators were reported by 16 MS, and two non-MS. Only data from MS reporting more than 10 isolates, and sample categories for which five or more MS reported, are included in this summary report. For data on *E. coli* indicators not included in this chapter, please refer to Level 3.

4.2.1. Antimicrobial resistance in E. coli indicator isolates from food

For 2006, only one MS reported data on antimicrobial resistance in *E. coli* indicators in meat from pig and sheep, and three MS reported data on antimicrobial resistance in *E. coli* indicators in meat from cattle and broilers. Please refer to tables in Level 3.

4.2.2. Antimicrobial resistance in E. coli indicator isolates from animals

Data on the occurrence of antimicrobial resistance in *E. coli* indicators from animals (*Gallus gallus,* pigs, cattle and turkeys) are presented in Table AB EC2-EC5.

Gallus gallus

Data on antimicrobial resistance in *E. coli* indicator isolates from *Gallus gallus* (broilers) was reported by 12 MS and two non-MS (Table AB EC2). The highest levels of resistance were reported for tetracycline, nalidixic acid and ampicillin (overall average ranging from 37.8% - 43.9%), followed by resistance to streptomycin, sulphonamide and ciprofloxacin (overall average ranging from 17.4% - 29.6%). The proportions of fully sensitive isolates varied widely among the countries, ranging from 80.5% reported by Norway to 3.1% reported by Spain. The proportions of resistant isolates reported from Norway and Denmark were generally lower than from other countries.

Table AB EC 2. Antimicrobial resistance in E. coli from Gallus gallus

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		N	%R	%R	%R	%R	%R	%R	%R	%R	%R	%R	%	%R
Austria	Yes	271	24.8	-	4.5	47.7	1.1	48.9	31.2	-	27.4	17.3	-	-
Denmark	Yes	123	17.1	-	0	0	0	7.3	10.6	8.9	6.5	1.6	61.8	2.4
Germany	-	50	64.0	-	2.0	8.0	4.0	44.0	16.0	24.0	38.0	12.0	6.0	16.0
Hungary	-	420	45.5	-	7.0	-	2.1	78.2	19.7	35.2	45.5	-	-	-
Ireland	-	33	-	-	-	-	-	-	50.0	-	81.8	-	-	-
Italy	Yes	186	67.7	2.2	23.9	-	2.2	36.6	33.0	58.1	67.7	-	16.7	37.1
Netherlands	Yes	154	65.6	15.6	18.8	50.0	7.8	50.0	-	70.8	52.6	61.7	8.4	37.0
Norway	Yes	190	13.2	1.1	0	1.1	1.1	1.1	2.1	8.9	3.7	3.2	80.5	1.1
Poland	Yes	21	57.1	-	0	-	0	52.4	28.6	4.8	14.3	4.8	-	-
Portugal	-	13	38.5	-	7.7	30.8	23.1	38.5	30.8	-	84.6	-	-	-
Slovenia	Yes	66	62.1	1.5	9.1	24.2	15.2	62.1	30.3	28.8	42.4	47.0	9.1	30.3
Spain	Yes	96	-	18.8	27.1	38.5	10.4	82.3	41.7	54.2	69.8	36.5	3.1	55.2
Switzerland	Yes	310	16.1	-	3.5	4.2	2.9	34.8	19.4	41.0	39.0	-	-	-
United Kingdom	Yes	88	28.4	-	-	-	-	-	-	-	46.6	-	-	8.0
EU Total, N		**1521**	**620**	**47**	**146**	**265**	**52**	**575**	**325**	**450**	**668**	**216**	**132**	**217**
EU Total, %			**40.8**	**3.1**	**9.6**	**17.4**	**3.4**	**37.8**	**21.4**	**29.6**	**43.9**	**14.2**	**8.7**	**14.3**

Only MS reporting more than 10 isolates were included in this table
For Hungary; N=415 for sulfonamide, N=404 for tetracycline, N=386 for gentamicin, N=170 for nalidixic acid, N=417 for chloramphenicol, N=417 for streptomycin
For Ireland; N=16 for streptomycin, For Italy; N=176 for chloramphenicol, N=172 for sulfonamide, N=185 for streptomycin
For Italy; N=176 for chloramphenicol, N=172 for sulfonamide, N=185 for streptomycin
For Poland; N=2 for fully sensitive, N=1 for resistant to >4 antimicrobials, For Switzerland; N=309 for ampicillin

Pigs

Data on antimicrobial resistance in *E. coli* indicators from pigs were reported by 12 MS and one non-MS (Table AB EC3). As seen in 2004 and 2005, several MS reported extremely high proportions of tetracycline-resistant isolates (overall average 68.1%). High levels of resistance were also reported for streptomycin and ampicillin (overall average 36.4% and 27.8%, respectively). High levels of resistance to nalidixic acid were reported by Portugal and Spain (27.3% and 19.7%).

Table AB EC 3. Antimicrobial resistance in E. coli from pigs

			Antimicrobial												
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	Yes	308	12.0	-	3.7	3.0	1.7	3.0	51.8	-	56.1	19.3	-	-
Denmark	Yes	148	20.3	-	1.4	0	0.7	0.7	40.5	25.7	28.4	14.2	50.7	13.5
Estonia	Yes	11	9.1	0	0	-	0	0	45.5	-	0	0	27.3	0
France	-	100	27	-	20	1	1	6	60	-	86	44	-	-
Hungary	-	316	44.0	-	18.5	-	5.7	6.9	40.1	49.7	78.8	-	-	-
Ireland	-	63	-	-	0	-	-	-	90.9	-	92.1	-	-	-
Italy	Yes	174	55.2	0	22.2	-	0	5.2	51.7	59.9	73.0	-	14.4	28.2
Netherlands	Yes	79	34.2	0	10.1	1.3	2.5	1.3	-	53.2	69.6	46.8	20.3	8.9
Poland	Yes	92	8.7	-	4.3	-	2.2	6.6	37.0	18.5	44.0	9.8	-	-
Portugal	Yes	11	-	10.0	-	-	9.1	27.3	54.5	-	72.7	-	-	45.5
Spain	Yes	193	-	1.0	30.6	5.2	4.1	19.7	57.0	66.3	88.1	64.3	5.2	39.3
Switzerland	Yes	90	21.1	-	5.6	1.1	0	3.3	47.8	53.3	25.6	-	-	-
United Kingdom	Yes	305	44.7	-	-	-	-	-	-	-	75.4	-	-	31.1
EU Total, N		**1800**	**500**	**3**	**195**	**21**	**37**	**85**	**656**	**468**	**1226**	**293**	**128**	**244**
EU Total, %			**27.8**	**0.2**	**10.8**	**1.2**	**2.1**	**4.7**	**36.4**	**26.0**	**68.1**	**16.3**	**7.1**	**13.6**

Only MS reporting more than 10 isolates were included in this table
For Hungary; N=306 for tetracycline, N=312 for streptomycin, N=309 for chloramphenicol, N=301 for gentamicin, N=174 for nalidixic acid
For Italy; N=153 for chloramphenicol, N=152 for sulfonamide
For Poland; N=91 for tetracycline, N=39 for fully sensitive, N=4 for resistant to >4 antimicrobials, N=91 for nalidixic acid
For Portugal; N=10 for cefotaxime
For Spain; N=173 for fully sensitive
For United Kingdom; N=304 for ampicillin

Cattle

Data on antimicrobial resistance in *E. coli* indicators from cattle was reported by 14 MS and one non-MS (Table AB EC4). As in the previous years, the highest level of resistance was reported for tetracycline and ampicillin (overall average 61.2% and 24.3%), whereas resistance to other antimicrobials was low. Portugal and Estonia reported relatively high levels of resistance to ciprofloxacin, however, in both cases, proportions were based on a small number of isolates. The highest percentages of fully sensitive isolates (95.9%) were reported by Sweden. In general, the occurrence of resistance in *E. coli* from cattle was lower then among *E. coli* isolates from broilers and pigs, probably due to differences in the use of antimicrobials among these animal species.

Table AB EC 4. Antimicrobial resistance in E. coli from cattle

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	Yes	186	2.4	-	1.8	0.6	0.6	0	7.7	-	8.3	1.8	-	-
Denmark	Yes	93	2.2	-	0	0	0	0	10.8	11.8	9.7	3.2	83.9	1.1
Estonia	Yes	23	4.3	0	4.3	34.8	0	0	13.0	-	8.7	0	43.5	0
Finland	Yes	185	0.5	-	0	0	0	0	2.7	0	0.5	0	-	0
France	-	100	17.0	-	17.0	2.0	3.0	5.0	21.0	-	27.0	14.0	-	-
Hungary	-	399	24.1	-	8.1	-	1.9	1.8	15.3	26.6	18.8	-	-	-
Ireland	-	3322	-	-	-	-	-	-	75.7	-	79.4	-	-	-
Italy	Yes	71	9.9	-	1.4	-	0	11.3	7.0	7.0	16.9	-	76.1	5.6
Netherlands	Yes	325	24.3	1.2	14.2	10.0	5.2	8.9	-	31.4	36.0	22.5	60.9	15.4
Poland	Yes	193	12.4	-	0.5	-	0	1.6	6.9	3.6	9.9	2.6	-	-
Portugal	-	16	100	14.3	40.0	100	50.0	41.7	87.5	-	66.7	-	-	18.8
Slovenia	Yes	13	7.7	0	7.7	0	7.7	7.7	15.4	15.4	15.4	69.2	23.1	7.7
Sweden	Yes	314	0	0	0	0.6	1.0	0.6	1.9	1.6	1.6	0.3	95.9	0
Switzerland	Yes	560	40.0	-	21.8	1.8	4.6	3.0	45.0	-	47.9	-	-	-
United Kingdom	Yes	2260	70.0	7.5	42.2	-	2.0	-	55.9	-	73.8	-	-	43.8
EU Total, N		**7500**	**1820**	**49**	**353**	**46**	**52**	**57**	**568**	**197**	**4577**	**108**	**696**	**1049**
EU Total, %			**24.3**	**0.7**	**4.7**	**0.6**	**0.7**	**0.8**	**7.6**	**2.6**	**61.0**	**1.4**	**9.3**	**14.0**

Only MS reporting more than 10 isolates were included in this table
For Hungary; N=395 for chloramphenicol, N=377 for gentamicin, N=398 for ampicillin, N=346 for tetracycline, N=220 for nalidixic acid, N=297 for sulfonamide
For Ireland; N=3302 for tetracycline, N=107 for streptomycin
For Italy; N=71 for sulfonamide
For Netherlands; N=280 for sulfonamide, N=280 for ciprofloxacin, N=45 for ciprofloxacin
For Poland; N=188 for streptomycin, N=191 for tetracycline, N=155 for fully sensitive, N=186 for chloramphenicol, N=4 for resistant to >4 antimicrobials, N=192 for trimethoprim
For Portugal; N=12 for nalidixic acid, N=5 for ampicillin, N=7 for cefotaxime, N=12 for tetracycline, N=5 for chloramphenicol, N=5 for ciprofloxacin
For United Kingdom; N=590 for streptomycin, N=590 for cefotaxime, N=590 for gentamicin, N=590 for chloramphenicol

Turkeys

Data on antimicrobial resistance in *E. coli* indicators from turkeys was reported by 5 MS (Table AB EC5). High levels of resistance were reported for tetracycline, ampicillin, streptomycin, nalidixic acid, chloramphenicol and sulfonamide (overall average ranging from 19.7% to 72.2%). The high level of resistance to nalidixic acid, which was also observed in broilers, may reflect frequent use of fluoroquinolones in poultry.

Table AB EC 5. Antimicrobial resistance in E. coli from turkeys

			Antimicrobial											
	Monitoring program		Ampicillin	Cefotaxime	Chloramphenicol	Ciprofloxacin	Gentamicin	Nalidixic acid	Streptomycin	Sulfonamide	Tetracycline	Trimethoprim	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	Yes	10	18.2	-	18.2	9.1	0	9.1	27.3	-	63.6	18.2	-	-
Hungary	-	96	62.5	-	36.6	-	2.1	-	38.9	60.0	69.8	-	-	-
Italy	Yes	138	70.3	0	21.7	-	2.9	43.5	47.8	-	92.8	-	5.1	47.1
Poland	Yes	116	51.7	-	12.9	-	1.7	35.3	16.8	18.6	50.0	12.2	-	-
United Kingdom	Yes	36	52.8	-	-	-	-	-	-	-	72.2	-	-	5.6
Total, N		**396**	**238**	**0**	**81**	**1**	**8**	**102**	**125**	**78**	**286**	**16**	**7**	**67**
Total, %			**60.1**	**0**	**20.5**	**0.3**	**2.0**	**25.8**	**31.6**	**19.7**	**72.2**	**4.0**	**1.8**	**16.9**

Only MS reporting more than 10 isolates were included in this table
For Hungary; N=93 for chloramphenicol, N=95 for sulfonamide, N=95 for streptomycin
For Ireland; N=3 for streptomycin
For Poland; N=35 for fully sensitive, N=113 for streptomycin, N=113 for sulfonamide, N=26 for resistant to >4 antimicrobials, N=115 for trimethoprim

4.2.3. Discussion

Monitoring of antimicrobial resistance in indicator bacteria, such as *E. coli* and Enterococci*,* enables the evaluation of trends in the occurrence antimicrobial resistance in animals and food, even when zoonotic pathogens are scarce or absent.

Accordingly, reports on antimicrobial resistance in *E. coli* indicators from the MS were based on relatively large numbers of isolates, as compared to reports on zoonotic pathogens. This makes the data more representative. In *E. coli* isolates from animals, resistance to tetracycline, nalidixic acid and ampicillin was most common, depending on animal species. These observations are consistent with data reported by the MS in 2004 and 2005. The reported levels of antimicrobial resistance varied widely among MS. In general, low levels of resistance were reported by the Nordic countries compared to other reporting countries. This may reflect differences between countries in the usage of antimicrobials in animals, and national differences in legislations and guidelines related to antimicrobial use.

The reporting of antimicrobial resistance in *E. coli* demonstrated widespread occurrence of antimicrobial resistance in indicator bacteria from farm animals in the MS. This constitutes a reservoir of resistant bacteria and resistance determinants (genes) in the Community.

5. FOODBORNE OUTBREAKS

5. FOODBORNE OUTBREAKS

5.1. General overview

Since 2005, reporting of foodborne outbreaks has been mandatory for the European MS. However, since the foodborne outbreak investigation and reporting systems are not harmonised within the EU, differences in numbers, and types of reported outbreaks and causative agents do not necessarily reflect different levels of food safety between MS. All foodborne outbreaks reported by MS and 3 non-MS are incorporated in the report; including confirmed and suspected outbreaks as well as those outbreaks where evidence for an implicated source was not provided. An overview of countries reporting data on foodborne outbreaks is provided in Table OUT1.

Table OUT1. Overview of countries reporting data on foodborne outbreaks, 2006

	Total number of MS reporting	Countries
Salmonella	22	**All MS** except CY, LU, MT
		Non-MS: NO, RO, CH
Campylobacter	15	**MS:** AT, BE, CZ, DK, DE, EE, FI, FR, DU, HU, IE, IT, LT, NL, PL, ES
		Non-MS: NO, CH
Pathogenic *E. coli*	10	**MS:** AT, BE, DK, DE, IE, PL, PT, ES, SE, UK
		Non-MS: NO, RO
Yersinia	9	**MS:** AT, FI, FR, DE, IT, LV, LT, PT, SI
		Non-MS: NO
Listeria	5	**MS:** BE, CZ, FI, DE, ES
		Non-MS: CH
Shigella	8	**MS:** AT, BE, DK, FR, DE, LV, LT, PL
		Non-MS: NO
Bacterial Toxins	16	**MS:** AT, BE, DK, FI, FR, DE, HU, IT, LV, LT, NL, PL, PT, SI, SE, UK
		Non-MS: NO, RO, CH
Foodborne viruses	18	**MS:** AT, BE, DK, EE, FI, FR, DE, GR, HU, IE, IT, LV, NL, PL, SK, SI, SE, UK
		Non-MS: NO
Trichinella	7	**MS:** FR, DE, LV, LT, PL, SK, ES
Cryptosporidium	3	**MS:** DE, IE, SI
		Non-MS: NO[1]
Giardia	3	**MS:** BE, DE, IT
		Non-MS: NO[1]

1. NO - one outbreak involving both *Cryptosporidium* and *Giardia*

In 2006, 22 MS reported 5,710 foodborne outbreaks involving a total of 53,568 people, resulting in 5,525 hospitalisations (10.3%) and 50 deaths (0.1%) (Table OUT2). No outbreak data were received from Cyprus, Luxembourg and Malta. Three non-Member States: Norway, Romania and Switzerland, reported 97 outbreaks involving 1,461 persons, of which 255 were admitted to hospital.

Outbreaks were reported either as household outbreaks, affecting only members of one single household, or as general outbreaks affecting members of more than one household. In 2006, a total of 3,001 general outbreaks and 2,709 household outbreaks were reported by the MS.

The total number of reported outbreaks increased by 8.4% in 2006 compared to 2005, where 23 MS and Norway reported a total of 5,355 foodborne outbreaks. Within the EU, this represented an increase of 6.6% of the reported outbreaks.

The number of household outbreaks reported by the MS has increased with 19.8% compared to 2005. Part of this increase may be explained by the fact that Germany, this year, distinguished between general and household outbreaks. However, the number of reported general outbreaks in the MS was almost similar in 2006 (3,001) compared to 2005 (3,038) (Table OUT2). The lack of a decrease in this number, despite the more detailed report from Germany, may in part be explained by large increases in the number of general outbreaks reported by Slovakia, France and Italy.

The number of reported deaths caused by foodborne outbreaks has more than doubled from 2005 to 2006, which was mainly due to a large *L. monocytogenes* outbreak in the Czech Republic.

Table OUT2. Number of reported foodborne outbreaks in EU, 2006

	Outbreaks						Human cases		
	N	% of total	General	Household	% with aetiology[1]	Outbreak reporting rate per 100,000	N	No. admitted to hospital	No. of deaths
Austria	609	10.7	95	514	100	7.4	2,535	490	3
Belgium	116	2.0	57	59	43.1	1.1	1,030	109	3
Czech Republic[2]	65	1.1	65	-	100	0.6	1,438	263	16
Denmark	53	0.9	47	6	96.2	1.0	1,457	15	-
Estonia	27	0.5	5	22	100	2.0	173	56	0
Finland	46	0.8	41	5	63.0	0.9	1,907	23	-
France	904	15.8	612	292	64.5	1.4	9,415	808	5
Germany	1,370	24.0	595	775	97.7	1.7	7,812	-	9
Greece	58	1.0	32	26	75.9	0.5	691	244	0
Hungary	174	3.0	83	91	89.7	1.7	6,868	700	7
Ireland	27	0.5	9	18	77.8	0.6	208	10	0
Italy[2]	156	2.7	156	-	53.2	0.3	1,088	-	-
Latvia	309	5.4	44	265	74.4	13.5	793	-	0
Lithuania	103	1.8	44	59	83.5	3.0	696	403	1
Netherlands	49	0.9	24	25	75.5	0.3	476	18	1
Poland	561	9.8	183	378	71.3	1.5	6,974	2,078	1
Portugal	13	0.2	10	3	100	0.1	177	69	0
Slovakia[3]	455	8.0	445	10	100	8.4	1,874	71	0
Slovenia	61	1.1	60	1	82.0	3.0	1,738	98	0
Spain	351	6.1	191	160	100	0.8	3,491	-	1
Sweden[4]	137	2.4	137	-	41.6	1.5	1,589	3	1
United Kingdom[2]	66	1.2	66	-	69.7	0.1	1,138	67	2
EU total	**5,710**	**-**	**3,001**	**2,709**	**83.7**	**1.2**	**53,568**	**5,525**	**50**
Norway	65	-	51	14	66.2	1.4	1,036	36	5
Romania	26	-	16	10	100	0.1	281	177	0
Switzerland	6	-	6	0	100	0.1	144	42	0

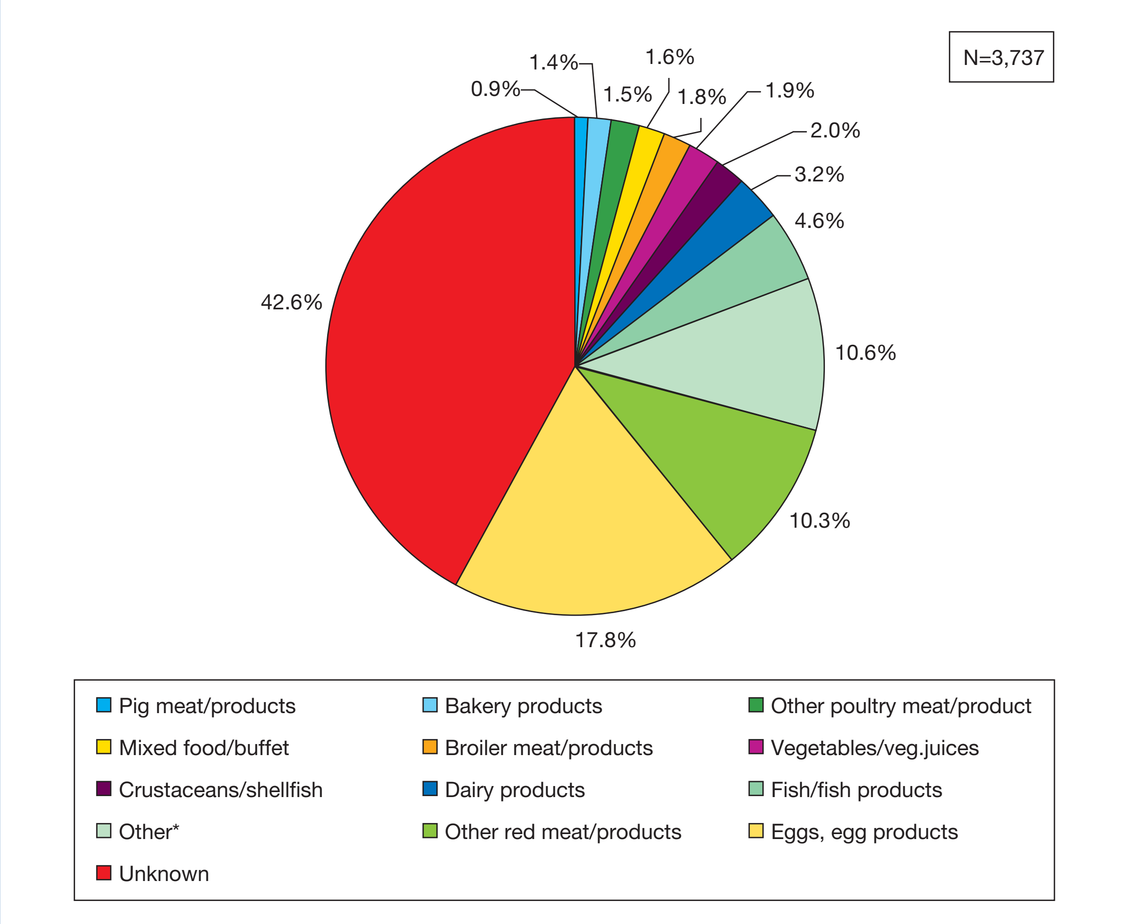
1. Percent of outbreaks where the causative agent has been identified and reported
2. Only general outbreaks reported
3. Household outbreaks 2 – 9 cases. General outbreaks >10 cases
4. No distinction between general outbreaks and household outbreaks

Since some MS report data on general outbreaks only (CZ, IT, UK) it is likely that the total number of household outbreaks is underestimated. Also, as Sweden reports all outbreaks as general outbreaks the total number of general outbreaks may in fact include some household outbreaks.

Analyses of the data are further complicated by the fact that some countries report aggregated outbreak data. In 2006, 35.7% percent of the outbreaks were reported in an aggregated form. However, 1,834 general outbreaks and 1,903 household outbreaks were reported individually. These individually reported outbreaks affected 31,304 and 6,700 cases, respectively.

Of the individually reported outbreaks (N=3,737), detailed information on implicated foodstuffs was reported in 57.4%. The most common food vehicle was eggs and egg products, responsible for 17.8% of these outbreaks, while unspecified meat (other meat or mixed red meat and product hereof) was reported as the causative source in 10.3% of the outbreaks. Fish and fish products were the source in 4.6% and dairy products in 3.2%, respectively Fig. OUT1.

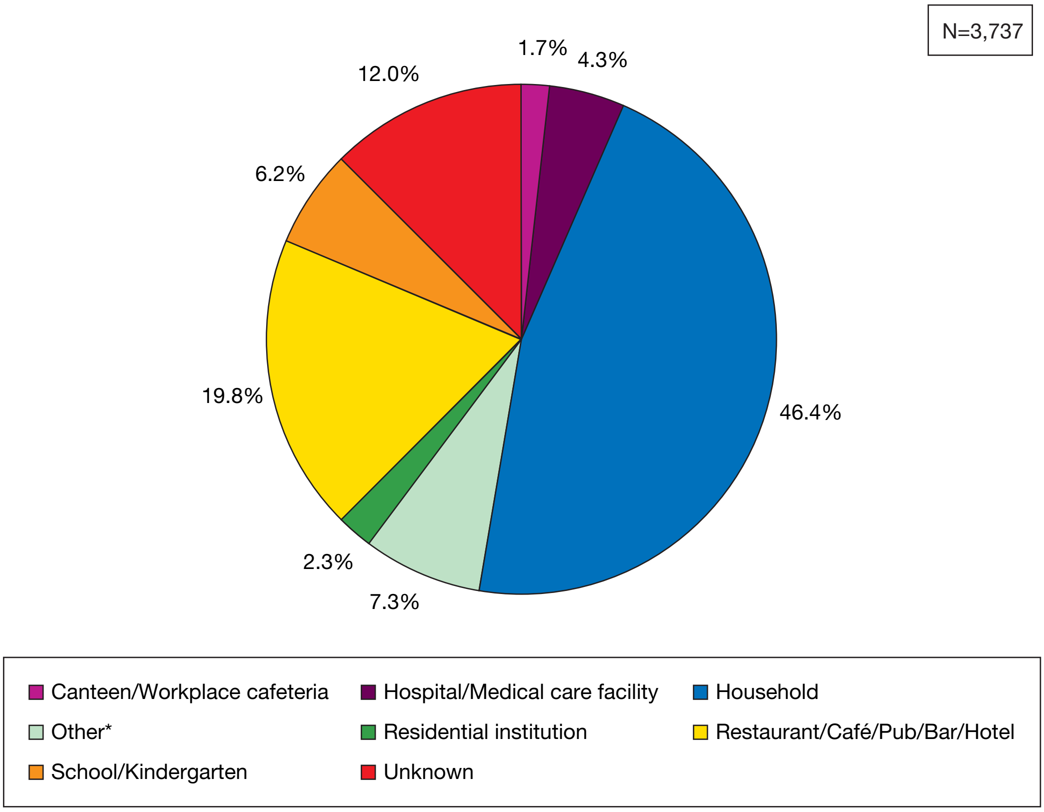
Figure OUT1. Distribution of vehicle involved (in %), for individually reported outbreaks, 2006



Note: * Other, include the categories; Other foods (7.7%), Sweets/chocolate (0.4%), Tap/well water (0.4%), Fruits/Berries/fruit juices (0.4%), Cereal incl. rice & nuts (0.4%), Cheese (0.4%), Drinks, incl. Bottled water (0.2%), Milk (0.2%), Turkey meat/products (0.2%), Bovine meat/products (0.2%), Herbs/spices (0.1%), Sheep meat/products (0.1%)

In 27.7% of all reported outbreaks the location of exposure was unknown, while for the individually reported outbreaks this proportion was 12.0%. Even though 1,903 outbreaks were reported as household outbreaks, only 1,732 outbreaks were reported as located in private households. Apart from private households, the most common locations of infection in individually reported outbreaks were restaurants/cafés etc. (19.8%) and schools and kindergartens (6.2%). The distribution of reported locations of individually reported outbreaks is presented in Fig. OUT2.

Figure OUT2. Distribution of location (in %), for individually reported outbreaks, 2006



Note: * Other, include the categories; Other (5.5%), Camp/Picnic (0.6%), Take-away/fast-food outlet (0.5%), Mobile retailer/market/street vendor (0.3%), Temporary mass catering (0.3%), Aircraft/Ship/Train (0.1%)

Causative Agents

Salmonella remains the most common zoonotic agent in foodborne outbreaks reported in the EU. In 2006, *Salmonella* was responsible for 53.9% of all reported outbreaks (63.6% in 2005). These outbreaks affected 22,705 people of which 14.0% were admitted to hospital (Table OUT3). *Campylobacter* caused 6.9% of all reported outbreaks. For the first time foodborne viruses were more commonly reported than *Campylobacter* as causes of foodborne outbreaks. The proportion of outbreaks caused by foodborne viruses increased from 5.8% in 2005 to 10.2% in 2006. This increase may be explained by the fact that most MS reported data on these outbreaks in 2006 as compared to 2005, where much fewer MS included these types of outbreaks in their report.

Outbreaks caused by foodborne viruses are generally characterised by affecting more people per outbreak than the zoonotic agents. In 2006, on average, reported outbreaks caused by viruses involved 23 cases, which was three times more than an outbreak caused by *Salmonella* (7 cases) and seven times more than *Campylobacter* (3 cases). However, more people with salmonellosis (14%) were admitted to a hospital compared to people affected by foodborne viruses (4%). In total, 23 deaths were reported due to foodborne outbreaks caused by *Salmonella,* three people died of foodborne viruses and none died of *Campylobacter* outbreaks.

On average, *Listeria* was the most severe pathogen associated with outbreaks in 2006. Nine outbreaks affected 120 people, of which 74.2% (89) was hospitalised and 17 people died. This was mainly due to a large outbreak in the Czech Republic, where *L. monocytogenes* was identified as the causative agent. All 78 people involved were hospitalised and 13 persons died (16.7%). The source was identified to be soft cheese (laboratory confirmed).

Staphylococcus was indicated as the causative agent in 4.1% (236) of all reported outbreaks. A total of 2,057 people were affected, 277 were hospitalised and two persons died. France reported the largest number of *Staphylococcus* outbreaks (169) affecting 1,290 cases. Poland reported 17 outbreaks, involving 389 cases.

On average, *Yersinia* involved 23 cases per outbreak, which was mainly due to two large outbreaks in Finland involving 502 persons. *Clostridium* spp. affected 20 people per outbreak, mainly due to a large outbreak in France involving 500 cases diagnosed with *C. perfringens*. In Poland two outbreaks caused by *Klebsiella* affected 107 persons.

Table OUT 3. Causative agents responsible for foodborne outbreaks, 2006 (All countries)

	Outbreaks				Human cases		
	N	% of total	General	Household	N	No. admitted to hospital	No. of deaths
Salmonella	3,131	53.9	1,520	1,611	22,705	3,185	23
Unknown	952	16.4	610	342	9,437	947	2
Food borne viruses	587	10.2	373	214	13,345	553	3
Campylobacter	400	6.9	116	284	1,304	65	0
Staphylococcus	236	4.1	157	79	2,057	277	2
Toxins	86	1.5	20	66	834	261	3
Clostridium	81	1.4	55	26	1,651	44	2
Bacillus	78	1.3	66	12	964	34	0
Histamine	71	1.2	62	9	370	41	0
Pathogenic *E. coli*	48	0.8	25	23	750	103	1
Shigella	33	0.6	19	14	138	22	0
Yersinia	26	0.4	11	15	604	15	2
Giardia[1]	18	0.3	13	5	44	-	0
Trichinella	18	0.3	5	13	202	113	0
Listeria	9	0.2	5	4	120	89	17
Other[2]	9	0.2	5	4	31	2	0
Cryptosporidium	7	0.1	4	3	59	0	0
Brucella	6	0.1	3	3	43	3	0
Flavivirus	6	0.1	2	4	26	25	0
Klebsiella	3	0.1	2	1	109	1	0
Streptococcus	2	<0.1	2	0	236	-	-
EU Total	**5,705**	**98.2**	**3,000**	**2,706**	**53,546**	**5,523**	**50**
Total	**5,807**	**100.0**	**3,075**	**2,732**	**55,029**	**5,780**	**55**

1. For Giardia, one outbreak from Norway involved both *Giardia* and *Cryptosporidium*
2. Including: *Aeromonas, Anisakis, Diphyllobothrium, Escherichia coli*, non-pat*, Proteus, Vibrio,* Wax esters (from fish)

A large proportion of cases were hospitalised in outbreaks caused by Flavivirus (96.2%), *Trichinella* spp. (55.9%) and bacterial toxins (31.2%).

The causative agent was unknown in 16.4% of all the reported outbreaks. This proportion was higher for general outbreaks (19.8%) than for household outbreaks (12.5%).

5.2. Foodborne outbreaks caused by *Salmonella* spp.

Twenty-two MS and three non-MS reported a total of 3,131 foodborne outbreaks of human salmonellosis, which constituted 53.9% of the total number of reported outbreaks in the EU and in the reporting non-MS (Table OUT4).

In 2006, Germany, Austria, Slovakia, Spain and Poland accounted for 78.0% of the *Salmonella* outbreaks, reporting 908, 453, 452, 338 and 292 outbreaks respectively. Germany reported 330 general and 578 household outbreaks, involving 4,851 persons of which seven died. The majority of *Salmonella* outbreaks in Austria were small household outbreaks (83.9%), with 2 – 8 cases. In total, the non-MS, Norway, Romania and Switzerland reported 14 general and 6 household outbreaks caused by *Salmonella*.

Table OUT4. Salmonella serovars reported for foodborne outbreaks, 2006[1]

	Outbreaks		Human cases		
	N	% of total	N	No. admitted to hospital	No. of deaths
Salmonella spp	1,188	37.9	6,697	192	6
S. Enteritidis[2]	1,729	55.2	13,853	2,714	14
S. Typhimurium	129	4.1	1,088	149	3
S. group D	26	0.8	207	63	0
S. group B	12	0.4	98	0	0
S. group C	6	0.2	24	0	0
S. Infantis	5	0.2	48	9	0
S. Hadar	4	0.1	33	1	0
S. Kentucky	4	0.1	8	2	0
S. Paratyphi B	4	0.1	25	1	0
S. Virchow	4	0.1	138	2	0
S. Abony	2	0.1	6	2	0
S. Ajiobo	2	0.1	161	13	0
S. Bovismorbificans	2	0.1	4	1	0
S. Give	2	0.1	55	0	0
S. Montevideo	2	0.1	52	5	0
S. Muenchen	2	0.1	34	0	0
S. Newport	2	0.1	59	7	0
S. Paratyphi A	2	0.1	8	0	0
S. Saintpaul	2	0.1	12	1	0
S. Stanley	2	0.1	95	23	0
Total	**3,131**	**100,0**	**22,705**	**3,185**	**23**

1. Only serovars causing two or more outbreaks are presented
2. Including 418 *S.* Enteritidis cases in a single Hungarian outbreak

S. Enteritidis was the predominant *Salmonella* serovar associated with outbreaks (Table OUT4) and accounted for 29.8% of all reported outbreaks, 47.0% of all hospitalisations and 25.5% of all deaths in 2006. For 37.9% of the outbreaks caused by *Salmonella,* no serovar was specified.

In outbreaks caused by *S*. group D, *S.* Enteritidis or *S*. Stanley involving more than 25 human cases, relatively large proportions of cases required hospitalisation (30.4%, 19.6% and 24.2%, respectively). In two *S.* Enteritidis outbreaks in Hungary and France, three out of four cases required hospitalisation.

Slovakia reported 451 *S.* Enteritidis outbreaks affecting 1,849 persons and Spain reported *S.* Enteritidis as the cause of 100 general and 63 household outbreaks, involving 1,724 persons and causing one death.

Salmonella phage types

Phage type data were provided for 25.2% of all *S.* Enteritidis outbreaks. Phagetype information was only provided for a subset of the outbreaks reported by Austria, Belgium, Germany, Slovakia and the United Kingdom. The five most commonly reported phage types were *S.* Enteritidis PT4, PT8, PT21, PT6 and PT6a; accounting for 120, 110, 92, 32 and 23 outbreaks respectively.

For the 129 outbreaks caused by *S.* Typhimurium, phagetypes were provided for 20.2%. Phagetype information was reported for the majority of *S.* Typhimurium outbreaks in Austria (25 outbreaks) and Norway (1) and from Slovakia (1), Sweden (1) and the United Kingdom (2). Nine different phage types were reported, and the most common phagetypes were DT104 (7 outbreaks), DT120 (4) and DT193 (3).

Location of exposure

Information on location of exposure was available for 66.0% of the *Salmonella* outbreaks (Table OUT5). Households (37.3%) and restaurants/cafés etc. (6.8%) were the most commonly reported locations of exposure. On average, outbreaks at restaurants affected four times more people per outbreak than outbreaks in private homes.

Salmonella outbreaks in schools and kindergartens, and residential institutions were less common, but generally affected more people per outbreak (22 and 20, respectively), than outbreaks in private households and at restaurants/cafés etc. Greece and Slovenia were the only MS reporting *Salmonella* outbreaks associated with camps or picnics (1 and 3 respectively, all *S.* Enteritidis outbreaks), and on average, 24 people were affected in these outbreaks.

In general, outbreaks at restaurants have the potential to affect large groups of people, e.g. three *S.* Enteritidis outbreaks at a social gathering in Hungary affected 732 persons in total, of whom 18.6% was hospitalised and 4 people died.

Table OUT5. Major categories of exposure locations for Salmonella outbreaks, 2006

	Outbreaks	Cases		
Location	**N**	**N**	**No. admitted to hospital**	**No. of deaths**
Household	1,167	4,803	845	4
Restaurant/Café/Pub/Bar/Hotel	214	3,590	443	4
School/Kindergarten	54	1,201	53	4
Hospital/Medical care facility	39	347	38	1
Canteen/Workplace cafeteria	24	278	45	0
Residential institution	12	244	11	0
Take-away/fast-food outlet	12	113	21	0
Mobile retailer/market/street vendor	7	100	9	0
Temporary mass catering	5	87	9	0
Aircraft/Ship/Train	4	52	-	0
Camp/Picnic	4	95	41	0
Other	526	5,163	1,065	5
Unknown	1,063	6,632	605	5
Total	**3,131**	**22,705**	**3,185**	**23**

Food vehicles

Overall, the food vehicle was unknown, or not reported in 44.8% (2,601) of all the reported outbreaks in 2006. However, information on the food vehicle was provided in 60.7% of the *Salmonella* outbreaks (Table OUT6).

As in previous years eggs and egg products were the vehicle most frequently associated with *Salmonella* outbreaks (Figure OUT3); causing 1,043 outbreaks involving 8,443 persons of whom 15.6% were admitted to hospital and 8 persons died. The vehicle group “mixed food” and “buffet” caused the most severe *Salmonella* infections, as 37.4% of the patients were admitted to hospital. High percentages of hospitalisation were also reported from *Salmonella* infections caused by broiler meat and broiler meat products (32.3%), cheese (26.7%) and bakery products (19.0%) (Table OUT6).

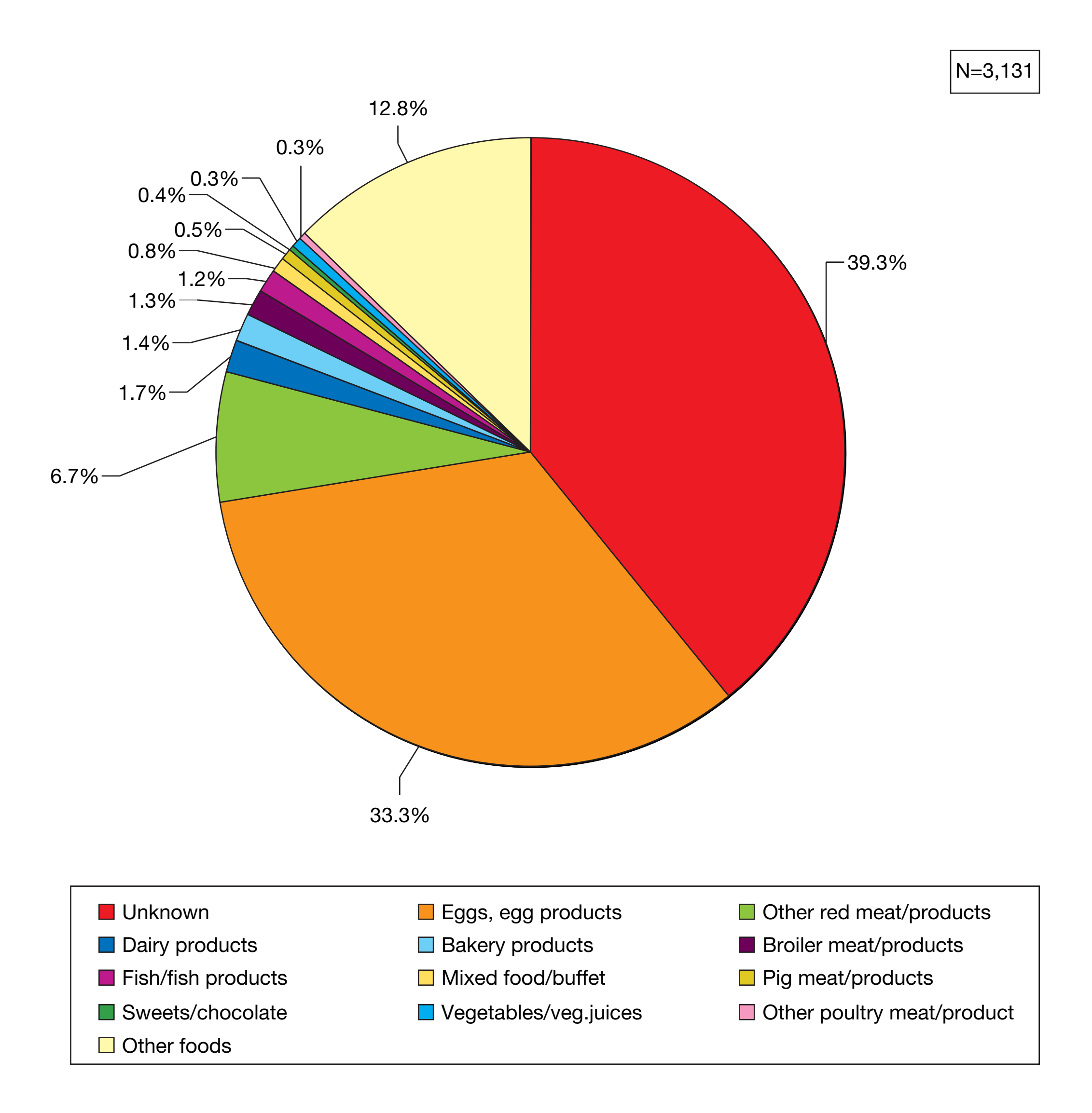
Table OUT6. Categories of food vehicles implicated in Salmonella outbreaks, 2006

	Outbreaks		Human cases	
	General	Household	N	No. admitted to hospital
Eggs, egg products	402	641	8,443	1,316
Other red meat/products[1]	67	143	990	144
Bakery products	29	14	989	188
Dairy products	20	33	366	11
Mixed food/buffet	20	5	366	137
Broiler meat/products	17	24	251	81
Fish/fish products	14	24	187	9
Pig meat/products	10	5	185	4
Sweets/chocolate	6	6	71	-
Vegetables/veg. juices	6	4	359	8
Other poultry meat/product[2]	4	6	104	16
Cereal incl. rice and nuts	3	0	20	-
Fruits/berries/fruit juice	2	1	30	2
Bovine meat/products	1	0	20	1
Cheese	1	2	86	23
Crustaceans/shellfish	1	5	19	6
Herbs/spices	1	0	16	2
Sheep meat/products	1	0	3	1
Turkey meat/products	1	4	15	2
Tap water/well water	0	1	2	-
Other foods[3]	200	178	4,170	617
Unknown	714	515	6,013	617
Total	**1,520**	**1,611**	**22,705**	**3,185**

1. Includes meat and meat products such as sausage, ham, kebab, unspecified minced meat
2. Includes duck, poultry meat and poultry meat products
3. Includes data from aggregated outbreak reports, mixed meals, pizza, soups and sauces

As some MS reported aggregated data on their outbreaks, information on the different sources of infection has also been aggregated. For example, Spain reported 146 *Salmonella* outbreaks affecting 1,095 people and identified eggs as the possible source in 76 of the reported outbreaks, meats including poultry were the source of infection in 11 outbreaks and others unspecified in 25 outbreaks. Lithuania reported *S.* Enteritidis as causative agent in 74 outbreaks and identified chicken as source of infection in 18 outbreaks, eggs in 13, poultry (2), cakes with cream (7) and ready to eat products in five outbreaks. Also the Netherlands and Slovakia have reported aggregated data on source of infection.

Figure OUT 3. Food vehicles implicated in human Salmonella outbreaks (% of outbreaks), 2006



Note: only sources involving more than 10 outbreaks are shown in the figure. Other foods includes: Cereal incl. rice and nuts(3), Fruits/berries/fruit juice(3), Bovine meat/products(1), Cheese(3), Crustaceans/shellfish(6), Herbs/spices(1), Sheep meat/products(1), Turkey meat/products(5), Tap water/well water(1) and outbreaks where the source was reported as "other foods".

Some relevant *Salmonella* outbreaks

Hungary reported the largest and most severe outbreak caused by *Salmonella*. The causative agent was *S.* Enteritidis and the outbreak affected 418 people, of whom 24.6% were hospitalised and four persons died. The source of infection was laboratory confirmed to be fancy cake (layer cake) served at a social gathering mainly involving elderly people.

Germany reported, among others, three large *S.* Enteritidis outbreaks. One outbreak involved 171 persons. The source was vanilla ice cream, offered at an ice cream parlour. The causative agent . Enteritidis PT 21c was detected and laboratory confirmed in the ice cream. The second outbreak was caused by a lunch meal produced in a catering canteen delivering meals for day care centres. In total, 144 children and their nursery teachers were affected. The implicated food served was; fish with yoghurt sauce and drinking yoghurt. The causative agent *S.* Enteritidis PT 4 was identified in food samples. The third outbreak was due to *S.* Enteritidis PT 21c and was caused by contaminated cake, stored at ambient temperature and served in a home for elderly citizens. The outbreak affected 136 persons of whom 4 persons died.

Belgium reported a *S.* Enteritidis PT 21 outbreak in a Chinese restaurant close to the French border, where 59 people were affected and 28 were hospitalised. An epidemiological investigation was conducted by the French authorities, which pointed out duck meat as the source of contamination. The microbiological investigation was done in Belgium, but only *S.* Indiana was detected in some fresh duck from the same producer. However, more than 10^6 CFU/g *S.* Enteritidis PT 21 were isolated from whole eggs from the restaurant kitchen. The phage type and PFGE pattern of the strains matched perfectly with the epi-type isolated from patients and from persons among the kitchen staff. Eggs were probably the primary source of the infection and the kitchen staff may have transmitted *Salmonella* to the different dishes served, with the duck meat as the most important.

Latvia reported a *S.* Enteritidis outbreak at an open-air public holiday event, affecting 49 persons. Isolates from 27 patients, incl. 17 of the kitchen staff, were microbiological investigated and 8 samples were found positive for *S.* Enteritidis. A retrospective cohort study revealed pork, fried in a mixture of raw eggs, as the source of infection.

Outbreaks caused by exotic *Salmonella* serovars from vegetables were reported by Sweden and the United Kingdom. Sweden reported a *Salmonella* outbreak at an Asian restaurant affecting 130 people. Two different species, *S.* Bareilly and *S.* Virchow were identified in sprouts being kept at room temperature. In the United Kingdom an outbreak with *S.* Ajiobo affected 153 people and hospitalised 11 persons (7.2%). Sandwiches with salad leaves were the suspected source of infection.

Other outbreaks caused by less common serovars were reported by two non-MS. Norway reported an *S.* Kedougou outbreak affecting 60 persons and causing two deaths. The source was laboratory confirmed to be Norwegian salami produced for the national marked. In Switzerland an outbreak with *S.* Stanley affected 82 persons, and caused 28.0% of the patients to be hospitalised. The causative source was confirmed to be soft cheese by microbiological investigation and by epidemiological case-control study.

5.3. Foodborne outbreaks caused by *Campylobacter* spp.

Campylobacter is the most common zoonotic cause of diarrhoeal illness in humans within the EU. In 2006, fifteen MS and two non-MS reported 400 outbreaks of human campylobacteriosis. This was a 19.0% decrease compared to 2005 and a 67.8% decrease since 2004. In 2006, *Campylobacter* was identified as the cause of infection in 6.9% of all reported outbreaks (Table OUT3). In total, 1,304 persons were affected by campylobacteriosis and 65 were admitted to a hospital. The majority of the *Campylobacter* outbreaks were reported by Germany and Austria, reporting 208 and 136 outbreaks respectively. The majority of the outbreaks were household outbreaks (71.0%) affecting approximately 50% of all persons with campylobacteriosis. Eleven countries reported 119 outbreaks due to *C. jejuni* and Austria reported two *C. coli* household outbreaks.

Location of exposure

Information on location of exposure was available for 73.3% of all reported *Campylobacter* outbreaks, and the most commonly reported locations were private households (49.3%) and restaurants (9.8%). In total, nine *Campylobacter* outbreaks (2.3%) were reported located at canteens or workplace catering, on average affecting seven times more people per outbreak than outbreaks in private homes. *Campylobacter* outbreaks located at camps or picnics affected, on average, 24 persons per outbreak, mainly due to two large outbreaks in Belgium and Hungary.

Food vehicle

The food vehicle was reported in 55.5% of all outbreaks (Table OUT7). Unspecified meat was the most common source of infection, causing 23.0% of all *Campylobacter* outbreaks. However, no details were provided concerning the animal species from which implicated meat came and therefore this may include red meat as well as poultry meat. The second most frequent source was broiler meat/products reported in 10.3% of the outbreaks.

Table OUT7. Categories of sources implicated in Campylobacter outbreaks, 2006

	Outbreaks	Human cases	
	N	N	No. admitted to hospital
Unspecified meat/meat products[1]	92	275	2
Broiler meat/products	41	135	10
Dairy products	25	62	1
Fish/fish products	16	34	0
Eggs, egg products	13	19	3
Pig meat/products	8	107	4
Other poultry meat/product	7	59	4
Mixed food/buffet	4	34	1
Milk	3	6	1
Turkey meat/products	3	44	8
Cheese	1	2	1
Fruits/berries/fruit juice	1	4	-
Sweets/chocolate	1	3	-
Tap water/well water	1	2	-
Other foods[2]	6	76	0
Unknown	178	442	30
Total	**400**	**1,304**	**65**

1. Including 84 outbreaks from Germany
2. Other food includes soups, pizza, omelette and ice cream

Campylobacter is usually a common causative agent of waterborne outbreaks and is known to cause large waterborne outbreaks. This year, however, no MS reported any waterborne outbreaks caused by *Campylobacter*, only Norway reported one small waterborne outbreak, affecting 2 people.

In France, a *Campylobacter* outbreak at a restaurant affected 42 persons. Poultry was the source of infection. Belgium reported a *Campylobacter* outbreak involving 40 people camping, of whom eight persons were hospitalised. Epidemiological investigation pointed out turkey meat as the source of infection.

Denmark reported a *Campylobacter* outbreak located in a private company. Of 130 employees, 23 were probable cases of which 6 cases were later culture confirmed. A cohort study pointed towards a relish served with fish and chips in the company canteen as the source of infection. Investigations in the company canteen kitchen subsequently revealed, that raw pieces of chicken had been stored in the refrigerator on top of the relish and meat juice had dripped into the relish.

5.4. Foodborne outbreaks caused by pathogenic *E. coli*

Ten MS and two non-MS reported 48 outbreaks caused by pathogenic *E. coli* in 2006 (Table OUT3). This represented 0.8% of the total number of reported outbreaks and a 20.0% decrease compared to 2005. Poland and Germany reported 58.3% of the pathogenic *E. coli* outbreaks, 15 and 13 outbreaks respectively. In total, the *E. coli* outbreaks affected 750 persons, of whom 13.7% required hospitalisation. In total, 52.1% of the reported *E. coli* outbreaks were general outbreaks, and they affected three times more people than the household outbreaks (580 vs. 170), mainly due to a Danish outbreak affecting 250 persons.

No deaths were reported by the MS, while Norway reported one death. Nineteen outbreaks were caused by Verotoxigenic *E. coli* (VTEC), and involved 111 persons and caused 42 hospitalisations (37.8%).

In 52.1% of all reported *E. coli* outbreaks the food vehicle was unknown. In six outbreaks (12.5%), the vehicle was milk or dairy products, and in three outbreaks bovine meat (6.3%) was the source. Poland reported three water borne *E. coli* outbreaks.

Denmark reported the largest pathogenic *E. coli* outbreak: An outbreak with enterotoxigenic *E. coli* (ETEC) affected 250 persons at a school. Microbiological investigation detected ETEC in samples from 18 cases and *S.* Anatum in four samples. A cohort study pointed towards pesto served with pasta as the source of infection. *S.* Anatum and enterotoxigenic *E. coli* were isolated from leftovers of the pesto. Though the *E. coli* in the pesto were different from the epi-type found in the cases, it was concluded that the pesto was the source of infection. Probably the bacteria were introduced via imported basil used in the pesto. In Denmark ETEC is normally seen as travel-diarrhoea and this outbreak is the largest ETEC outbreak in Denmark so far.

Different types of meat were implicated in outbreaks reported by Portugal and Norway. In Portugal, sandwiches with cooked meat served at a school picnic affected 25 people, all of whom were hospitalised. *E. coli* was laboratory confirmed to be the causative agent. A small but severe outbreak was reported by Norway. The outbreak was caused by verotoxigenic *E. coli* O103:H25 involving 17 persons, of which 10 developed Haemolytic Uraemic Syndrome (HUS) and one child died. The source of infection was laboratory confirmed to be a traditional Norwegian sausage (morrpoelse) made from sheep. Also, Romania reported salted soft cow cheese as a source of infection (laboratory confirmed) in an *E. coli* outbreak at a kindergarten, affecting 46 persons, of whom 14 were admitted to hospital.

5.5. Foodborne outbreaks caused by *Yersinia* spp.

Nine MS and one non-MS reported 26 outbreaks caused by *Yersinia* spp., corresponding to 0.4% of all reported outbreaks in 2006 (Table OUT3). In total, the outbreaks involved 604 people. Most cases originated from two large outbreaks in Finland (83.1%). The number of *Yersinia* outbreaks reported in 2006 was almost three times higher than in 2005, where four MS reported nine outbreaks, but less than in year 2004 where six MS reported 51 *Yersinia* outbreaks.

Information on source of infection was provided in 53.8% of the reported outbreaks. Pig meat products and pig meat were the source in seven outbreaks (26.9%), while fish and seafood were the sources in two outbreaks (7.7%).

Finland reported two large *Yersinia* outbreaks, involving 502 persons. In both outbreaks, stored domestic grated carrots from the summer 2005 had been served in schools and kindergartens. The carrots were traced back to the farm and to the vegetable processing plant. Samples were taken from carrots, storages, and surfaces of washing and peeling devices. *Y. pseudotuberculosis* 0:1 was recovered from carrots and surface samples and were laboratory confirmed to be indistinguishable from the patient isolates.

5.6. Foodborne outbreaks caused by other bacterial agents

Listeria

Five MS and one non-MS reported nine *Listeria* outbreaks, affecting 120 persons, of which 74.2% were hospitalised (89). In total, seventeen people died of listeriosis, corresponding to 30.9% of all deaths reported in relation to foodborne outbreaks (Table OUT3). This makes *Listeria* the most severe zoonoses in connection with foodborne outbreaks in 2006. Soft cheese was identified as the source of infection in three outbreaks reported by the Czech Republic, Germany and Switzerland, while mushrooms and a cream dairy product were sources of infection in two outbreaks.

The Czech Republic reported the most severe and largest *Listeria* outbreak caused by *L. monocytogenes*. In total, 78 people were affected and all involved were hospitalised, 13 people died. Soft cheese was laboratory confirmed to be the source of infection.

Germany reported a *L. monocytogenes* outbreak affecting at least 6 persons, one of whom died. The source of infection was a contaminated Harz cheese. Cheese was collected from the patients' refrigerators and from the producer. The cheese samples collected at the manufacturing company were found highly contaminated (52,000 – 120,000 CFU/g), and the isolates were indistinguishable from the patients' isolates.

Shigella

Eight MS and one non-MS reported 33 *Shigella* outbreaks (0.6% of all outbreaks) involving 138 persons, of which 15.9% were admitted to hospital (Table OUT3). More than half (57.6%) of the outbreaks were general outbreaks, affecting 114 persons. The source of infection was identified in 24.2% of the outbreaks, and dairy products were the source of infection in two outbreaks (one from unpasteurised milk).

Brucella

Spain, Greece and Italy were the only MS to report *Brucella* outbreaks in 2006, reporting 4, 1 and 1 outbreak respectively. In total, 43 people were affected and three required hospitalisation. Cheese was identified as the source of infection in four of the 6 outbreaks.

Klebsiella

In 2006, Poland and Latvia was the only MS to report *Klebsiella* outbreaks, reporting 2 and 1 outbreak respectively. The majority of people involved were mainly reported by Poland (107 vs. 2) and the outbreaks were located in a hospital. Dairy products were laboratory confirmed to be the source of infection.

Bacterial toxins

Sixteen MS, and three non-MS reported 482 outbreaks caused by bacterial toxins, which were 8.3% of all outbreaks reported in 2006 (Table OUT3). In total, the bacterial toxins outbreaks affected 5,504 people, of whom 11.2% were admitted to hospital and 7 people died. The majority of the reported outbreaks were general outbreaks (62.0%). *S. aureus* and *Staphylococcus* spp. were responsible for 2,369 reported cases (2,053 and 320 respectively) of which 16.0% were hospitalised. *Clostridium* spp. affected 1,651 persons, where all *C. botulinum* cases (33) were hospitalised and one died (Table OUT8).

People involved in household outbreaks were more likely to be hospitalised. In total, 475 persons were affected by outbreaks in private households and of these 42.9% were hospitalised.

Table OUT8. Outbreaks caused by bacterial toxins, 2006

	Outbreak		Cases		
	General	Household	ill	No. admitted to hospital	No. of deaths
Bacillus cereus	65	12	941	34	0
Bacillus licheniformis	1	0	23	-	-
Clostridium botulinum	3	15	33	33	1
Clostridium perfringens	52	11	1,618	11	1
Staphylococcus aureus	156	79	2,053	277	2
Staphylococcus spp.[1]	7	1	320	101	0
Other toxins[2]	13	58	473[3]	121[4]	3[5]
Toxins, unspecified	1	7	43	34	0
Total	**298**	**183**	**5,504**	**611**	**7**

1. Including 6 outbreaks due to Staphylococcal enterotoxins
2. Including: Lectin (1), marine biotoxins (11), mushrooms (54)
3. Including: Lectin (130), marine biotoxins (192), mushrooms (127)
4. Including: Mushrooms (119)
5. Mushrooms

S. aureus toxins were responsible for 48.8% of the outbreaks caused by bacterial toxins reported by the countries, and 4.0% of all reported outbreaks in 2006 (Table OUT3). In the majority of the *S. aureus* outbreaks (125) the source of infection was either unspecified or unknown. Dairy products were the causative source in 26 outbreaks, unspecified red meat in 19 outbreaks and unspecified poultry in 16 outbreaks. In total, 71.9% of the *S. aureus* outbreaks (169), affecting 62.8% of all *S. aureus* cases were reported by France.

In Switzerland, *S. aureus* caused an outbreak involving 40 people of whom 45.0% were hospitalised. Cheese made of unpasteurised milk was laboratory confirmed as the source of infection. Additionally, Austria reported a large outbreak of *S.* enterotoxins involving 113 people of whom 89.4% were hospitalised. The outbreak was located in a home for children and the source was laboratory confirmed to be chicken nuggets with rice.

Nine MS and one non-MS reported 63 *C. perfringens* outbreaks, accounting for 29.4% of the cases infected by bacterial toxins. Eleven cases were admitted to hospital and one person died. Meat and meat products, including poultry and fish, were the most common sources of *C. perfringens* infections. Almost half of the outbreaks (41.3%) were located at restaurants and 12.7% at school canteens and in kindergartens (9.5% and 3.2%, respectively).

France reported the largest outbreak due to bacterial toxins: a *C. perfringens* outbreak, which affected 500 people at a festive meal. The source was epidemiologically linked to poultry. In the United Kingdom 139 persons were involved in an outbreak caused by marine biotoxins at a restaurant. The suspected source was mussels. Belgium reported one severe *S. aureus* outbreak, where the causative source was a dairy product, 28 persons were affected, and all required hospitalisation.

B. cereus was the causative agent in 77 outbreaks and caused 17.1% of the cases infected by bacterial toxins. Meat and meat products were the source of infection in eight outbreaks, unspecified poultry in four and cereals products (incl. rice) in three outbreaks. In 33 outbreaks, the source was unspecified and in 18.2% of the outbreaks the source was unknown. Restaurants were the most common location for *B. cereus* outbreaks (57.1%). The largest single outbreak was reported by Belgium and involved 70 people on camping. Milk was laboratory confirmed to be the source of infection.

Food vehicles of intoxication

The food vehicles of intoxication were specifically reported in 57.9% (279) of all bacterial toxin outbreaks. In outbreaks, where the vehicle was reported: mushrooms (58) and vegetables (6) were reported in 22.9% of the outbreaks, meat and meat products in 20.4% (57), poultry in 10.8% (30), milk, milk products and dairy products 10.0% (28), fish 7.5% (21), seafood 7.2% (20) and eggs and eggs product in 3.9% (11) of the outbreaks. Other unspecified food or mixed food products were identified as the vehicle in 21.8% (105) of all the reported toxin outbreaks. In 20.3% of the outbreaks the vehicle was unknown. The food vehicles of intoxication, which affected most persons per outbreak, were unspecified poultry (29), broiler meat (22), cereal products incl. rice (20) and eggs and eggs products (11).

In total, the outbreaks caused by bacterial toxins were mainly located in restaurants (33.2%), affecting 36.4% of the cases, and in private households (32.0%) affecting 8.6% of the cases. On average, 7 outbreaks at residential institution (e.g. military institution, home for children) affected 36 cases per outbreaks, and 8 outbreaks at canteens affected 28 cases per outbreak. Outbreaks in schools and kindergartens affected 19.9% of the cases and on average affected 46 outbreaks 24 cases per outbreak.

5.7. Foodborne outbreaks caused by viruses

Eighteen MS and one non-MS reported foodborne outbreaks caused by viruses (Table OUT9). Foodborne viruses (adenovirus, calicivirus including norovirus, hepatitis A, rotavirus and Tick-borne encephalitis virus) caused 10.2% of all reported outbreaks and affected 13,345 people, of whom 4.1% were admitted to hospital and three people died (Table OUT3). Since 2005, the number of reported outbreaks caused by viruses has increased by 88.3% (315 in 2005 vs. 593 in 2006) and the number of people affected has almost doubled. It has been assumed that outbreaks caused by foodborne viruses have previously been critically under-reported, and the data from 2006 are therefore probably closer to the true occurrence, compared to data reported in preceding years, where also fewer countries in general reported data on viruses.

Table OUT9. Outbreaks caused by foodborne viruses, 2006

	Foodborne virus not specified	Tick-borne encephalitis virus (TBE)	adenovirus	calicivirus including norovirus	Hepatitis A virus	rotavirus	Total
Austria	-	-	-	6	-	-	6
Belgium	-	-	-	4	-	-	4
Denmark	-	-	-	18	-	-	18
Estonia	-	4	-	-	-	-	4
Finland	-	-	-	13	-	-	13
France	37	-	-	34	-	-	71
Germany	-	-	-	150	15	-	165
Greece	-	-	-	1	1	1	3
Hungary	-	-	-	10	-	-	10
Ireland	-	-	-	3	-	-	3
Italy	-	-	-		10	-	10
Latvia	12		1	30	10	107	160
Netherlands	-	-	-	11	-	-	11
Norway	-	-	-	16	-	-	16
Poland	-	-	9	9	3	13	34
Slovakia	-	2			-	-	2
Slovenia	-	-	-	22	-	6	28
Sweden	-	-	-	31	-	-	31
United Kingdom	-	-	-	4	-	-	4
Total	**49**	**6**	**10**	**362**	**39**	**127**	**593**

Calicivirus including norovirus

In 2006, caliciviruses (including norovirus) caused 61.7% of the foodborne virus outbreaks (not including TBE). Caliciviruses were the most common cause of non-bacterial foodborne outbreaks and reported as the causative agent in 6.2% of all reported outbreaks in 2006. Caliciviruses affected 11,703 people corresponding to 21.3% of all cases reported in 2006.

The outbreaks were mainly general (295) and attack rates were high, but the disease mostly mild. On average, 22 people were involved per outbreak and 3.3% (387) were admitted to hospital.

Hungary reported the two largest outbreaks due to caliciviruses: One outbreak was caused by drinking water from a well, affecting 3,673 people of whom 161 persons were admitted to hospital. The other outbreak involved a number of schools in one city, affecting 826 people, four cases required hospitalisation. The source was unknown. Germany reported 150 calicivirus outbreaks involving 1,857 people.

Finland reported a calicivirus outbreak, where the source was ready-to-eat salad served in several canteens and restaurants. Calicivirus were isolated from the cases and a cohort study was conducted. In total 450 people were affected, one was admitted to hospital and one person died.

Waterborne outbreaks were only reported by Hungary, Finland and Norway, reporting 2, 1 and 1 outbreak respectively. Three of these (HU, FI) were caused by water from wells. In Finland calicivirus were laboratory confirmed in both patients and water. This outbreak affected 84 people.

Sweden was the only MS to report norovirus outbreaks caused by raspberries. Six raspberry outbreaks affected a total of 76 people. Imported frozen raspberries from China caused two of the outbreaks.

Food vehicle

In 63.9% of the calicivirus outbreaks the source of illness was unknown (Table OUT10). The infectious dose of caliciviruses, including norovirus is low and it is therefore complicated to confirm the presence of the virus in food items. Difficulties to identify whether the food has been contaminated at the primary source, by contaminated water, by an infected food handler, or whether person-to-person transmission has occurred, further complicates the reporting of more detailed information for these types of outbreaks.

The most common known food vehicles causing infections were crustaceans and shellfish, mixed foods and buffets, and vegetables (Table OUT10).

Table OUT10. Categories of food vehicles implicated in calicivirus outbreaks, 2006

	Outbreaks		Human cases	
	General	Household	N	No. admitted to hospital
Bakery products	5	0	131	0
Broiler meat/products	2	0	111	-
Cereal incl. rice and nuts	1	0	14	-
Cheese	1	0	14	1
Crustaceans/shellfish	28	4	338	2
Dairy products	1	1	20	2
Drinks/bottled water	0	2	4	-
Eggs, egg products	2	0	51	0
Fish/fish products	3	1	22	-
Fruits/berries/fruit juice	6	0	76	-
Mixed food/buffet	17	0	456	0
Other foods	32	2	1,863	29
Other red meat/products	5	1	61	9
Pig meat/products	1	0	4	-
Sweets/chocolate	1	0	25	-
Tap water/well water[1]	4	0	3,817	176
Unknown	175	57	3,969	167
Vegetables/veg. juices	11	0	727	1
Total	**295**	**68**	**11,703**	**387**

1. Incl. 3,673 cases from the Hungarian outbreak

Four MS (BE, DK, DE, SE) and one non-MS reported mixed food and buffet meals as the causative source of illness in 4.7% of the reported calicivirus outbreaks. On average, the outbreaks affected 27 persons per outbreak.

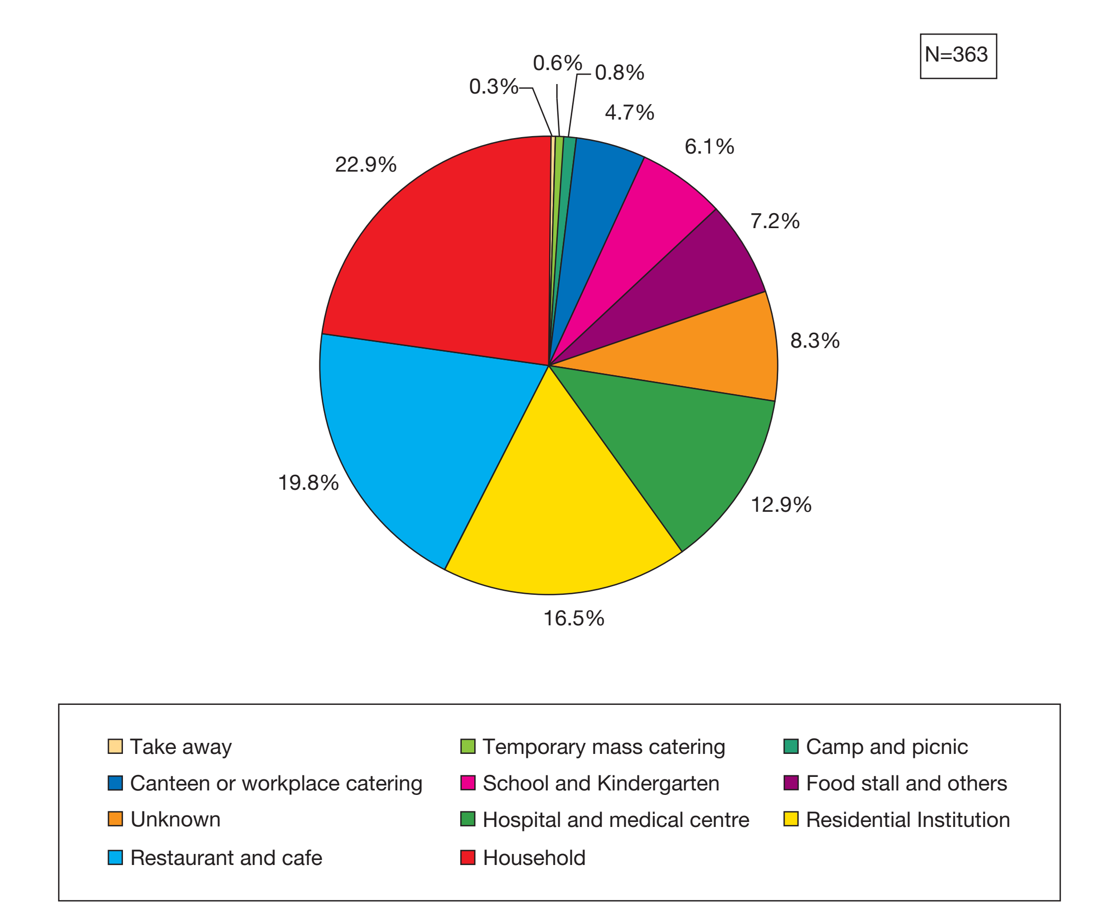
In Sweden frozen raspberries imported from China caused an outbreak affecting 9 people. Calicivirus was detected and laboratory confirmed in both humans and berries. Another calicivirus outbreak at a restaurant in Sweden, with seven cases, was probably caused by person-to-person transmission. Calicivirus were detected both in personnel and guests.

Germany reported an outbreak affecting 13 people in a household. Calicivirus was detected in spaghetti bolognaise, and contamination by an infected food handler was probably the source of infection.

Location of exposure

Locations were reported in 83.2% of the reported calicivirus outbreaks (Figure OUT4). Of these, the most common location of exposure was in private homes (22.9%), affecting on average 7 people per outbreak. In 24.5% of all reported calicivirus outbreaks; restaurants and canteens were reported as the location (72 and 17 respectively) affecting a mean of 29 people per outbreak. Residential institutions, including nursing homes and rehabilitation centres, were the location in 16.5% of outbreaks, affecting an average of 28 people per outbreak. In 12.9% of the calicivirus outbreaks, hospitals and medical centres were reported as the setting. The distribution of calicivirus cases reported in connection to outbreaks and the location at which they were acquired is presented in Fig. OUT4. In total, 45.0% of all cases were infected at either schools, kindergartens, residential institutions or at restaurants and cafés.

Figure OUT4. Distribution of location for Calicivirus outbreaks (%)



Tick-borne encephalitis virus (TBE)

Only two MS: Estonia and Slovakia reported outbreaks with Tick-borne encephalitis (Table OUT9). All 6 outbreaks were located in private households and attributed to unpasteurised goats' milk. In total, 26 people were affected and all involved except one was hospitalised.

Other viral outbreaks

Five MS reported outbreaks caused by Hepatitis A virus (Table OUT9). In total, 39 outbreaks were reported, affecting 181 people of whom 38.1% were hospitalised. The number of viral outbreaks may be specifically underestimated in the Community. The source of infection was unknown in 92.3% of the outbreaks. Twenty-one outbreaks occurred in private households.

Latvia and Poland were the only two MS reporting outbreaks caused by adenovirus. Latvia reported only one household outbreak, affecting 2 people, and with an unknown source of infection. Poland reported eight general outbreaks affecting 233 cases and one household outbreak affecting 2 cases. While the sources of infection were not identified in five of the Polish adenovirus outbreaks, vegetables were the source of two outbreaks and poultry products the source of one.

Four MS reported 127 outbreaks caused by rotavirus (Table OUT9). In total, 568 people were affected, seven percent were hospitalised. In Latvia, outbreaks were mainly located in private households: 99 outbreaks affecting 263 people, while 30 people were affected by general outbreaks. No information was reported on hospitalisation or source. In Poland, 101 people were affected and 28 were hospitalised. Fruit and vegetables were reported as the source in two outbreaks, affecting five people, all were hospitalised.

5.8. Foodborne outbreaks caused by parasites

Trichinella
Seven MS reported 18 *Trichinella* spp. outbreaks: Poland (7), Lithuania (3), France (2), Latvia (2), Spain (2), Germany (1) and Slovakia (1). These outbreaks corresponded to 0.3% of all reported outbreaks and 2.0% of all hospitalisations reported by the countries in 2006 (Table OUT3). Outbreaks caused by *Trichinella* spp. in total, involved 202 people, of whom 55.9% were hospitalised. All outbreaks were associated with meat; five outbreaks were related to pig meat (including two wild boars) and 13 outbreaks to unspecified meat. In Spain, two general outbreaks affected 30 people. Poland reported the largest number of cases; 127 people were involved in 7 household outbreaks, 73.2% were hospitalised.

Cryptosporidium
In 2006, seven *Cryptosporidium* outbreaks were reported by Germany, Ireland and Slovenia, reporting 5, 1 and 1 outbreak respectively. In total, 59 people were affected. In Germany milk and dairy products were the source of two outbreaks. In Slovenia epidemiological evidence pointed at an infected carrier person as source of one outbreak affecting eight people.

Giardia
Germany, Belgium and Italy reported seventeen *Giardia* outbreaks, reporting 12, 4 and 1 outbreak respectively. In total, 39 persons were reported affected, none were hospitalised. The outbreaks were small, affecting 2-5 people per outbreak (on average 2.4). Most outbreaks were general outbreaks. The source of infection was unknown in 66.7% of the outbreaks. Sources were identified as fish and seafood, water, milk and unspecified beverages.

In addition, the non-MS Norway reported one waterborne *Giardia* outbreak where also *Cryptosporidium* was also identified. In total, five people were affected.

5.9. Foodborne outbreaks caused by marine biotoxins and other toxins

In 2006, 71 histamine-poisoning outbreaks were reported, primarily by France reporting 59 outbreaks, Sweden reported four outbreaks, and Belgium and Denmark reported two outbreaks. Finland, the Netherlands, the United Kingdom and the non-MS Norway reported one outbreak respectively (Table OUT3). All outbreaks, except one, were related to fish and seafood. In total, 370 people were affected whereof 41 cases were hospitalised. France reported the largest histamine-poisoning outbreak; 61 persons were poisoned by food at a restaurant, the infection was epidemiological linked to fish.

Sweden reported two and Austria one outbreak caused by wax esters from butterfish. Seven people were affected.

5.10. Waterborne outbreaks

Waterborne outbreaks may potentially be large, especially if public drinking water is contaminated. Hospitals and institutions hosting small kids or elderly citizens are in that case most vulnerable. The laboratory detection in water can be complicated; if the level of contamination is low. Contaminated water can spread pathogenic agents to other foodstuffs, either in the primary production or during food preparation.

Four MS: Poland, Finland, Hungary and Austria, and the non-MS Norway reported 17 waterborne outbreaks, reporting 4, 4, 2, 1 and 6 outbreaks respectively. Finland reported two outbreaks due to well water and one outbreak due to community water supply. In total, 3,952 people were affected and 181 were hospitalised. The largest waterborne outbreak was reported by Hungary, where *Calicivirus* affected 3,673 people whereof 161 were hospitalised. *Calicivirus* was the causative agent in four waterborne outbreaks. The large outbreak in Hungary was found to have mixed aetiology, involving both *Calicivirus* and *Campylobacter.* Poland reported one pathogenic *E. coli* waterborne outbreak, Austria reported one *S.* Enteritidis outbreak, and Norway reported one *Campylobacter* and one *Giardia*/*Cryptosporidium* outbreak. Four outbreaks were laboratory confirmed (one outbreak in Finland, one in Hungary and two in Norway), eight outbreaks were epidemiologically investigated and in two outbreaks, increased level of indicator bacteria was detected.

5.11. Discussion

Reporting of foodborne outbreaks to the Community level has been mandatory since 2005 and the data received in 2006 from MS were generally complete and of high quality. A total of 5,710 outbreaks were reported which was 6.6% more than in 2005. This increase may mainly be attributable to the improved reporting of the MS.

Together 53,568 people were involved in the food borne outbreaks in the EU, and 55 deaths were reported. The number of deaths may be an underestimation as this information is not always available in the countries. However, it was the *Salmonella* and *Listeria* outbreaks, which caused most of the reported death cases. The mortality was the highest in the *Listeria* outbreaks where 14.1% of the affected persons were reported to have died.

Salmonella outbreaks remained by far the most commonly reported foodborne outbreaks. As in the previous years eggs or products thereof were the most frequently implicated source of these outbreaks. Interestingly, in 2006 the second most commonly reported food vehicle for *Salmonella* outbreaks was unspecified meat and products thereof. This category is likely to cover both red meat and poultry meat.

For the first time, foodborne viruses were reported as the second most common cause of foodborne outbreaks in the EU, which increase is most likely due to more MS reporting this type of outbreaks. The transmissions routes for foodborne viruses are often complicated to investigate, both microbiologically and epidemiologically, and therefore the source of infection is often classified as suspected or unknown. In previous years, it has been assumed that the number of foodborne outbreaks caused by viruses was undereported, and it is therefore encouraging to see more outbreaks being reported despite the lack of an identified food vehicle. The numbers from 2006 are probably closer to the true prevalence, than what has been reported previously.

As in 2005, both *Campylobacter* and *Staphylococcus* remained common causes of food borne outbreaks. Unspecified meat was reported as the most common food vehicle for *Campylobacter.* This, however, does not imply that broiler meat is no longer a major source, but rather that less details concerning the meat sampled were provided in 2006. Also outbreaks caused by other classical foodborne pathogens, including parasites, were frequently reported by the MS indicating that the sources of foodborne infections are many.

In the recent years, several MS have improved their investigations of foodborne outbreaks by establishing coordinated outbreak investigation systems at the national level. Most MS have divided the outbreak investigation out in local regions, and a coordinating national centre with rapid outbreak notification, either via the Internet, fax or phone. These activities, along with the data generated through the national surveillance and monitoring programmes, may well improve the possibility of identifying the outbreaks and the food vehicles and thus help improve outbreak investigations, both at the national and at the international level.

In 2006, more MS reported data on outbreaks with unknown aetiology compared to 2005. Furthermore, the quality of data regarding locations and sources of outbreaks has improved over the last years. Even though the data may still be incomplete, it remains important that all outbreaks are reported into EFSA's web-based reporting system, in order to estimate the true prevalence of outbreaks within the Community.

New consumption habits in the Community and an increased import of foodstuff, e.g. fresh vegetables, have introduced exotic zoonotic agents and viruses as cause of outbreaks, which were formerly seen mostly in travel related infections. This further emphasises the importance of collaboration between the MS regarding outbreaks and trace back of foodstuffs involved in human outbreaks.

In order to control or prevent future outbreaks, knowledge of sources and transmission routes of infection are essential and should be shared among the MS. At this point, there are still a number of differences in how the MS report outbreaks, which make it difficult to compare and analyse the available Community data. EFSA has just published guidelines on harmonising the reporting of foodborne outbreaks through the Community reporting system in accordance with Directive 2003/99/EC. These guidelines were prepared in collaboration with ECDC and they are published on EFSA website www.efsa.europa.eu. Such harmonisation may, with time, facilitate the analyses of data and strengthen the conclusions made based on these analyses.

6. ANIMAL POPULATIONS

6. ANIMAL POPULATIONS

6.1. Distribution of farm animals within EU

In 2006, the majority of MS 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 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 the EU since data were not provided by all MS.

MS also reported data on minor animal species. For information regarding animal species that are not mentioned in this chapter (livestock numbers or herds), please refer to Appendix Table PO2 and PO3, and Level 3.

Table PO1. Overview of countries reporting data for 2006[1]

Animal species	Total number of MS reporting	Countries
Animals in general	24	**MS:** All MS except MT
		Non-MS: NO, CH
Gallus gallus	23	**MS:** All MS except CY, MT
		Non-MS: NO, CH
Cattle	24	**MS:** All MS except MT
		Non-MS: NO, CH
Pigs	23	**MS:** All MS except CY, MT
		Non-MS: NO, CH
Sheep	24	**MS:** All MS except MT
		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.

6.1.1. Gallus gallus (fowl)

The total *G. gallus* livestock populations in 2006, including data on specific categories (broilers and laying hens), were reported by 22 MS and two non-MS (Table PO2). Furthermore, some countries also reported data on breeding hens, elite breeding hens and grandparent breeding hens for both meat and egg production, and data on mixed flocks (Level 3). As in 2005, Poland reported the largest population of *G. gallus*. In addition, Belgium, the Czech Republic, Portugal, Spain and the United Kingdom also reported high numbers of *G. gallus*, altogether accounting for just over 66% of the total EU population. In most countries, broilers accounted for more than 55% of the total *Gallus gallus* population. Laying hens accounted for more than 50% of the population in France, Lithuania, and for 76.3% in Luxembourg. For information on the number of flocks within the countries, please refer to Appendix Table PO3.

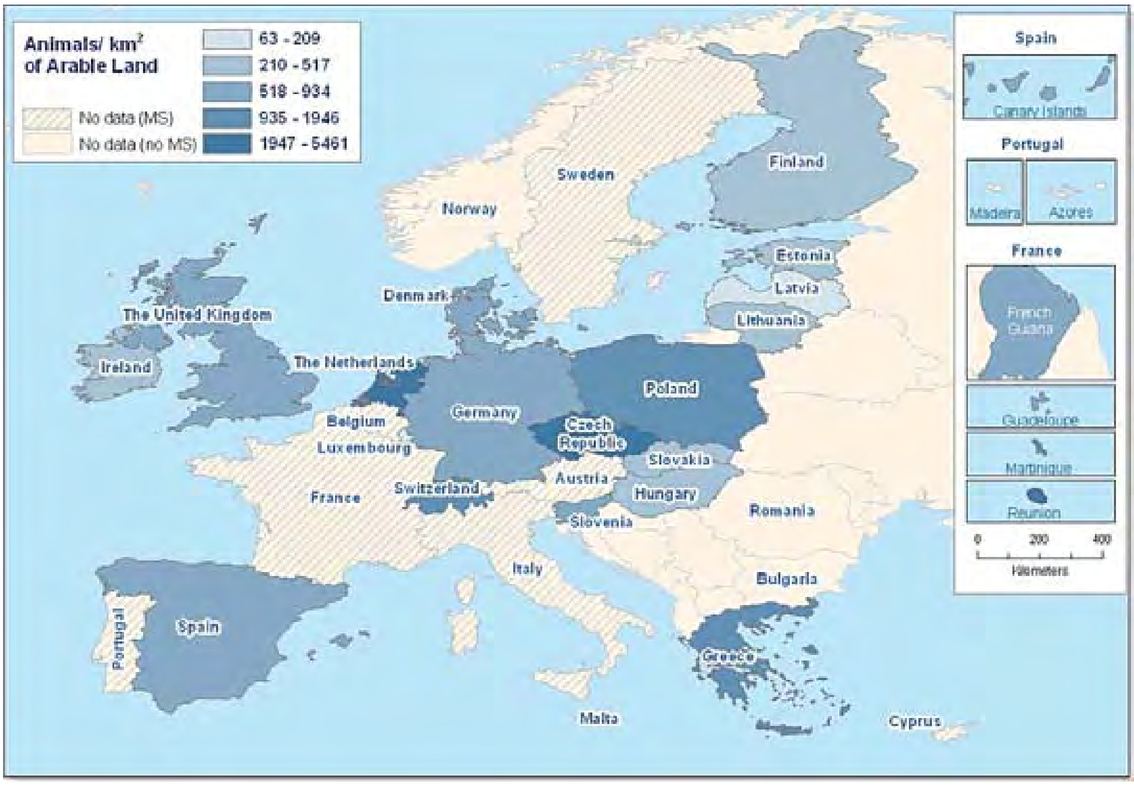
At the EU level, broilers accounted for approximately 77% of the total G. gallus population, while laying hens accounted for approximately 19% (percentages based only on data from MS reporting in the subgroups in question).

Table PO2. Gallus Gallus populations (livestock numbers), 2006

	Total population	Broilers		Laying hens	
		N	% of total	N	% of total
Austria[1]	59,680,606	-	-	-	-
Belgium[1]	247,721,072	-	-	-	-
Czech Republic	200,703,694	192,000,000	95.7	6,422,694	3.2
Denmark	23,317,956	20,218,452	86.7	3,099,504	13.3
Estonia	2,411,141	1,401,896	58.1	968,245	40.2
Finland	9,731,427	5,366,137	55.1	3,103,333	31.9
France	77,710,270	-	-	44,612,729	57.4
Germany[2]	92,919,600	56,762,500	61.1	36,157,100	38.9
Greece	108,504,761	97,190,260	89.6	5,675,836	5.2
Hungary	30,303,000	-	-	14,815,000	48.9
Ireland	15,296,500	12,000,000	78.4	1,988,500	13.0
Latvia	3,344,020	1,539,229	46.0	1,627,856	48.7
Lithuania	7,855,310	3,024,800	38.5	4,377,300	55.7
Luxembourg	81,252	19,269	23.7	61,983	76.3
Netherlands	91,782,254	41,913,979	45.7	41,641,960	45.4
Poland	314,000,000	226,000,000	72.0	24,000,000	7.6
Portugal[1]	158,528,000	154,206,000	97.3	-	-
Slovakia	6,889,000	4,000,000	58.1	2,709,000	39.3
Slovenia	2,686,415	1,566,749	58.3	1,119,666	41.7
Spain	201,716,594	128,195,395	63.6	42,014,506	20.8
Sweden[1]	76,782,159	72,905,571	95.0	3,209,807	4.2
United Kingdom	156,607,000	110,672,000	70.7	38,257,000	24.4
EU total	1,888,572,031	1,128,982,237	59.8	275,862,019	14.6
Norway[1]	50,931,800	49,167,500	96.5	1,764,300	3.5
Switzerland	7,508,484	4,467,536	59.5	2,873,752	38.3

1. Number of slaughtered animals
2. 2005 data

Figure PO1. Gallus gallus populations in the EU, 2006[1]



The colour scale indicates the population size per km² of arable land.
In the map, a natural break classification method is used.
N/A: no data available.
The data refers to live animals; data on slaughter animals are not included.

6.1.2. Cattle

In 2006, 24 MS and two non-MS 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 almost 49% of the EU total. Only half of the MS reported data on categories. Calves < 1 year accounted for approximately one third of the total populations except in Greece where the population of calves < 1 year was approximately 6%. The percentage of beef cattle varied widely, ranging from 1.4% in the Netherlands to 47.5% in France. Dairy cows and heifers accounted for 21.0%-69.3% of the total in the reporting MS. For information on the number of herds and/or holdings of cattle within the countries, please refer to Appendix Table PO3.

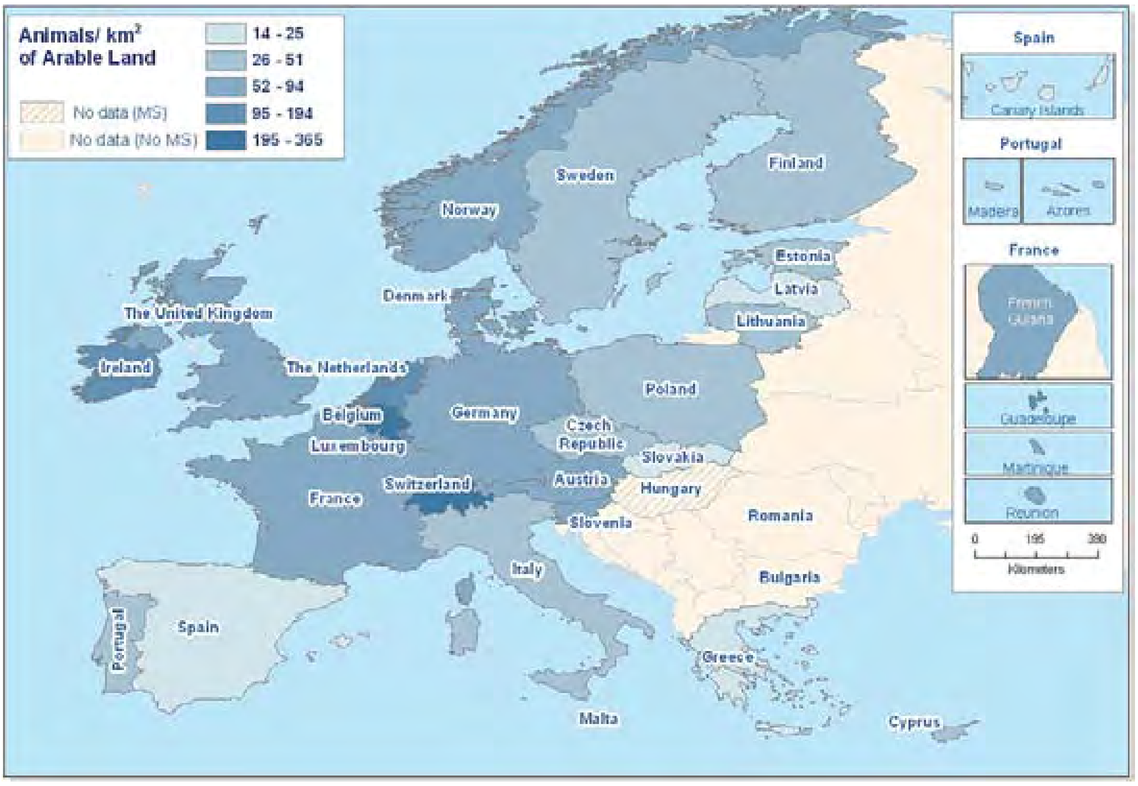
Table PO3. Cattle populations (livestock numbers), 2006

	Cattle, in total	Calves < 1 year	% of total	Meat production animals	% of total	Dairy cows and heifers	% of total
Austria	2,002,919	-	-	-	-	-	-
Belgium	2,697,824	-	-	-	-	-	-
Cyprus	58,948	-	-	-	-	-	-
Czech Republic	1,430,713	-	-	-	-	-	-
Denmark	1,620,826	-	-	-	-	-	-
Estonia	252,717	69,197	27.4	10,658	4.2	161,796	64.0
Finland	949,291	317,656	33.5	178,545	18.8	453,090	47.7
France	18,903,638	5,011,747	26.5	8,982,508	47.5	5,873,483	31.1
Germany	12,676,700	3,922,400	30.9	2,163,600	17.1	6,590,800	52.0
Greece	840,123	50,581	6.0	204,408	24.3	254,833	30.3
Hungary	800,882	-	-	-	-	-	-
Ireland	6,321,823	1,530,038	24.2	-	-	-	-
Italy	6,156,374	-	-	-	-	-	-
Latvia	401,468	-	-	-	-	-	-
Lithuania	859,917	-	-	-	-	-	-
Luxembourg	183,640	49,453	26.9	-	-	38,617	21.0
Netherlands	3,673,000	824,000	22.4	52,314	1.4	2,546,428	69.3
Poland	5,273,123	-	-	-	-	-	-
Portugal	1,315,634	474,972	36.1	-	-	-	-
Slovakia	524,247	-	-	-	-	-	-
Slovenia	454,033	136,617	30.1	-	-	-	-
Spain	6,359,710	-	-	-	-	1,407,522	22.1
Sweden[1]	1,604,933	508,495	31.7	176,613	11.0	393,263	24.5
United Kingdom	10,270,000	2,622,000	25.5	4,612,000	44.9	2,863,000	27.9
EU total	**85,632,483**	**15,517,156**	**18.1**	**16,380,646**	**19.1**	**20,582,832**	**24.0**
Norway	918,200	-	-	50,800	5.5	233,700	25.5
Switzerland	1,494,296	-	-	-	-	-	-

1. 2005 data

In Figure PO2 the density of cattle populations in the reporting countries in the EU are shown. Amongst MS, the population density was highest in Belgium. However, the non-MS Switzerland reported an even higher population density.

Figure PO2. Cattle populations in the EU, 2006



The colour scale indicates the population size per km^2 of arable land.
In the map, a natural break classification method is used.
N/A: no data available.

6.1.3. Pigs

In 2006, a total of 21 MS and two non-MS 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 MS (Denmark, France, Germany, Poland and Spain) reported markedly larger populations of pigs compared to the other MS, accounting for 76% of the reported EU-total. Amongst MS that reported data on pig categories, fattening pigs accounted for a large part of the total, ranging from 37.4%-93.4%. Breeding pigs accounted for approximately 10% of the total populations in most of the reporting MS. For information on the number of herds and/or holdings of pigs within countries, please refer to Appendix Table PO3.

At the EU level, fattening pigs accounted for approximately two thirds of the total population, while breeding animals accounted for just above 10% (based only on data from MS reporting in both subgroups).

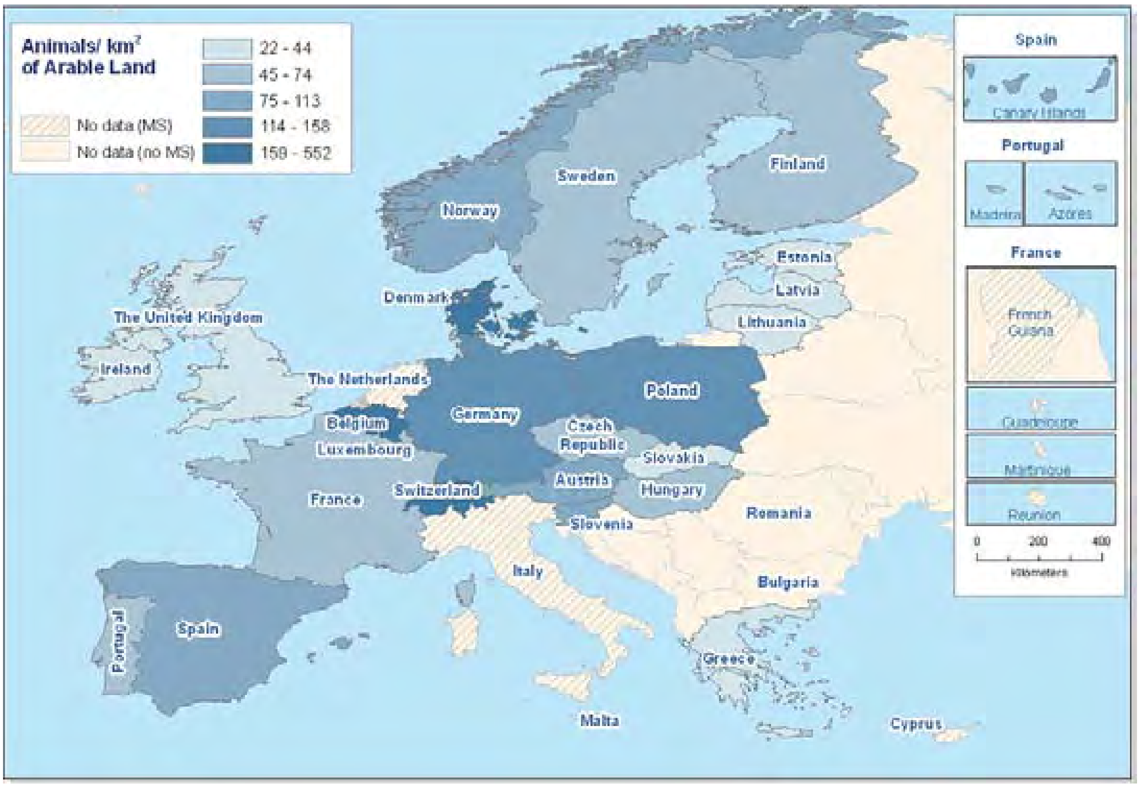
Table PO4. Pig populations (livestock numbers), 2006

	Pigs, in total	Fattening pigs	% of total	Breeding animals	% of total
Austria	3,160,819	1,103,920	34.9	313,285	9.9
Belgium	5,503,886	4,850,501	88.1	653,385	11.9
Czech Republic	2,736,135	1,022,861	37.4	322,146	11.8
Denmark	14,581,382	-	-	-	-
Estonia	240,712	101,687	42.2	24,954	10.4
Finland	1,436,470	1,261,539	87.8	174,931	12.2
France	15,009,310	8,185,753	54.5	1,282,395	8.5
Germany	26,820,600	-	-	2,511,300	9.4
Greece	2,071,847	1,934,227	93.4	122,255	5.9
Hungary	3,987,000	1,816,000	45.5	-	-
Ireland	1,620,000	1,451,000	89.6	167,000	10.3
Latvia	354,739	-	-	-	-
Lithuania	1,127,100	-	-	-	-
Luxembourg	84,151	76,390	90.8	7,761	9.2
Poland	18,881,000	-	-	-	-
Portugal	2,812,022	-	-	-	-
Slovakia	921,723	-	-	-	-
Slovenia	575,116	241,327	42.0	53,645	9.3
Spain	24,353,445	14,527,040	59.7	2,899,361	11.9
Sweden[1]	1,811,216	1,085,304	59.9	188,112	10.4
United Kingdom	4,933,000	4,376,000	88.7	557,000	11.3
EU total	**133,021,673**	**42,033,549**	**30.2**	**9,277,530**	**6.7**
Norway	813,800	432,000	53.1	62,200	7.6
Switzerland	1,631,593	-	-	-	-

1. 2005 data

In Figure PO3 the density of pig populations in the reporting countries in the EU are shown. The population size of pigs per km^2 of arable land was highest in Belgium, Denmark and the non MS Switzerland, closely followed by Germany and Poland.

Figure PO3. Pig populations in the EU, 2006



The colour scale indicates the population size per km2 of arable land.
In the map, a natural break classification method is used.
N/A: no data available.

6.1.4. Sheep

Data reported on sheep populations in 2006 are shown in Table PO5. A total of 22 MS and two non-MS reported data. The largest sheep populations were reported by Spain and the United Kingdom. These two MS alone, accounted for 68.9% of the entire reported EU-total. In 2006, only few MS reported subgroup data. The data reported indicates that the majority of sheep was older than one year. Furthermore, in France and the Netherlands a significant part of the population were categorized as milk ewes; 19.5% and 47.0%, respectively (Level 3). For information on the number of flocks and/or holdings of sheep within the countries, please refer to Appendix Table PO3.

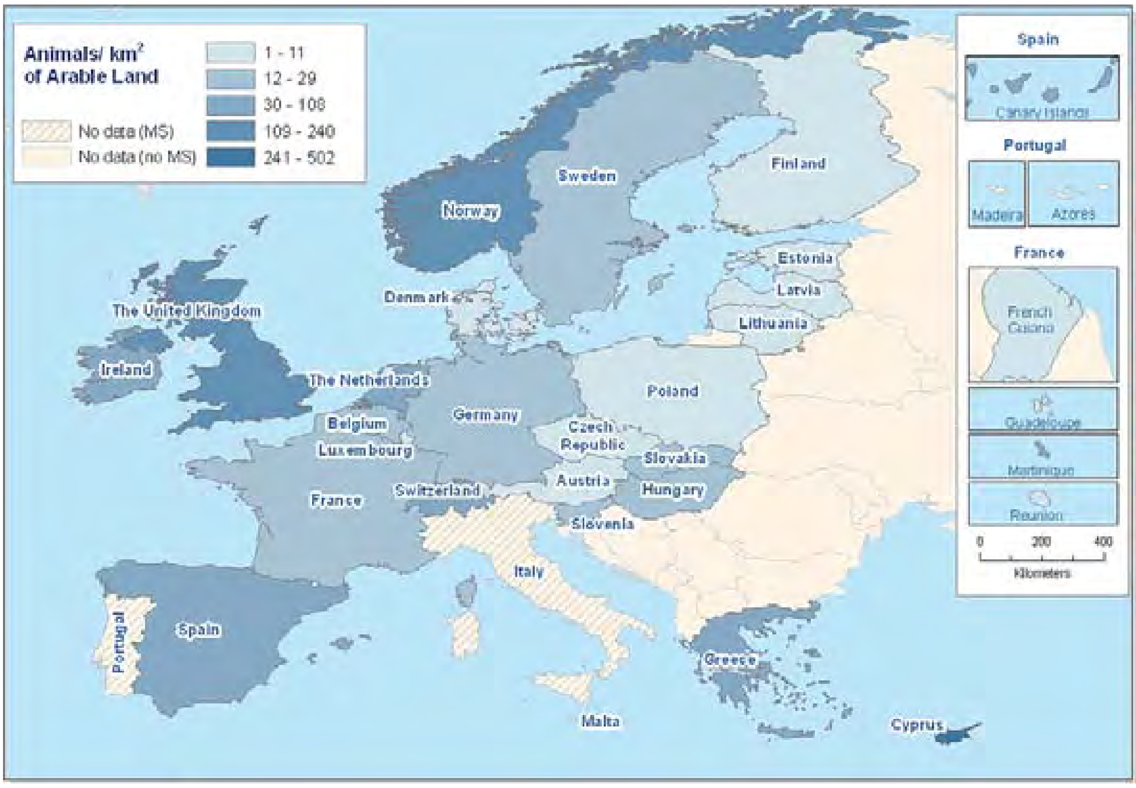
Table PO5. Sheep populations (livestock numbers), 2006

	Sheep, in total	Animals < 1 year	% of total	Animals > 1 year	% of total
Austria	376,327	158,033	42.0	218,294	58.0
Belgium	219,274	-	-	-	-
Cyprus	627,249	-	-	-	-
Czech Republic	148,412	53,389	36.0	139,224	93.8
Denmark	195,907	-	-	-	-
Estonia	56,877	17,991	31.6	38,886	68.4
Finland	116,653	3,654	3.1	57,124	49.0
France	8,494,176	-	-	1,586,139	18.7
Germany[1]	2,642,400	-	-	-	-
Greece	5,324,207	-	-	-	-
Hungary	1,121,971	-	-	-	-
Ireland	3,601,064	-	-	-	-
Latvia	64,280	-	-	-	-
Lithuania	36,600	-	-	-	-
Luxembourg	9,644	3,890	40.3	5,754	59.7
Netherlands	1,384,360	699,360	50.5	-	-
Poland	251,422	-	-	-	-
Slovakia	326,322	-	-	-	-
Slovenia	131,528	-	-	-	-
Spain	22,119,192	3,806,668	17.2	18,312,524	82.8
Sweden[1]	471,284	249,275	52.9	222,009	47.1
United Kingdom	34,722,000	17,058,000	49.1	17,664,000	50.9
EU total	**82,441,149**	**22,050,260**	**26.7**	**38,243,954**	**46.4**
Norway	2,334,200	-	-	894,100	38.3
Switzerland	442,875	-	-	-	-

1. 2005 data

In Figure PO4 the density of sheep populations in the reporting countries in the EU are shown. The sheep populations per km^2 arable land were, as in 2005, highest in Cyprus, the United Kingdom and Norway.

Figure PO4. Sheep populations in the EU, 2006



The colour scale indicates the population size per km2 of arable land.
In the map, a natural break classification method is used.
N/A: no data available.

6.1.5. Discussion

In 2006, 24 MS and two non-MS reported data on animal populations within the four most important animal categories: cattle, pigs, sheep and *Gallus gallus* fowl. Compared to 2005, additional MS reported data and data quality was generally improved; consequently, a more valid picture of animal populations in the Community is available.

The distribution of these main farm animal species varied in the EU. Fowl population was most concentrated in some central European countries such as the Netherlands, the Czech Republic, Poland and Greece. Cattle population was more evenly distributed through the EU, and the highest density was reported for Belgium and Ireland. Pig populations were clustered in central European countries and Denmark. Sheep population was more diversely distributed in the Community, the United Kingdom, Cyprus and Norway reporting the highest population density.

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 for animals and people.

7. OTHER MICROBIOLOGICAL CONTAMINANTS

7. OTHER MICROBIOLOGICAL CONTAMINANTS

Histamine

Histamine poisoning, also known as scombroid poisoning, is caused by the ingestion of foods that contain high levels of histamine and possibly other vasoactive amines and compounds. Histamine and other amines are formed by the growth of certain bacterial species and the subsequent action of their decarboxylase enzymes on histidine and other amino acids in food, either during the production of a product such as Swiss cheese or by spoilage of foods such as fishery products, particularly tuna or mahi mahi. However, any food that contains the appropriate amino acids and is subjected to certain bacterial contamination and growth may lead to histamine poisoning when ingested. All humans are susceptible to this type of intoxication, but symptoms can be severe in the elderly. The onset of symptoms is rapid and the duration of the illness is usually short, lasting 3 days at the most.

Enterobacter sakazakii

Enterobacter sakazakii is a gram-negative rod-shaped bacterium belonging to the family *Enterobacteriaceae.* The majority of cases of *E. sakazakii* infections reported in the scientific literature are associated with severe disease in neonates (sepsis, meningitis, or necrotizing enterocolitis), and the reported case fatality can be as high as 33%. The bacteria rarely cause disease in adults. Although the organism's reservoir is unknown, a growing number of outbreaks in neonates provided evidence that milk-based, powdered infant formulas was the source of infection.

Staphylococcal enterotoxins

Staphylococcus aureus are gram-positive bacteria, some strains of which can produce a highly heat-stable protein toxin causing staphylococcal food poisoning in humans. The onset of symptoms is usually rapid and their severity depends on individual susceptibility and general health, the amount of contaminated food that is eaten, and the amount of toxin in the food. Nausea, vomiting, retching, abdominal cramping, and prostration are the most common symptoms. The duration of the illness is usually short. Many types of food have been associated with staphylococcal food poisoning. However, especially foods that require considerable handling during preparation and that are kept at slightly elevated temperatures after preparation are most frequently involved.

Table MC1. Overview of MS reporting staphylococcal enterotoxin, E. sakazakii and histamine data, 2006

	Total number of MS reporting	Countries
Histamine	11	**MS:** AT, BE, CZ, DK, EE, HU, LT, PL, PO, SK, SI
Enterobacter sakazakii	9	**MS:** AT, BE, CZ, EE, DE, HU, IE, SK, SI
Staphylococcal enterotoxins	8	**MS:** AT, BE, DE, HU, IE, PL, PO, SK

7.1. Histamine, *E. sakazakii* and staphylococcal enterotoxins in food

Only investigations which included at least 25 samples are presented in the following tables. However, in the analyses of non-compliance with the microbiological criteria all the reported data by the MS was covered, except the data derived from HACCP and own checks.

Table MC2. Histamine in fishery products from fish species associated with a high amount of histidine, not enzyme maturated

Country	Sampling unit	Amount of sample	N	≤ 100 mg/kg	> 400 mg/kg	>100 - ≤ 200 mg/kg	>200 - ≤ 400 mg/kg	% non-compliant samples
Austria	Single	5-10g	85	16	0	2	1	3.5%
	Single	25g	72	4	5	2	2	18.1%
Belgium	Batch	150g	41	40	0	0	1	0.0%
Hungary	Batch	5g	56	0	0	0	1	1.8%
Slovakia	Batch	10g	315	315	0	0	0	0.0%
Poland	Batch	-	295	31	0	3	0	11.5%
Portugal	Batch	300g - 15kg	40	40	0	0	0	0.0%
EU Total			**904**	**446**	**5**	**7**	**5**	**5.6%**

In total 11 MS reported histamine in fishery products associated with high amount of histidine. Austria and Poland found moderate proportions of the samples in non-compliance with the histamine criterion, while the other MS reported none or low levels of such samples. All examinations regarded fishery products which were not enzyme maturated. For fishery products enzyme maturated in brine, Portugal reported five out of the seven batches not meeting the criterion.

Table MC3. E. sakazakii in ready-to-eat foodstuffs, 2006

		Sampling unit	Sample size	Units tested	% non-compliant
Dried dietary foods for special medical purposes					
Germany	-	Single	-	61	0.0
Hungary	-	Single	25-300g	250	0.0
Ireland	At retail	Single	25g	580	0.0
Dried infant formulae which are not marked as intended for infants less than 6 months of age					
Ireland	-	Single	25g	580	0.0
Slovakia	-	Single	10g	1,853	0.0
Dried infant formulae intended for infants less than 6 months of age					
Germany	-	Single	-	403	1.0
EU Total				**3,324**	**0.1**

Nine MS reported on *E. sakazakii* in dietary foods for special medical purposes or infant formulae. The MS that investigated more than 25 samples detected no positive samples. However, Austria (single samples) and the Czech Republic (batches) reported one positive finding in three and seven samples examined, respectively.

Table MC4. Staphylococcal enterotoxins in cheeses, milk and whey powder, 2006

		Sampling unit	Amount of sample	Units tested	% non-compliant
Cheeses made from cows' milk					
Poland	Soft and semi-soft made from pasteurised milk	Batch	25g	368	0.0%
	Soft and semi-soft made from raw or low heat-treated milk	Batch	25g	30	0.0%
Cheeses made from goats' milk					
Slovakia	Soft and semi-soft made from raw or low heat-treated milk	Batch	10g	40	7.5%
EU Total				**438**	**0.7%**

Out of the eight reporting MS only two had examined more than 25 samples for staphylococcal enterotoxins. Slovakia reported 7.5% positive samples, while Poland reported none. In addition, Belgium reported four (26.7%) of the cheeses sampled at farm to be positive for the enterotoxins. No positive findings were reported by MS from milk, whey powder or other dairy products.

Compliance with the microbiological criteria

The microbial criteria included in Community Regulation 2073/2005, came in to force from January 1st 2006. The Regulation lays down specific rules for sampling and testing, and set limits for presence of histamine, staphylococcal enterotoxins and *Enterobacter sakazakii* in specific food categories. The criteria apply for products placed on the market during their shelf-life. Table MC5 summaries the reported findings at retail for the included categories.

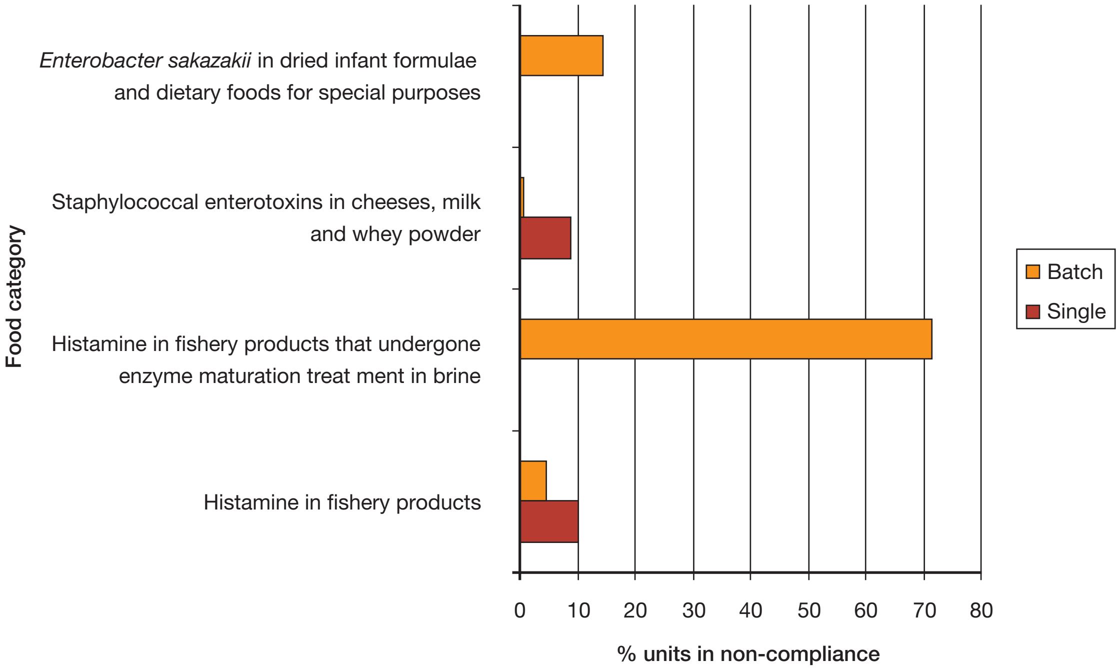
Table MC5. Proportion of units positive for histamine, staphylococcal toxins and E. sakazakii in food categories with criteria laid down by Regulation 2073/2005 in EU, 2006

Food categories		Total single samples			Total batches		
		Sample size	Units tested	% pos	Sample size	Units tested	% pos
1.2.1	Staphylococcal enterotoxins in cheeses, milk, and whey powder	5, 10 or 25g	102	8.8	5g to 300kg, not specified	474	0.6
1.2.3	*E. sakazakii* in infant formulae and dried dietary foods	5, 10 or 25g	3,328	0.2	5g to 300kg, not specified	7	14.3
1.2.5	Histamine in products from fish species with a high amount of histidine	5, 10 or 25g	158	10.1	5g to 300kg, not specified	767	4.6
1.2.6	Histamine in fishery products, enzyme maturation treatment in brine	5 or 10g	9	0	3.5kg	7	71.4

The microbial food safety criteria requires
- Absence of staphylococcal enterotoxins in cheeses, and milk- and whey powder in 25g samples.
- Absence of *Enterobacter sakazakii* in dried infant formulae and dried dietary foods medical purposes in 10g samples.
- Mean histamine levels in batches of products from fish species associated with high amounts of histidine must not exceed 100 mg/kg, no sample must exceed 200 mg/kg and a maximum of two out of nine of the samples can have between 100 and 200 mg/kg.
- Mean histamine levels in batches of fishery products that have undergone enzyme maturation in brine must not exceed 200 mg/kg, no samples must exceed 400 mg/kg and a maximum of 2/9 of the samples can contain 200 and 400 mg/kg.

The Highest proportion of samples in non-compliance was detected for histamine in batches of fishery products (Figure MC1). This observation is, however, based on a low number of samples reported by one MS, and therefore should be confirmed by further studies. Moreover, results concerning *E. sakazakii* in batches were also from a small survey in one MS, and thus should be interpreted with care. For other food and sample categories, the reported non-compliance levels were low or very low.

Figure MC1. Compliance with the E. sakazakii, staphylococcal enterotoxins and histamine criteria in the EU, 2006



7.2. Discussion

In total, 11 MS provided information on histamine, *E. sakazakii* and staphylococcal enterotoxins. From the Community perspective, it is important to follow how the new microbiological criteria for these agents are being applied and respected in MS.

Compliance with the criteria was observed for all of the mentioned agents. Unfortunately, in several cases, the number of samples examined by MS was too low to support reliable conclusions. Also, an increase in the number of MS reporting this type of data would improve the quality of the analyses regarding the compliance with the microbiological criteria.

Information on the food-borne outbreaks caused by the agents were available from several MS. Staphylococcal enterotoxins were responsible for 243 outbreaks with 2,369 reported human cases and 2 deaths. Dairy products were the known vehicles in 26 of these outbreaks. In total, 71 outbreaks caused by histamine, with 370 human cases, were reported by MS. All of the histamine outbreaks except one were related to fish or fishery products. These reports support the importance of collecting information on the occurrence of the agents in foodstuffs. No *E. sakazakii* outbreak was reported in 2006. For more information concerning outbreaks see chapter 5 on foodborne outbreaks.

8. MATERIALS AND METHODS

8. MATERIALS AND METHODS

8.1. Data received in 2006

In 2006, data were collected on a mandatory basis on the following 8 zoonotic agents: *Salmonella*, thermotolerant *Campylobacter*, *Listeria monocytogenes*, Verotoxigenic *E. coli*, *Mycobacterium bovis*, *Brucella*, *Trichinella* and *Echinococcus.* The mandatory reported data also included antimicrobial resistance in isolates of *Salmonella* and *Campylobacter*, foodborne outbreaks and susceptible animal populations. Furthermore, based on the epidemiological situations in each MS, data were reported on the following agents and zoonoses: *Yersinia*, rabies, *Toxoplasma*, cysticerci, *Sarcocystis*, Q-fever, psittacosis, *Leptospira* and antimicrobial resistance in indicator *E. coli* isolates. Finally, data concerning compliance with microbiological criteria were also reported for staphylococcal enterotoxin, *E. sakazakii* and histamine.

Twenty-four MS submitted national zoonoses reports for the year 2006. In addition, reports were submitted by four non-Member States (Bulgaria, Norway, Romania and Switzerland) For Bulgaria and Romania, this was the first national report on zoonoses submitted to the Commission. No national zoonoses report was received from Malta. From the Communicable Disease Networks, data on human zoonoses cases were received from all 25 MS and additionally from six non-MS, Bulgaria, Norway, Romania, Switzerland, Lichtenstein and Iceland.

For the third year, countries submitted data on animals, food, feed and foodborne outbreaks using a web-based zoonoses reporting system that is maintained by EFSA.

8.2. Methods

Human data
EU trends in disease frequency (expressed as numbers of confirmed cases per 100,000) were tested by linear and logistic regression analysis. Statistically significant ($p<0.05$) trends were reported and graphically represented. Due to wide variation in the frequencies of zoonotic infections among MS, trends in disease incidence were evaluated within each MS, and for all MS combined. When making comparisons between Member States, one should take into account such factors as the variability of case definitions, reporting requirements, surveillance systems and microbiological methods employed by reporting countries. Analyses were made using SPSS 11.0.

The European Surveillance System (TESSy) is a software platform that was recently adopted by the European Centre for Disease Prevention and Control (ECDC) for the collection of data on infectious diseases. It was used for the first time by reporting countries for the 2006 Zoonoses Report. Both aggregated and case-by-case data were reported to TESSy. Although aggregated data did not include individual case's information, such as age and gender, both reporting formats were useful to calculate country-specific disease incidence and trends.

Enter-net is the current laboratory and epidemiologic surveillance network for *Salmonella*, *Campylobacter* and *E. coli* (VTEC) in the European Union.

Data on foodstuffs, animals and feedingstuffs
EU weighted means were estimated by weighting the MS-specific proportion of positive units with the reciprocal of the sample fraction, defined as "number of tested units per MS per year, divided by the total number of units in the MS population per year". Because the total number of units in the population is not always available, the most reliable proxy was used. For broiler meat samples, table eggs, and laying hen flocks, the population was defined as the numbers of broilers and laying hens per MS, respectively, that were based on the population data reported for 2006, and supplemented for a few MS with EUROSTAT data from 2005. For broiler flocks, the number of flocks estimated in the baseline survey was used to define the population, whereas for cattle and small ruminants, the reported population data were used. Source of data for weighting is included under all figures with weighted means.

Statistical analysis trends over time
Changes in the proportions of positive tests for zoonotic agents in foodstuffs and animals during 2004, 2005, and 2006, were visually explored, for each MS, by *trellis* graphics, using the *lattice* package in the R software (http://www.r-project.org). In order to obtain yearly estimates of the ratios between positive and tested samples, for groups of examined MS, the SURVEYMEANS procedure in the SAS System was used. A weight was applied for each observation, corresponding to the reciprocal of the sampling fraction in each MS (number of units in the population / tested units), to take into account disproportionate sampling at the MS level. Statistical significance of three-year trends was tested by a weighted logistic regression for binomial data, using the SURVEYLOGISTIC procedure. Because non-independence of observations within each MS could

not be excluded due, for example, to the possibility of sampling of animal belonging to the same holdings, or meat samples from the same slaughterhouses, the CLUSTER 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.

8.3. Sources of *Salmonella* data

Humans

Salmonellosis is a notifiable disease in humans in all MS and the two non-MS, except the Netherlands and the United Kingdom (Appendix Table SA23). In the United Kingdom, although reporting of food poisoning is mandatory, isolation and specification of the organism is voluntary. However, reporting of *Salmonella* is generally believed to be carried out by the majority of the laboratories testing for the organism in the UK. In 2005, all human data for the Community Report were provided by the ECDC based on TESSy and Enter-Net.

Foodstuffs

Data on *Salmonella* in foodstuffs were reported by most MS and several non-MS in 2006. However, sampling schemes, place of sampling, sampling frequency, and diagnostic methods varied between MS and food types. For a full description of monitoring schemes and diagnostic methods in the individual MS, please refer to Appendix Tables SA9, SA12, SA18 and SA21. The monitoring schemes were based on different samples, such as neck skin samples, carcass swabs, caecal contents and meat cuttings; these were collected at slaughter, processing, meat cutting plants and at retail. Several MS reported data that were 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 purposes, and were, therefore, not included in data analysis and tables. Information on serotype distribution was not consistently provided by all MS.

Animals

Salmonella in poultry (*Gallus gallus*) and other animals is notifiable in most MS and in the two non-MS (Appendix, Table SA23), except for Hungary and Denmark. *Salmonella* in other animals is notifiable in most MS and in two non-MS except for Hungary. In Austria, Denmark and Slovakia only clinical cases only are notifiable for animals other than poultry. Monitoring of *Salmonella* in animals is mainly conducted through passive, laboratory-based surveillance of clinical samples, active routine monitoring of flocks of breeding and production animals in different age groups, and tests on organs during meat inspection. Directive 92/117/ECC prescribes a sample plan for the control of *S*. Enteritidis and *S*. Typhimurium in breeding flocks of *Gallus gallus* to ensure comparability of data among MS. However, in Estonia, monitoring differed from the scheme described in Directive 92/117/ECC. In Appendix, Table SA2-4 monitoring programmes and control strategies in breeding flocks of *Gallus gallus* that are applied in different MS are shown. The above directive does not include requirements for monitoring and control of other commercial poultry production systems, but most MS have national programmes for laying hens (Appendix, Tables SA5 and SA6), broilers (Appendix, Tables SA7 and SA8), ducks (Appendix, Tables SA13 and SA15), geese (Appendix, Tables SA14 and SA15) and turkeys (Appendix, Tables SA10 and SA11). Some MS also monitor *Salmonella* in pigs (Appendix, Tables SA16 and SA17), cattle (Appendix, Tables SA19 and SA20) and other animals.

Feedingstuffs

There is no common sampling scheme for feed materials in the 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 “sample” (often several samples from the same batch). As in previous years, most MS 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. Data are, nevertheless, 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 of specific animal groups). Detection of *Salmonella* in fishmeal, meat and bone meal, cereals, oil seeds and products and compound feed for cattle, pigs and poultry in 2002 to 2006 are presented. Sample and batch based data from the different monitoring systems were summarised. Data were excluded when either the number of tested units or the number of positive units was missing, or if directly labelled as imported. The tables only include MS reporting results for at least 25 samples or batches. All data reported by the MS have been summarised in Level 3. An overview of countries providing data on serovars is presented in Appendix, Table SA22. For a summary of the serovar and phage type data reported by each MS and non-MS see Level 3.

Antimicrobial resistance

The countries reported results of antimicrobial susceptibility testing of *Salmonella* isolates from humans, various animal species and from various foods. Qualitative results were requested for the 2006 Community Report as number of resistant isolates out of the total number of isolates tested against each antimicrobial agent, in each specific sample category. Quantitative results reported as MIC (Minimal Inhibitory Concentration), were requested as the number of isolates in each MIC, out of the total number of isolates tested, for each antimicrobial agent, in each specific sample category. In this summary, only quantitative results determined by broth dilution method were included, and antimicrobials to be included were selected based on their public health importance.

Countries were requested to report on a defined panel of antimicrobial agents, whereas only limited constraints were placed on the variation in serovars or sample categories. As in previous years, this led to some heterogeneity of data on antimicrobial resistance in *Salmonella*. In order to preserve comparability of data between countries, categories in which several countries reported were primarily selected for this summary. Furthermore, categories were selected based on their relative public health importance. Direct comparison of proportions of resistant isolates between countries was avoided if the reporting was based on less than 10 isolates.

The countries generated data on antimicrobial susceptibility in *Salmonella* in different ways. Most often the reported isolates constitute a sub-sample of isolates available at the National Reference Laboratory. Isolates may be obtained by different monitoring approaches either by active and systematic monitoring of humans, animals, foods, and other sources, or by passive monitoring based on diagnostic submissions of samples from clinical cases in animals and by testing of foods on suspicion. In some countries, *Salmonella* prevalence in animals and food was very low and only a small number of isolates, or none, was available for susceptibility testing. In most countries standard methods and breakpoints published by the Clinical Standards Laboratory Institute (CLSI)[1,2] were used for susceptibility testing of *Salmonella.* For some antimicrobials (e.g. Ciprofloxacin) not all countries used the same breakpoint for antimicrobial susceptibility testing. Use of different breakpoints clearly has large influence on the proportion of isolates categorized as resistant or susceptible. For some antimicrobials direct comparisons between proportions of resistant isolates between countries should therefore be interpreted with caution and readers should refer to the breakpoint table for *Salmonella* (Table AB SA_BP) at the end of this section, For selected antimicrobials and sample categories, the full MIC distributions are presented in this summary report (Table AB SA_MIC1 to AB SA_MIC3).

8.4. Sources of Campylobacter data

Humans

With the exception of Germany, Poland and the United Kingdom, human campylobacteriosis is notifiable in all MS, Norway and Switzerland (Appendix Table CA2). Luxembourg, Malta and Portugal provided no information. Most MS have had notification systems in place for many years. However, Cyprus and Ireland have implemented their notification systems in recent years (2004-2005). 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 bacteriological tests.

Foodstuffs

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, however, not included in the report.

Animals

Campylobacter is notifiable in *Gallus gallus* in Finland and Norway, and in all animals in Belgium, Estonia, Latvia, Lithuania, the Netherlands, Slovenia, Spain and Switzerland. In food, *Campylobacter* is notifiable in Austria, Belgium, the Czech Republic, Estonia, Italy, Latvia, the Netherlands, Slovakia, Slovenia, Spain and Norway (poultry meat only) (Appendix Table CA1). The most frequently used methods for detecting *Campylobacter* in animals at farm, slaughter and in food were the bacteriological methods ISO 10272 and NMKL 119 (Appendix Table CA1) for further details). Additionally, three MS used PCR methods at slaughter level. 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

1 Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated from Animals; Approved Standard [ISBN 1-56238-377-9] M31-A

2 NCCLS. Performance Standards for Antimicrobial Susceptibility Testing: Eleventh Informational Supplement. NCCLS document M100-S11 [ISBN 1-56238-426-0]. NCCLS, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2001. (NCCLS changed name to Clinical and Laboratory Standards Institute by January 1st, 2005 (www.clsi.org)).

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. At retail, sampling was predominantly carried out on fresh meat.

Antimicrobial resistance

The countries reported results of antimicrobial susceptibility testing of *Campylobacter* isolates from humans, various animal species and from food of animal origin. Qualitative results were requested for the 2006 Community Report as number of resistant isolates out of the total number of isolates tested against each antimicrobial agent, in each specific sample category. Quantitative results reported as MIC (Minimal Inhibitory Concentration), were requested as the number of isolates in each MIC, out of the total number of isolates tested, for each antimicrobial agent, in each specific sample category. In this summary, only quantitative results determined by broth dilution method were included. The countries were requested to report on a defined panel of antimicrobial agents, and antimicrobials to be included were selected based on their relative public health importance.

Countries could report for *C. jejuni*, *C. coli* and/or *Campylobacter spp.* collectively. In order to preserve comparability of data between countries, categories in which several countries reported were primarily selected for this summary. Furthermore, categories were selected based on their relative public health importance. Direct comparison of proportions of resistant isolates between countries was avoided if the reporting was based on less than 10 isolates.

The countries generated data on antimicrobial susceptibility in *Campylobacter* in different ways. Most often the reported isolates constitute a sub-sample of isolates available at the National Reference Laboratory. Isolates may be obtained by different monitoring approaches either by active and systematic monitoring of humans, animals, foods, and other sources, or by passive monitoring based on diagnostic submissions of samples from clinical cases in humans and animals, or by testing of foods only on suspicion.

In most countries, standard methods and breakpoints published by the Clinical Standards Laboratory Institute (CLSI)[3, 4] were used for susceptibility testing of *Campylobacter* isolates, but for some antimicrobials national standards were used. In the case of some antimicrobials (e.g. Ciprofloxacin) not all countries used the same breakpoint for antimicrobial susceptibility testing of the isolates. Use of different breakpoints clearly has large influence on the proportion of isolates categorized as resistant or susceptible. For some antimicrobials direct comparisons between proportions of resistant isolates between MS should therefore be interpreted with caution and readers should refer to the breakpoint tables at the end of this section and for *Campylobacter* (Table AB CA_BP). For selected antimicrobials and sample categories, the full MIC distributions are presented in this summary report (Table AB CA_MIC1 and AB CA_MIC2).

8.5. Sources of Listeria data

Humans

In 2006, listeriosis was notifiable in humans in all MS and non-MS, with the exception of the Netherlands. Luxembourg did not provide information on their notification system relative to humans. Notification of *Listeria* in food was required in Austria, Belgium, Estonia, Hungary, Italy, Latvia, the Netherlands, Slovakia, Slovenia, and Spain. In 2005, all human data for the Community Report were provided by the ECDC based on TESSy and Enter-net.

Foodstuffs

Monitoring programmes and diagnostic methods for testing samples for *Listeria* are found in Appendix, Table LI1. Surveillance in ready-to-eat foods was performed in most MS. However, due to differences in sampling and analytical methods, comparisons from year to year and between countries were difficult.

Animals

Listeria in animals was notifiable in 12 MS and two non-MS. *Listeria* in animals was not notifiable in Austria, the Czech Republic, Denmark, Hungary, Latvia, Portugal and the United Kingdom. Cyprus, France, Ireland, Luxembourg, Malta, Poland did not provide information on their notification system in relation to animals (Appendix, Table LI2).

3 Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated from Animals; Approved Standard [ISBN 1-56238-377-9] M31-A

4 NCCLS. Performance Standards for Antimicrobial Susceptibility Testing: Eleventh Informational Supplement. NCCLS document M100-S11 [ISBN 1-56238-426-0]. NCCLS, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2001. (NCCLS changed name to Clinical and Laboratory Standards Institute by January 1st, 2005 (www.clsi.org)).

8.6. Sources of VTEC data

Humans
In humans, VTEC infections are notifiable in 16 MS and two non-MS (Appendix, Table VT2). Enterohaemorrhagic *E. coli* (EHEC) is notifiable in Cyprus, Estonia, Greece and Ireland. In 2006, all human data for the Community Report were provided by the ECDC based on Enter-Net.

Foodstuffs
Food samples were collected in a variety of settings, such as abattoirs, cutting plants, dairies, wholesalers and at the retail level, and included different samples such as carcass surface swabs, cuts of meats, minced meat, milk, cheeses, and other products. The majority of investigated products were raw but intended to undergo preparation before being consumed. The samples were taken as part of official control and monitoring programmes as well as random national surveys. The number of samples collected and types of food sampled varied among individual MS. Most of the animal samples were collected on the abattoir or at the farm.

For further details on VTEC surveillance and monitoring, please refer to Appendix, Table VT1.

8.7. Sources of tuberculosis data

Humans
Tuberculosis in humans is notifiable in 22 MS, Norway and Switzerland. *Mycobacterium bovis* cases of 2006 were not yet reported to the EuroTB network, so 2005 data were presented. In several of the reporting MS, the notification system for human tuberculosis does not distinguish the tuberculosis cases caused by different species of *Mycobacterium* (Appendix Table TB1).

Animals
Rules for intra-Community trade of bovines, including requirements for cattle herds and country qualification as officially free for tuberculosis are laid down in Council Directive 64/432/EEC, as last amended by Regulation (EC) 1226/2002. Community co-financing of programmes for eradication of bovine tuberculosis in 2006 (Commission Decision 2005/873/EC) were approved for Estonia, Italy, Poland, Portugal and Spain.

The non-MS, Norway and Switzerland, are Officially Tuberculosis Free, and monitor *M. bovis* according to the EU directives. An overview of the OTF status is presented in Appendix Table TB-BR1.

8.8. Sources of Brucella data

Humans
Brucellosis in humans is notifiable in most MS, except for Denmark (Appendix Table BR1). Information on notification was not provided by Luxembourg and Malta.

Animals
By the end of 2006, Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Slovakia, Sweden and the United Kingdom (Great Britain) - as well as 48 provinces and one region in Italy and the Azores in Portugal were officially free of brucellosis in cattle (OBF) (Appendix Table TB-BR1).

Austria, Belgium, the Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Luxembourg, the Netherlands, Poland, Slovakia, Slovenia, Sweden, the United Kingdom, 64 departments in France, 47 provinces and one region in Italy, two provinces of the Canary Islands in Spain and the Azores in Portugal were officially brucellosis free in sheep and goat (ObmF) in 2006 (Appendix Table TB-BR1).

In 2006, Poland was declared ObmF, while Italy had additional provinces and one region declared OBF/ ObmF (Decision 2006/169/EC).

Community co-financing of programmes for eradication of bovine, ovine and caprine brucellosis were approved for Cyprus, Greece, Italy, Portugal and Spain. Co-financed eradication programmes were also approved for ovine and caprine brucellosis in France, and for bovine brucellosis in Ireland, Poland, the United Kingdom and Northern Ireland (Commission Decision 2005/873/EC).

The non-MS, Norway, has been declared OBF and was declared ObmF and monitors brucellosis in cattle, sheep and goat according to the EU directives. Switzerland is officially free of brucellosis in cattle (OBF) as well as in sheep and goats (ObmF).

8.9. Sources of *Yersinia* data

Humans

In 2006, notification of yersiniosis in humans was mandatory in 17 MS and Norway (Appendix Table YE1). Twenty-two MS and two non-MS reported cases of yersiniosis in 2006 (no case was reported in France, Ireland, and Italy).

Foodstuffs

Differences in sampling and analytical methods, and sensitivity, make comparison between countries difficult.

A notification system for *Yersinia* in foodstuffs exists in Austria, Belgium, Estonia, Italy, the Netherlands, Slovakia, Slovenia and Spain. Data on *Yersinia* in food samples, with sample sizes ≥ 25, were provided by four MS in 2006 (AU, DE, IT and ES).

Animals

Yersinia infections in animals were notifiable in Belgium, Latvia, Lithuania, the Netherlands, Slovenia and Spain. Seven MS (AU, FI, DE, IE, II, NL and SK) and one non-EU MS (CH) reported data on sampling from animals. Substantial numbers of samples from pigs, cattle, sheep, goats, solipeds, poultry, dogs and cats were tested in Germany.

8.10. Sources of *Trichinella* data

All MS, except Cyprus and Malta, and non-MS included information on *Trichinella* in their report for 2006. The Commission Regulation 2075/2005/EC came into force in 2006. In accordance with this regulation, all finisher pigs, sows, boars, horses, wild boars and some other wild species must be tested for *Trichinella* at slaughter. The regulation allows for the possibility that MS can apply for status as region with negligible risk of trichinellosis.

Humans

Trichinella in humans and in animals is notifiable in most MS and non-MS. In Denmark and the United Kingdom, *Trichinella* in humans is not notifiable. In Hungary, *Trichinella* in animals is not notifiable. France (animals), Ireland (animals), Italy (animals), Luxembourg, Malta, Bulgaria and Romania did not report whether *Trichinella* is notifiable. *Trichinella* in foodstuffs is notifiable in 14 MS and Norway (see the Appendix, Table TR2 for more information). In humans, 15 MS and Norway diagnose *Trichinella* infections based on clinical symptoms, serology (ELISA), histopathology and Western Blot. The remaining MS, Bulgaria, Romania and Switzerland provided no information on diagnostic methods used to detect this pathogen in humans.

Animals

Only three MS provided information about compliance with the new Regulation 2075/2005/EC concerning diagnosis of *Trichinella* in animals. The remaining MS and non-MS reported using the digestion and compression methods described in Directive 77/96/EEC. Bulgaria, Lithuania and Romania provided no information concerning diagnostic methods used in animals (see the Appendix, Table TR1 for more information).

8.11. Sources of *Echinococcus* data

Humans

Echinococcosis is notifiable in humans in all MS and non-MS except for Denmark, the Netherlands, Switzerland and the United Kingdom. Bulgaria, Luxembourg, Malta and Romania provided no information as to whether echinococcosis is notifiable in humans. In animals, *Echinococcus* detection is notifiable in most MS and Non-MS except for Czech Republic, France, Hungary and the United Kingdom, and non-MS. Bulgaria, Cyprus, Germany, Ireland, Luxembourg, Malta, Poland and Romania provided no information whether *Echinococcus* detection in animals is notifiable. (Appendix, Table EH2).

Animals

Guidelines for the control of the pathogen through meat inspection of animal carcasses for human consumption are provided through Council Directive 64/433/EEC, whereby visual inspection of all slaughtered animals is carried out by official veterinarians examining organs and muscles intended for human consumption. Whole carcasses or organs are destroyed in cases where *Echinococcus* cysts are found. For an overview of the monitoring and diagnostic methods, please refer to Appendix, Table EH1.

8.12. Sources of *Toxoplasma* data

Humans

Human infections with *T. gondii* are notifiable in 16 MS. Germany, Greece and Lithuania notify only congenital cases. In the United Kingdom, *T. gondii* is only notifiable in Scotland. No information on notification procedures was provided from Bulgaria, Luxembourg, Malta, Portugal and Romania (Appendix, Table TO2).

Animals

Toxoplasmosis in animals is notifiable in eight MS and two non-MS (Appendix, Table TO2).

An overview of monitoring programmes is presented in Appendix, Table TO1.

8.13. Sources of rabies data

Humans

In 2006, information concerning rabies in animals was submitted from all MS except Cyprus, Ireland and Malta, and from four non-MS. Rabies is notifiable in humans in most MS, and non-MS. No information was provided by Bulgaria, Luxembourg, Malta, Portugal and Romania. 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. See Appendix, Table RA3 for more information.

Animals

In accordance with Council Directive 64/432/EEC, rabies is notifiable in animals in all MS; in the Netherlands the infection is only notifiable in dogs. No information on notification was provided by Bulgaria, Ireland, Luxembourg, Malta and Romania. Belgium, Czech Republic, Finland, France, Ireland, Luxembourg, Norway (mainland), Sweden, Switzerland and the United Kingdom have declared themselves free from rabies. Cyprus, Greece, Malta and Spain (mainland and islands) consider themselves free from rabies. See Appendix, Table RA3 for more information.

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[5] and OIE[6] and the mouse inoculation test. However, ELISA, PCR and histology are also used. Bulgaria, Greece, Hungary, Ireland, Lithuania, Malta, the Netherlands, Portugal and Romania provided no information on the diagnostics used. See Appendix, Table RA2 for more information.

8.14. Sources of TSEs and Avian Influenza data

The information regarding Transmissible Spongiform Encephalopathy (TSE) was derived from the European Commission Report on The Monitoring and Testing of Ruminants for the Presence of Transmissible Spongiform Encephalopathy (TSE) in the EU in 2006, published by the European Commission, Health and Consumer Protection Directorate General. The Report is available on Commission webpage (http://ec.europa.eu/food/food/biosafety/bse/annual_reps_en.htm).

Also the information on surveillance for Avian Influenza in the EU is derived from the Commission, from the Annual Reports of the Community Reference Laboratory for AI in Weybridge, UK on the EU surveillance for AI in poultry and wild birds during 2006, which are available at the European Commission, Health and Consumer Protection Directorate-General's website:
http://ec.europa.eu/food/animal/diseases/controlmeasures/avian/eu_resp_surveillance_en.htm

8.15. Sources of *E. coli* and Enterococci indicators data

Results of antimicrobial resistance in resistant isolates were analysed as percentages, out of the total number of isolates tested against each antimicrobial for each bacterial species in each specific sample category. Resistance to the following antimicrobials was reported: ampicillin, cefotaxime, chloramphenicol, gentamicin, nalidixic acid, sulphonamides, tetracycline, and trimethoprim. Data were provided by 16 MS. The countries reported results for antimicrobial susceptibility testing of isolates of *E. coli* indicators from various animal species and from various foods.

5. WHO Laboratory techniques in rabies
6. O.I.E. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals

Breakpoints applied in individual countries for antimicrobial susceptibility testing by dilution methods are presented in Table AB EC_BP, for *E. coli*, at the end of this section. Isolates from different MS may originate from different categories of animals, and this presents a further source of variation in the results, because prevalence of antimicrobial resistance in indicator bacteria can differ markedly in different ages or classes of animals.

8.16. Sources of foodborne outbreak data

A foodborne outbreak is defined by the Zoonoses Directive 2003/99/EC as 'an incidence, observed under given circumstances, of two or more human cases of the same disease and/or infection, or a situation in which the observed number of cases exceeds the expected number and where the cases are linked, or are probably linked, to the same food source'.

In 2006, data were received from 22 MS and the three non-MS. No data were available from Cyprus, Luxembourg and Malta. Data quality varied between countries. Some countries listed outbreaks, while others reported aggregated data. Some MS only reported general outbreaks.

8.17. 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 the zoonotic agents in animals, foodstuffs and feedingstuffs:

- 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%

Tables of breakpoints for antimicrobial susceptibility testing by MS:

Table SA AB_BP Breakpoint table for Salmonella

	Antimicrobial																			
	Ampicillin		Cefotaxim		Chloramphenicol		Ciprofloxacin		Gentamicin		Nalidixic acid		Streptomycin		Sulfonamide		Tetracycline		Trimethoprim	
Country	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**
Austria	8	1-32			32	2-64	0.12	0.03-2048	4	1-32	32	8-128	64	4-64	512	64-1024	16	2-32	4	4-32
Czech Republic	32				32		4		16		32				1024		16		16	
Denmark	32	1-32			32	2-64	0.12	0.03-4	8	1-32	32	8-64	32	4-64	512	64-1024	16	2-32	16	4-32
Finland	8	0.25-32	1	0.06-2	32	1-128	0.12	0.008-1	4	0.5-64	32	1-128	64	2-256	512	16-2048	16	0.5-64	4	0.25-32
Germany	32	1-32			32	2-64	2	0.03-4	16	1-32	32	4-128	32	4-16	512	32-512	16	2-32	16	4-32
Netherlands	8	0.5-64	1	0.12-16	32	2-128	0.12	0.06-8	4	0.25-32	32	0.5-128			512	0.25-1024	16	0.5-64	4	0.5-64
Norway	8	0.25-32	1	0.06-2	32	1-128	0.12	0.007-1	4	0.5-64	32	1-128	64	2-256	512	16-2048	16	0.5-64	4	0.25-32
Poland	64	1-32			64	2-64			32	1-32	64	8-128	64	4-64	1024	64-1024	32	1-32	32	4-32
Slovakia	8	0.5-64	1	0.25-32	32	0.25-32	0.12	0.06-4	4	0.25-32			64	0.25-32			16	0.25-32		
Spain	8	0.25-32	1	0.03-4	32	2-256	0.12	0.06-32	4	0.25-64	32	0.5-128	64	2-64			16	0.5-256		
Sweden	8	0.25-32	1	0.06-2	32	1-128	0.12	0.007-1	4	0.5-64	32	1-128	64	2-256	512	16-2048	16	0.5-64	4	0.25-32

For erythromycin no data were reported.
Only MS that reported data are included in this table.
BP: Breakpoint
TR: Test range

Table AB CA_BP Breakpoint table for Campylobacter

	Antimicrobial																	
	Ampicillin		Chloramphenicol		Erythromycin		Ciprofloxacin		Gentamicin		Nalidixic acid		Streptomycin		Tetracycline		Trimethoprim	
Country	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**	**BP**	**TR**
Austria	16	1-128	32	2-32	8	0.25-128	2	0.06-32	2	0.25-64	32	2-128	4	1-64	4	0.25-128	16	0.5-64
Czech Republic	32	0.25-32			8	0.06-128	2	0.06-128	8	0.25-128	32	0.06-128	32	0.06-64	16	0.25-128		
Denmark			32	2-32	32	0.5-32	4	0.03-4	16	0.12-16	64	2-64	16	2-16	16	0.25-16		
Finland	32	0.5-64			8	0.12-16			2	0.25-8	32	1-128						
France	16				8		2		2		32				4			
Germany	16	0.12-256			8	0.25-256	2	0.03-64	32	0.12-256	64	0.25-256			4	0.12-256		
Hungary	64	0.015-256			16	0.015-256					64	0.015-256			32	0.015-256		
Italy					8		2		2		32		4		4			
Netherlands	16	0.5-64	32	2-128	32	0.5-64	2	0.12-16	4	0.25-32	64	1-128	8	1-128	4	0.12-128		
Norway	16	0.5-64			8	0.12-16			4	0.25-8	32	1-128			4	0.25-32		
Slovenia	16	0.5-64			8	0.12-16			2	0.25-8	32	2-128						
Spain					32	25-32	2	6-32	4	25-64	64	5-128	128		4	5-256		
Sweden	16	0.5-64			8	0.12-16			2	0.25-8	32	1-128			4	0.25-32		

For cefotaxime and sulfonamide no data were reported.
Only MS that reported data are included in this table.
BP: Breakpoint
TR: Test range

Table EC AB_BP Breakpoint table for Escherichia coli

	Antimicrobial																			
	Ampicillin		Cefotaxim		Chloramphenicol		Ciprofloxacin		Gentamicin		Nalidixic acid		Streptomycin		Sulfonamide		Tetracycline		Trimethoprim	
Country	BP	TR	BP	TR	BP	TR	BP	TR	BP	TR	BP	TR	BP	TR	BP	TR	BP	TR	BP	TR
Austria	32	1-32			32	2-64	0.12	0.03-4	8	1-32	32	8-128	32	4-64			16	2-32	16	4-32
Denmark	32	1-32			32	2-64	0.12	0.03-4	8	1-32	32	8-64	32	4-64	512	64-1024	16	2-32	16	4-32
Finland	16	0.25-32	1	0.06-2	32	1-128	0.25	0.008-1	8	0.5-64	32	1-128	32	2-256	512	16-2048	16	0.5-64	8	0.25-32
Germany	32	1-32			32	2-64	2	0.03-4	16	1-32	32	4-128	32	4-64	512	32-512	16	2-32	16	4-32
Netherlands	16	0.5-64	0.5	0.12-16	32	2-128	0.12	0.06-8	4	0.25-32	32	0.5-128			512	0.25-1024	16	0.5-64	4	0.5-64
Norway	16	0.25-32	0.5	0.06-2	32	1-128	0.12	0.007-1	4	0.5-64	32	1-128	32	2-256	512	16-2048	16	0.5-64	4	0.25-32
Spain			1	0.03-4	32	2-256	4	0.06-32	16	0.25-64	32	0.5-128	64	2-64			16	0.5-256		
Sweden	16	0.25-32	0.5	0.06-2	32	1-128	0.12	0.03-1	4	0.5-64	32	1-128	32	2-256	512	16-2048	16	0.5-64	4	0.25-32

For Erythromycin no data were reported.
Only MS that reported data are included in this table.
BP: Breakpoint
TR: Test range

APPENDIX

Appendix 1

List of Abbreviations

AI	Avian Influenza
BSE	Bovine Spongiform Encephalopathy
BSN	Basic Surveillance Network
CFU	Colonies Forming Unit
CJD	Creutzfeldt-Jakob Disease
CLSI	Clinical Standards Laboratory Institute
DSN	Dedicated Surveillance Networks
EBLV	European Bat *Lyssavirus*
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
EEC	European Economic Community
EFSA	European Food Safety Authority
EHEC	Enterohaemorragic *Escherichia coli*
ELISA	Enzyme-Linked Immunosorbent Assay
ETEC	Enterotoxigenic *Escherichia coli*
EU	European Union
EUROSTAT	Statistical Office of the European Communities
FAO	Food and Agriculture Organization of the United Nations
g	Gram
GHP	Good Hygiene Practice
HACCP	Hazard Analysis and Critical Control Point
HUS	Haemolytic Uraemic Syndrome
ISO	International Organization for Standardization,
MIC	Minimal Inhibitory Concentration
MS	Member State
NMKL	Nordic Committee on Food Analysis
OBF	Officially Brucellosis Free
OBmF	Officially *Brucella melitensis* Free
OTF	Officially Tuberculosis Free
PCR	Polymerase Chain Reaction
RTE	Ready-to-eat
spp.	Subspecies
TBE	Tick Borne Encephalitis
TESSy	The European Surveillance System
TSEs	Transmissible Spongiform Encephalopathies
UV	Ultraviolet
VTEC	Verocytotoxin producing *Escherichia coli*
WHO	World Health Organization
ZCC	Zoonoses Collaboration Centre

Member States of the European Union, 2006

Member State	ISO Country Abbreviations 2006 Report
Austria	AT
Belgium	BE
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
Sweden	SE
United Kingdom	UK*

* In text, referred to as the Netherlands and the United Kingdom

Non Member States reporting in 2006

Member State	ISO Country Abbreviations 2006 Report
Bulgaria	BG
Iceland	IS
Liechtenstein	LI
Norway	NO
Romania	RO
Switzerland	CH

Appendix 2

Tables

Table 1. Overview of the existence of notification systems for human zoonotic diseases, 2006

	AT	BE	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	SK	SI	ES	S	CH	UK	NO	CH
Salmonellosis	Y[1]	Y[2]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	N	Y	Y	Y	Y	Y[7]	Y	Y	N[8]	Y	Y
Campylobacteriosis	Y[1]	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	-	-	N	Y	-	Y	Y	Y[7]	Y	Y	N	Y	Y
Listeriosis	Y	Y[3]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	N	Y	Y	Y	Y	Y[7]	Y	Y	N	Y	Y
VTEC	Y[1]	Y	-	Y	Y	Y	Y	Y	Y	Y[5]	Y	Y[5]	Y	Y	Y	-	-	Y	Y	Y	Y	Y	Y[7]	Y	Y	N	Y	Y
Tuberculosis	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y	Y	Y	Y	Y	Y[7]	Y	Y	Y	Y	Y
Brucellosis	Y	Y	Y	Y	N[4]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y	Y	Y	Y	Y	Y	Y	Y	Y[9,10]	Y	Y
Yersiniosis	Y	Y[3]	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	-	-	N	Y	-	Y	Y	Y[7]	Y	Y	N	Y	Y
Trichinellosis	Y	Y[3]	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N
Echinococcosis	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	N	Y	Y	Y	Y	Y	Y	N	N	Y	N
Toxoplasmosis	N	Y[2]	N	Y	N	Y	Y	Y	Y[6]	Y[6]	Y	Y	Y	Y	Y[6]	-	-	N	Y	-	N	Y	Y[7]	N	N	Y[11]	Y[12]	N
Rabies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y

Y=yes, N=no, - = no information
1. In Austria, clinical cases notifiable since 1996
2. In Belgium, in the French Community
3. In Belgium, in the Flemish Community
4. In Denmark, only imported cases registered
5. In Greece and Ireland, EHEC is notifiable
6. In Germany, Greece and Lithuania, congenital cases only
7. In Spain, cases from SIM (Microbiological Informations System)
8. In the United Kingdom, voluntary reporting from all laboratories that isolate Salmonella
9. In the United Kingdom, imported or laboratory infected cases occur
10. In the United Kingdom, reportable to all work related activities but not to all incidents
11. In the United Kingdom, only Scotland
12. In Norway, encephalitis cases are notifiable

Appendix Table SA1. Surveillance systems on Salmonella in feedingstuffs, 2006

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		-	-
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		Random sampling	Every consignment is sampled
-	-	-	-	Sampling frequency depends on raw feed material and it is based on risk assessment	
France	-	Official monitoring, random sampling		Official monitoring, random sampling	-
Germany	Yes	-		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 Council Directive 95/53/EC - both imported and domestic			
Italy	Yes	-	Official control as well as HACCP or own check by the industry	-	-
Latvia	No	HACCP or own check by the industry		-	-
Lithuania	Yes	Official and self control	Official and self control	Official and self control	Official and self control
Luxembourg	-	-	-	-	-
Malta	-	-	-	-	-
Netherlands	Yes	Own control		-	-
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	All consignments have to be sampled		All consignments have to be sampled	
United Kingdom (Great Britain)	-	Sampling of rendered material is required if the rendered material is intended for use in livestock feedingstuffs; reportable		Tested according to a risk assessment	-
United Kingdom (Northern Ireland)	-	-		x	-
Norway	Yes	Own check programme based on requirements of legislation. Random sampling by the official surveillance programme		x	x
Switzerland	-	-	-	-	-

x - routinely performed

1. In Sweden, feed mills producing feedingstuffs for poultry a minimum of five samples per week, feed mills producing feedingstuffs for ruminants, pigs or horses two samples a week.
2. 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.

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 76/371/EEC. Analysis method: ISO 6579, 2002
-	x	x	x	
-	-	-	-	
-	-	-	-	
Targeted sampling	-	-	-	
-	Monitoring	Monitoring	Monitoring	
x	Self control systems based on requirements of legislation. Final products: random official sampling			Official sampling is carried out according to Directive 76/371/EEC. Analysis method in Evira: ISO 6579, 2002 with some minor modifications.
-	-	-	-	
-	Official monitoring, random sampling			
-	-	-	-	
-	-	-	ISO 6571, ISO 6580 (Broilers)	
-	-	-	-	
-	x	x	x	
-	Official control as well as HACCP or own check by the industry			
HACCP or own check by the industry	HACCP or own check by the industry			
Official and self control	Official and self control	Official and self control	Official and self control	Analysis method: LST EN ISO 6579:2003 lt
-	-	-	-	
-	-	-	-	
-	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	
Own check programme based on the HACCP principles[1] and official targeted control	All consignments have to be sampled			
Codes of practice for control is applied as part of the HACCP process	x	x	x	
-	x	x	x	
Own check programme based on HACCP by the industry	All complete feedingstuffs must be subject to heat treatment[2]			Official sampling according to Council Directive 76/371/EEC
-	-	-	-	

Appendix Table SA2. Salmonella monitoring programmes in poultry breeders (Gallus gallus), 2006

Countries, running a monitoring or control programme described in the Directive 92/117EC					
Follow the Directive	AT, CZ[1], DK, DE, FI, FR, GR, IE, IT, LV, NO, NL, PT, SE, SK, SI, ES, UK, LT				
For additional sampling see Table SA3	DK, FI, FR, NO, NL, SE, UK				
Sampling of day-old chicks for egg production is voluntary	PT				
Requirement according to Directive 92/117/EC					
	Day old chicks	**Rearing period**		**Production period**	
	Dead chickens / destroyed chickens (20)	Samples from the inside of the delivery boxes (internal lining/paper/crate material)		Every 2 weeks	dead chickens (50) or
	Or meconium samples (250)	4 weeks 2 weeks before moving	Faecal samples (60) faecal samples (60)	Official sampling every 8 weeks	meconium samples (250)
Countries running a monitoring or control programme using a sampling scheme based on Directive 03/99/EEC					
Belgium	Inner lining of delivery boxes and blood	age of 16 weeks	Faecal samples (60)	Every 6 weeks (60)	Faecal samples at farm
	(all: domestic and imported)	- all flocks	litter	4 times a year	*Salmonella* control: dead in shell chicks, fluff, meconium (pooled samples)
		- imported reared hens and cocks	pooled faecal samples		
				4 times a year	Hygiene control of hatcheries
				Before arrival at slaughterhouse (2 weeks before slaughter)	60 faecal samples
Estonia	Dead chickens and inner lining of delivery boxes (10/flock or batch)	3 weeks before moving	Faecal samples (number of samples depend on flock size)	Every 2 weeks	dead chickens (50) or meconium (250)
Countries running a monitoring or control programme using a sampling scheme based on Directive 2003/99/EEC					
France	5 inner lining of delivery boxes per flock	4 weeks	3 pairs of boot swabs and 2 chiffs	Every two weeks at hatchery:	5 hatch tray layers or 250g of shells
				Every 8 weeks at farm (meat); at 24, 36, 54, 62 weeks (eggs):	2 pairs of boot swabs and 1 chiff
Diagnostic methods used					
ISO 6579:2002	BE, CR, DK, EE, FI, GR, IT, LV, PL, SK, SI, ES, NL				
NMKL No 71:1999	FI, NO, SE				
Modified ISO 6579:2002	UK				
ISO 6580	GR				
AFNOR NF U 47 100 and 47 101	FR				
Countries not providing detailed information about monitoring programmes					
No information available	CY, LT, MT				
Directive 03/99/EEC is the basis for the compulsory control of *S.* Enteritidis and *S.* Typhimurium in breeding flocks and in hatcheries	HU				
Luxembourg does not have any breeding flocks	LU				
A monitoring programme is running in the Beira Litoral region	PT				

1. In Czech Republic, number of faecal samples collected in the rearing and production period depend on flock size. During the production period no dead chicks or meconium samples are collected

Appendix Table SA3. Salmonella monitoring programmes in poultry breeders (Gallus gallus), 2006 – additional sampling

	Day old chicks	Rearing period		Production period	
Austria		At week 12	Faecal samples (60)	Every 4 weeks	Boot swabs
Denmark		1 week	dead chickens (40)	Every week	2 pairs of sock samples
		2 and 8 weeks	2 pair sock samples[1]	Hatcheries: after each hatch (1 - 4 hatchers may be pooled)	At least 25g wet dust per hatcher
		2 weeks before moving	blood samples (60)		
France	5 inner lining of delivery boxes per flock	4 weeks	3 pairs of boot swabs and 2 chiffs	Every two weeks at hatchery:	5 Hatch tray layers or 250g of shells
				Every 8 weeks at farm (meat); at 24, 36, 54, 62 weeks (eggs):	2 Pairs of boot swabs and 1 chiff
Finland				Every 8 weeks	Faecal samples on holdings
Norway		Grandparents: 1-2 and 9-11 weeks	Faecal samples (60)	Grandparents: At hatchery: every 2 weeks. At farm: Every 4 weeks	At hatchery: Meconium (250). At farm: faecal samples (60)
				Parents: At hatchery: every 2 weeks	
Netherlands	Leaflets (40)	max. 21 d before transfer	cloacal swabs (150)	From 20 weeks every 4 weeks	Cloacal swabs, 6x25/flock
				Hatchery	Fluff samples (25g) / hatching entity
Netherlands	Leaflets (40)	4 weeks	cloacal swabs (60)	From 20-22 weeks or 22 – 24 weeks every 9 weeks	
		max.21 d before transfer	cloacal swabs (150)	No vaccination	blood samples 1% of flock (30 – 60)/ flock
		Decision on vaccination		Vaccination	cloacal swabs, 6x25/flock
				From week 26 and on	fluff samples, every hatch, every machine
Sweden		Grandparents: 1-2 and 9-11 weeks	Dead chicks (10) and faecal samples (60)	Every month	Faecal samples (60)
United Kingdom	Grandparents supply flocks: Every week, official samples every 4 weeks.			Grandparents: Every week, Official sampling every 4 weeks	

1. A "sock-sample" consists of elastic cotton tubes pulled over the collector's boots. While walking through the poultry house, the cotton tubes absorb faecal droppings. Two pairs of "sock-samples" analysed as one pool has shown to be just as effective in detecting *Salmonella* as 60 faecal samples. In addition, the sampling method is easier to perform.

Appendix 2

Appendix Table SA4. Control measures taken in poultry breeder flocks in case of Salmonella infection, 2006

Serovars covered		
	All Serovars	AT, DK, FI, SE, NO[1], NL, LT
	S. Enteritidis and *S*. Typhimurium	EE, FR, DE, IE, UK, ES, N-IE, IT
	S. Enteritidis, *S*. Typhimurium, *S*.Hadar, *S*.Virchow, *S*.Infantis	SI
Restrictions on the flock		
	After confirmation	LV, NL, N-IE, PL, IT, ES
	Immediately following suspicion	AT, DK, EE, FR, FI, SE, NO, IE, SI, UK
	Chicks already delivered covered by restrictions	NO
Consequence for the flock		
	Treatment	SI
	Slaughter	BE, DK, EE, GR, FR, IE, N-IE, PL, UK, IT
	Restrictions for the delivery of hatching eggs	AT[2], BE[3], EE, ES, F, LV[4], NO, NL, DK[2], PL[3], SI, FR, IT, FI
	Slaughter and heat treatment	AT, DE, FI, NL[4], LT, SI
	Destruction	SE, NO, SI
Other consequences		
	Feedingstuffs are restricted (heat treatment or destruction)	DK, EE, FR, SE, SI,
	Disposal of manure restricted	EE, FR, FI, NO, SE, UK, DK, PL, SI
Cleaning and disinfection		
	Obligatory	AT, BE, DK, EE, FR, FI, SE, IE, NO, NL, PL, SI, UK, IT, LT
	Negative bacteriological result required before restocking	AT, DK, EE, FR, FI, IE, NO, NL, SI, SE, UK, IT, LT
	Requirement of an empty period	AT (14 days), EE (3 weeks), FR (less than 30 days), N0 (30 days), IT (30 days after disinfection)
Further investigations		
	Epidemiological investigation is always started	EE, FI, FR, NO, SE, IE, NL, UK, IT, SI
	Feed suppliers are always included in the investigation	FI, NO, SE, IE, NL, UK, SI
	Contact herds are included in the investigation	FI, FR, IE, NO, NL, SE, UK
Vaccination		
	Mandatory	AT
	Recommended	BE
	Permitted	CY, DK[5], SI, ES, UK, IT , LT
	Prohibited	EE, FI, LV, NO, SE

1. In Norway for invasive serovars and non-invasive serovars different control strategies may be applied
2. Destruction of the hatching eggs
3. Destruction of incubated eggs, not yet incubated eggs may be pasteurised
4. In the Netherlands, only flocks that are positive for *S*. Enteritidis or *S*. Typhimurium are obligatory slaughtered
5. In Denmark, no vaccination occur, as no vaccinations have been approved by The Danish Veterinary and Food Administration

Appendix Table SA5. Salmonella monitoring programmes in laying hens (Gallus gallus) producing table eggs, 2006

Day old chicks		Rearing period		Production period		Before slaughter at the farm	
Type of sample							
Samples from the inside of the delivery boxes; internal lining/ paper/crate material	CZ (10), DK (10), FR, LV, PL, SE, LT, SI[7]	Faecal samples	CZ[9], DK[1,2], EE[9], FI (60), F (60), LV, NO (60), NL (24-60), PL, SK, SE (90)[5], SI[7]	Faecal samples	AT, (60), CZ[9], DK, EE[9], FI (60), LV, NO (60), PL, LT, SK, SE (60-90)[5], ES	Faecal samples (60)	BE, FI, FR, NO
Dead chickens	AT (50), CZ (max 60), DK (20), EE (50), GR, LV, SK, SI[7], SE (10), UK, LT	Blood samples	DK[2], NL (24-60)[9]	Egg samples[10], and sock samples (2) or faecal samples (60)	DK	Faecal samples	EE[9], PL, SK, SE (60 or 90)
Meconium	AT (250), EE (250), FR, PL, SK, SE (250), UK	sock samples (2) and dust swab (2) at 4 weeks and 4 weeks before moving	FR	Faecal samples (60), or swabs/ sock samples (1) and dust swab (1)	FR	Swabs (at)	AT, BE, IE
Fluff, environmental samples and others	UK	Faecal swabs (26-60)	IE[9]	Dust swabs (26-60)	IE[9]	Sock/boot swabs	PL
		Sock/boot swabs	PL	Blood samples and faecal samples (vaccination)	NL (24-60)[9]	Faecal samples (60), or swabs/sock samples (1) and dust swab (1)	FR
				Sock/boot swabs	PL		
Frequency of sampling							
Each delivery	DK, LV, SK, SI, UK[8]	At 3 weeks/12 weeks	DK	Every 9 weeks[3] or 3 times[4]	DK	Prior to slaughter	BE, FR, FI, NO
Every flock	CZ, FR, SE, LT	At 4 weeks and 2 weeks before transfer	NO, SK, LT	Three times	FI[3]	3 weeks before to slaughter	SE
Voluntary	PL	At 5-6 weeks and 2 weeks before transfer	EE	At 25-30 and 50 weeks	NO, SE[5]	4 weeks before slaughter	LV
		At 2 weeks before transfer	FI, FR, LV, PL, SE, SI[7]	At 30 and 50 weeks	LV	1-2 weeks before slaughter	PL
		Max 21 days before transfer	NL	At 20-24 weeks and 98-104 weeks	EE	2 weeks before slaughter	EE
		Monthly private[6]	IE	At 24, 40 and 55 weeks	FR		
		At 4 weeks	CZ	Max 9 weeks before slaughter	NL		
				Every 15-20 weeks	PL		
				Every 2 weeks	SK		
				Once yearly official and monthly private[6]	IE		
				Every 9 weeks	LT		
				Every 12 weeks	AT, CZ		

Appendix Table SA5. Salmonella monitoring programmes in laying hens (Gallus gallus) producing table eggs, 2006 (cntd.)

Day old chicks	Rearing period	Production period	Before slaughter at the farm
Diagnostic methods used through out the production			
ISO 6579 (2002)	AT, BE, CZ, EE, FI, GR, IT, LV, PL, SK, SI, ES		
NMKL No 71:1999	FI, NO, SE		
AFNOR NF 47 100 and 47 101	FR		
The method described in the O.I.E. manual, 5th ed., 2004	SI		
Buffered Peptone water	PT		
Various bacteriological	DK, LT, UK		
No information	CY, DE, HU, IE, LU, MT		
Strategies in countries with no official sampling strategies, 2006			
Have voluntary sampling	AT		
Farms >5000 birds are required to sample 3 weeks prior to slaughter. Faecal samples (60) are taken with swabs/by hand or boot swabs (2)	BE		
No sampling strategies	IT[11], PT[10], ES		
Sampling of day old chicks as the monitoring procedure for layer breeder parent flocks	UK		

Note: Monitoring is not compulsory by Directive 2003/99/EC
"()": numbers in brackets are number of samples taken

1. In Denmark, at 3 weeks: 5 pairs of socks or 300 faecal samples. Flocks<200 animals: 2 pairs of sock samples or 60 faecal samples
2. In Denmark, at 12 weeks: Flock >500 animals: 60 blood samples, and 5 pairs of socks or 300 faecal samples. Flocks with 200-499 animals: 55 blood samples and 5 pairs of sock sample. Flocks<200 animals: Blood samples, and 2 pairs of sock samples or 60 faecal samples
3. In Denmark, for eggs sold to authorised egg-packing stations
4. In Denmark, for eggs sold at barn-yard sale or hobby poultry keeping
5. In Sweden, samples are collected from all holdings placing eggs on the market and holdings>200 layers not placing eggs on the market.
6. In Ireland, routine as part of National *Salmonella* Monitoring scheme
7. In Slovenia, only holdings with more than 350 laying hens
8. In UK, every 2 weeks by operator at hatchery, and officially every 8 weeks at hatchery as the monitoring procedure for layer breeder parent flocks
9. Number of samples depend on flock size
10. In Portugal, a surveillance programme is running in one region (Beira Lotoral)
11. In Italy, a compulsory control programme is running in the Veneto region

Appendix Table SA6. Measures taken in laying hens (Gallus gallus) producing table eggs in case of Salmonella infections, 2006

Serovars covered	
All Serovars	DK, FI, NO[1], LT, SE
S. Enteritidis and *S*. Typhimurium	CZ, EE, FR[6], NL, IE, PL, SK
S. Enteritidis, *S*. Typhimurium, *S*. Hadar, *S*. Virchow, *S*. Infantis	SI
Restrictions on the flock	
Immediately following suspicion	DK, EE, FR, FI, IE, NO, NL, PL, SI, SE
Eggs covered by restrictions already on the basis of suspicion	DK, FR, FI, IE, NO, NL, PL, SE, SI
Consequence for the flock	
Recovery or slaughter	
Slaughtered	GR, IE[5], PL, SK
Flocks destroyed	FI, LT, SE[3], SI
Sanitary slaughter	FR, NO[3]
Destruction	CY, CZ, DK, NO[2], SE[2], SI
Slaughter or destruction	EE
Treatment with antibiotics	AT[3], CZ, EE, PL, SI[10]
Consequence for the table eggs	
Destruction	CY, EE, NO[2], FI[2], SE
Heat treatment	AT, BE, CZ, DK, FR, LT, FI[3], IE[4], NL[4], SE[3]
Destruction or heat treatment	NO[3], PL, SK, SI
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	DK, EE, FI, SI, SE
Disposal of manure restricted	EE, FI, FR, NO, PL, SK, SI, SE
Cleaning and disinfection	
Obligatory	BE, EE, FR, FI, DK, IE, NO, NL, PL, SK, SI, SE, LT
Negative bacteriological result required before restocking	FR, FI, IE, NO, NL, DK, SI, SE
Requirement of an empty period	EE (21 days), FR, NO (30 days)
Further investigations	
Epidemiological investigation is always started	EE, FR, FI, IE, NO, NL, SE, UK, SI
Feed suppliers are always included in the investigation	EE, FI, IE, NO, NL, SE, SI
Contact herds are included in the investigation	EE, FI, FR, IE, NO, NL, SE
Intensification of the examination of non-infected flocks on the same farm	DK, FR, IE, NO, NL, SE
Vaccination	
Mandatory	HU
Recommended	AT[8], BE
Permitted	DK[7], CZ, FR, SK, ES[9], UK, LT, SI
Prohibited	EE, FI, LV, NO, SE

Note: No measures are fixed in Directive 2003/99/EC
1. In Norway, for invasive serovars and non-invasive serovars different control strategies may be applied
2. In France, during the rearing period, *S*. Typhimurium and *S*. Enteritidis are included. During the table egg production period in holdings placing their eggs on the marked via an egg packing centre, only *S*. Enteritidis is included until 60 weeks, and a last sampling is used to detect *S*. Typhimurium
3. In Ireland, as agreed with industry as part of *Salmonella* Control programme and as a condition of National Egg Quality Assurance Scheme
4. Non-invasive *Salmonella*
5. Invasive *Salmonella*
6. In Slovenia *S*. Enteritidis and *S*. Typhimurium only at rearing period. Other 3 serotypes at all production stages
7. Eggs are pasteurised until the flock is destroyed
8. In Austria, vaccination against *S*. Enteritidis recommended
9. In Denmark, no vaccination occur, as no vaccines have been approved by The Danish Veterinary and Food Administration
10. In Spain, only in rearing period

Appendix Table SA7. Salmonella monitoring programmes in broiler flocks (Gallus gallus), 2006

Day old chicks		Before slaughter at farm		At slaughter (flock based approach)	
Type of sample					
Samples from the inside of the delivery boxes, internal lining/paper/crate material	DK (10), EE (10), PL, SE (10)	Faecal samples	FI (60), LV, NO (60), SK, SE (30 or 60)[1], UK[4]	Neck skin samples	NO (≥1), SE (4000/year), UK[1]
Dead chicks	AT (50), DK (20), EE, SK, SE (20), UK	Sock samples	DK (5), UK[1]	Cloacal swabs (30), caecum (1)	IT [5]
Leaflets (40)	NL	Faecal samples or sock samples	BE (60 or 2), NL (60 or 2), PL		
Dust (at hatchery)	DK	Cloacal swabs	AU(9)[2]	Caecum swabs (30)/flock and breast skin (1)/batch	NL
Meconium	AT (250), PL, SK, SE (250), UK	Faecal samples or cloacal swabs	EE[1]		
		Bedding	SI		
		Ceaca (30) or organs (10)	SE[1]		
		Dust swabs	FR		
Frequency of sampling					
Each delivery	DK, SK	3 weeks before slaughter	AT, BE[6]		
Each batch	NL, EE	2 - 3 weeks before slaughter	DK	Each flock	IT[5]
Each flock	SE	1 - 2 weeks before slaughter	EE, SE, PL, UK[3]	Each flock/batch	NL, UK, NO
Every 2 week at hatchery, every 8 weeks official sampling	AT, UK	1 week before slaughter	LV		
		1 - 3 weeks before slaughter	NO, SI		
		At 5-6 weeks	EE		
		Within 4 weeks before slaughter	FI		
Diagnostic methods					
ISO 6579 (2002)		BE, EE, FI, GR, LV, PL, SK, UK			
Modified ISO 6579 (2002)		AT, SI			
Various bacteriological methods		DK, LT, UK			
NMKL No 71:1999		FI, NO, SE			
Method in accordance with the O.I.E. manual, 5th ed., 2004		SI			
Strategies in countries with no official monitoring, 2006.					
No official sampling strategies		CZ, ES			
Private monitoring: 2500 neck skin samples/house/year and carcass sampling at the slaughterhouse		IT			
A monitoring programme is running in the Beira Litoral region		PT			

Note: Monitoring is not compulsory by Directive 2003/99/EC
In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA9
"()": Numbers in brackets are number of samples taken
1. Number of samples depend on flock size
2. In Austria, broilers and spent hens
3. In UK, private sampling
4. In UK, the industry commonly tests flocks one to two weeks before slaughter
5. In Italy, a monitoring programme is running in the Veneto Region of Italy
6. In Belgium, only farms >5000 birds are required to sample

Appendix Table SA8. Measures taken in broilers (Gallus gallus) in case of Salmonella infections, 2006

Serovars covered	
All Serovars	AT, DK, FI, LT, NO[1], NL, SE[1]
S. Enteritidis and *S.* Typhimurium	EE, IE, LV, SI, SK, UK
Restrictions on the flock	
Immediately following suspicion	DK, EE, FI, LV, NO, NL, SI, SE
Consequence for the flock	
Slaughter	SK
Slaughtered and heat treated	AT, FI, LT, SI
Sanitary slaughter	BE, DK, IE, LV, NO[2], NL, UK-N IE
Destruction	FI, LV, NO[3], SE
Slaughter or destruction	EE, IE, LV, SK, UK
Treatment with antibiotics	AT, (EE)
Other consequence	
Feedingstuffs are restricted (heat treatment or destruction)	EE, SE
Disposal of manure restricted	EE, FI, LV, NO, SK, SI, SE
Cleaning and disinfection	
Obligatory	AT, DK, EE, FI, LT, LV, NO, NL, SI, SE
Negative bacteriological result required before restocking	DK, EE, FI, NL, NO, SI, SE
Requirement of an empty period	AT (14 days), NO (30 days)
Further investigations	
Epidemiological investigation is always started	EE, FI, IE, NO, SE, UK-GB
Feed suppliers are always included in the investigation	EE, FI, IE, NO, NL, SE
Contact herds are included in the investigation	EE, FI, NO, SE
Breeding flock that contributed to the hatch will be traced	IE, NO, NL, UK, SE
Vaccination	
Mandatory	
Recommended	
Permitted	AT, CZ, DK[4], LT, SI, SK, UK
Prohibited	EE, FI, LV, NO, SE

Note: No measures fixed in Directive 2003/99/EC
1. In Norway and Sweden, for invasive serovars and non-invasive serovars different control strategies may be applied
2. Non-invasive *Salmonella*
3. Invasive *Salmonella*
4. In Denmark, no vaccination occur, as no vaccines have been approved by The Danish Veterinary and Food Administration

Appendix Table SA9. Salmonella monitoring programmes in broilers and poultry meat products (Gallus gallus), 2006

Slaughterhouse and cutting plant		Processing plants		Poultry meat and meat products at retail	
Type of sample					
Neck skin samples	BE[1] (100-300/ matrix), CZ (15), IE, LT[2], NO, SE[2]	Depend on survey or own-control plans	DK[4], SE[4]	Depend on survey or own-control plans	DK[4], SE[4]
Cuts of meat (close to packaging)	DK[5]	Fresh meat, minced meat, final products	EE, LT, LV	Fresh meat	BE[1] (100-300/ matrix), NL, SI[6] (100/ year)
Fresh meat	LV, SI	Final product	CZ, IE (twice per year)	Fresh meat, final products	EE, LT, LV
Carcass swabs	IE	Fresh meat	IE	Final product	CZ, DE
At cutting plants: Crushed meat samples[7]	FI[3], NO[3], SE[3]	HACCP	AT, CZ, IT, SI	Survey - whole chickens	UK[8]
Neck skin samples, cuts of meat, scrap cuttings	EE, FI			Environmental samples	EE, LV
Chicken breasts, cutting meat, minced meat	BE[1] (100-300/ matrix)			HACCP	AT, CZ, IT, SI
Breast skin samples	NL				
HACCP	AT, CZ, IT, SI				
Frequency					
Weekly	BE, CZ, SI[9]	Weekly	CZ	Random and continuous	CZ, EE
All flocks	IE, LT	Surveys or own-control	DK[4], SE[4]	Survey or own-control	DK[4], SE[4]
Every batch	DK[10], NO (slau-ghterhouse)	Random and continuous	EE	Monitoring	DE, IE
Random and continuous	EE, FI	Continuous	LV	Yearly monitoring	NL
Continuous	LV	Routine	IE	Continuous	LV, SI, UK
Monthly	SI[9]	Routine according to HACCP plan, random according to monitoring programme	LT		
Daily in major slaughterhouses	SE				
Diagnostic methods					
Modified ISO 6579:1999			AT, DE		
ISO 17025			BE, IT		
Belgian official method SP-VG-M002			BE, IT		
ISO 6579:2002			CZ, EE, FI, IT, LV, SI, SE		
Depend on the laboratory and/or survey			DK		
NMKL No 71:1999			EE, FI, NO, SE		
Any approved method according to Comm. Decision 2003/470			SE		

Note: Monitoring is not compulsory by Directive 2003/99/EC
In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA7
"()": Numbers in brackets are number of samples taken
1. In Belgium, a monitoring programme based on matrixes of carcasses, meat preparation and fillets of broilers was carried out in 2004
2. In Lithuania, from every flock 60 samples of neck skins are collected randomly and pooled into 4 samples
3. Sample size and frequency depend on slaughterhouse or cutting plant capacity
4. Sampling by local authorities
5. In Denmark, ante-mortem negative batches: 4 pools of 10 samples of cuts of meat. Ante-mortem positive batches: 12 pools of 5 samples of cuts of meat
6. In Slovenia, monitoring is based on results from previous years.
7. Samples collected from cleaning tools, tables etc.
8. In UK, survey from Wales and Northern Ireland
9. Weekly - At cutting plants operating within 4 major poultry slaughterhouses. Monthly - At low capacity poultry slaughterhouses.
10. In Denmark, a batch is defined as the meat from animals slaughtered between two cleanings and disinfections of the processing equipment

Appendix Table SA10. Salmonella monitoring programmes in turkey breeders, 2006

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 92/117/EC							
Dead chickens/ destroyed chickens	LV, NO (10-50), PL (20), SK (20), SE (10), LT[6]	At age of 4 weeks and 2 weeks before moving.	faecal samples	FI (60), LV, NO (60), PL (60), SK (60), LT	Every 2 weeks	Dead chickens (50)	PL, SK
Samples from the internal linings of the delivery boxes	FI (10), LV, NO (30), PL, SK, SE, LT	At age of 4 weeks and 2 weeks before moving.	faecal samples (60), caecal samples (10)	SE	Every 2 weeks	Meconium samples at the hatchery (250) or dead chickens (50)	NO
Meconium	SE (250)				Every 2 weeks	Faecal samples	LT, LV[4]
					Every month	faecal samples (60), caecal samples (10)	SE
					Official sampling every 8 weeks	meconium samples at the hatchery (250)	LV[3], PL, SK, SE
					At hatchery: every 2 weeks	Samples from the underlying papers of hatching baskets	FI (5)
					At holding: every 8 weeks	faecal samples	FI (60)
Other schemes							
Swabs/faeces	CZ[1]		Swabs/faeces	CZ[1]		Swabs/faeces	CZ[1]
Internal lining papers of delivery boxes (5)	FR	Every 4 weeks	On farm: Faecal and litter samples (60), dust swab[2] (1)	FR	Every 4 weeks	On farm: Faecal and litter samples (60), dust swab[2] (1)	FR
Samples from the lorry and max 1 week after arrival: Wooswool samples	NL	5 weeks, 26 weeks	Cloacal swabs or coecal droppings, 30/flock	NL	Every 4 weeks	In hatchery: Environmental swab[5] (1)	FR
Sample scheme approved by EU (Decision 96/389/EC)	IE	Sample scheme approved by EU (Decision 96/389/EC)		IE	Every 4 weeks 30 coecal droppings or stocking samples	Faecal samples	NL
					Hatchery, every hatch, every machine	Fluff samples every hatch	NL
					Sample scheme approved by EU (Decision 96/389/EC)		IE
					Hatchery	Samples of imported eggs	AT
Diagnostic methods used							
ISO 6579:2002		CZ, FI, LV, PL					
NMKL No 71:1999		FI, NO, SE					
Countries not providing detailed information about monitoring programmes							
No information available		CY, FR, DE, GR, HU, IE, LT, LU, MU, PT, SI, ES					
No official surveillance programme		BE, CZ, DK, IT, NL, UK[7]					
No turkey breeder flocks present		AT, EE, LV[6]					

(): Number in brackets represent number of samples
1. In Czech Republic, only clinically ill or suspected animals are sampled
2. In France, 1 gauze swab (the sampling method consists in wiping 5 different sites of the poultry house)
3. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of 1000 eggs or more
4. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of less than 1000 eggs
5. 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)
6. In Latvia, monitoring programmes exits, but at the moment there is no breeder flocks
7. In UK monitoring programmes are voluntary. Breeders are encouraged to monitor in the same way as for Gallus gallus under Directive 92/117. All isolations of Salmonella must be reported

Appendix Table SA11. Salmonella monitoring programmes in turkeys – production level, 2006

Day old chicks		Rearing period and before slaughter (related to the flock)		At slaughter (related to the flock)	
Type of sample					
Litter samples	NL	Faecal samples	FI (60), NO (60), NL, SE (90)	Neck skin samples	NO (≥1), IE[3], SE
Dust/fluff	IE	Sock samples	DK (5)[2]	Cloacal swabs(30) and caecum (1)	IT [5]
Sampling based on the directive	PL	Sampling based on the directive	PL	Carcasses (1 flock per cycle=205 per annum)	IE
Swabs/faeces	CZ[1]	Cloacal swabs	AT (9)	Swabs/faeces	CZ[1]
		Swabs/faeces	CZ[1]		
		Dust swabs	FR		
Frequency of sampling					
Every two months	IE	2 – 3 weeks before slaughter	DK[2]		
		1 – 2 weeks before slaughter	SE, PL		
		Within 4 weeks before slaughter	FI		
		Max 3 weeks before slaughter	AT		
		1 – 3 weeks before slaughter every flock/batch	NO		
		Max 4 weeks before slaughter	NL		
Diagnostic methods used					
ISO 6579:2002		CZ, FI, LV, PL			
NMKL No 71:1999		FI, NO, SE			
Modified ISO 6579:2002		AT			
Countries not providing detailed information about monitoring programmes					
No information available		AT, CY, DE, GR, HU, LT, LU, MT, PT, SK, SI, ES			
No official surveillance programme		BE, CZ, IT, UK[4]			
No turkey production flocks present		EE			

Note: In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA12
(): Numbers in brackets are number of samples
1. In Czech Rep., only clinically ill or suspected animals are sampled
2. In Denmark, since March 2004 turkeys are no longer slaughtered , as the only major turkey slaughterhouse closed
3. In Ireland, private samples by individual plants
4. Monitoring programme in UK is voluntary. All isolations of Salmonella must be reported

Appendix Table SA12. Salmonella monitoring programmes in turkey meat and turkey meat products, 2006

Turkeys at slaughter and at cutting plants		Processing plants		Turkey meat and meat products at retail	
Type of sample					
Crushed meat	NO[4]	Crushed meat	SE[4]	Routine sampling	IE
Carcasses	IE	Depend on survey	DK[6], UK[7]	Depend on survey	DK[6], SE[6], UK[7]
Cuts of meat (batches close to packing)	DK[1]	Fresh meat, minced meat, final products	LV, LT	Fresh meat, final products	EE, LV, LT
Fresh meat	FI[2, 4], LV, SI	Final product	CZ, IE	Fresh meat	SI (100/year)[3]
Neck skin samples	CZ (15), SE, IE, NO, LT[8]	HACCP	AT, CZ, IT, SI	Final product	CZ, DE
HACCP	AT, CZ, IT, SI			HACCP	AT, CZ, IT, SI
Dependent on survey	UK[7]				
Frequency					
Every Batch	DK[5], NO	Twice yearly	IE	Surveys	DK
Weekly	CZ	Weekly	CZ	Random and continuous	CZ, EE
Random	FI	Surveys	DK, UK	Continuous	LV
Continuous	LV	Continuous	LV	Monitoring	DE, UK, LT
Monthly	SI			February-March	SI
Every flock	LT	Routine according HACCP plan, random according monitoring programme	LT		
Daily on major slaughterhouses	SE				
Diagnostic methods					
Modified ISO 6579:1999		AT, DE			
ISO 6579:2002		CZ, EE, FI, IT, LV, SI, IT, UK, LT			
Depend on the laboratory and/or survey		DK			
NMKL No 71:1999		NI, FI			
ISO 17025		IT			

Note: In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA11
"()": Numbers in brackets are number of samples taken

1. In Denmark, ante-mortem negative batches: 4 pools of 10 samples of cuts of meat. Ante-mortem positive batches: 12 pools of 5 samples of cuts of meat
2. In Finland, crushed meat from cleaning tools, tables etc.; similar approach for ducks, geese and guinea fowl
3. In Slovenia, monitoring is based on results from previous years. Samples are collected proportional with the human population in the country
4. Sample size and frequency depend on slaughterhouse and cutting plant capacity
5. In Denmark, a batch is defined as the meat from animals slaughtered between two cleanings and disinfections of the processing equipment
6. In Denmark, sampling by local authorities
7. Sampling by local authorities - surveys on average every 4 years
8. In Lithuania, from every flock take random 60 neck skins and make 4 joint samples

Appendix Table SA13. Salmonella monitoring programmes in duck breeders, 2006

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 92/117/EC							
Dead chickens	LV, SE, NO, PL, SK, LT[6]	4 and 2 weeks before moving	Faecal samples	LV, NO (60), PL (60), SK (60), LT, SE (60)	Every 2 weeks	Dead chickens (50)	PL, SK
Samples from the internal linings of the delivery boxes	LV, SE, NO, PL, SK, LT	4 and 2 weeks before moving	Caecal samples (10)	SE	Every 2 weeks	Meconium samples at the hatchery (250) or dead chickens (50)	NO
Meconium	SE (250)				Every 2 weeks	Faecal samples	LT, LV[4]
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	Once a month	Faecal samples (60)	SE
					Official sampling every 8 weeks	Meconium samples at the hatchery (250)	LV[3], SE, PL, SK
Other schemes							
Internal lining papers of delivery boxes (5)	FR	At 2, 10 weeks and 2 weeks before moving	On farm: Faecal and litter samples (10), dust swab (1)	FR[2]	Every 2 month	On farm: Faecal and litter samples (10), dust swab (1)	FR[2]
Swabs/faeces	CZ[1]		Swabs/faeces	CZ[1]		In hatchery: Environmental swab (1)	FR[5]
						Swabs/faeces	CZ[1]
Diagnostic methods used							
ISO 6579:2002		CZ, LV, PL, LT					
NMKL No 71:1999		NO, SE					
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, CZ, DK, IT, UK[7]					
No duck breeder flocks present		EE, LV[6]					

(): Number in brackets represent number of samples
1. In Czech Rep., only clinically ill or suspected animals are sampled
2. In France, 1 gauze swab (the sampling method consists in wiping 5 different sites of the poultry house)
3. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of 1000 eggs or more
4. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of less than 1000 eggs
5. 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)
6. In Latvia, monitoring programmes exits, but at the moment there is no breeder flocks
7. Monitoring programme in UK is voluntary. All isolations of Salmonella must be reported

Appendix Table SA14. Salmonella monitoring programmes in geese breeders, 2006

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 92/117/EC							
Dead chickens	LV, SE, NO, PL, SK	4 and 2 weeks before moving	faecal samples	LV, NO (60), PL (60), SK(60), SE (60)	Every 2 weeks	dead chickens (50)	PL, SK
Samples from the internal linings of the delivery boxes	LV, SE, NO, PL, SK	4 and 2 weeks before moving	caecal samples (10)	SE	Every 2 weeks	Meconium samples at the hatchery (250) or dead chickens (50)	NO
Meconium	SE (250)				Every 2 weeks	Faecal samples	LV[1]
					Once a month	Faecal samples	SE (60)
					Official sampling every 8 weeks	meconium samples at the hatchery (250)	LV[2], PL, SK
Other schemes							
Internal lining papers of delivery boxes (5)	FR	At 2, 10 weeks and 2 weeks before moving	On farm: Faecal and litter samples (10), dust swab (1)	FR[2]	Every 2 month	On farm: Faecal and litter samples (10), dust swab (1)	FR[4]
Swabs/faeces	CZ[3]		Swabs/faeces	CZ[3]		In hatchery: Environmental swab (1)	FR[5]
						Swabs/faeces	CZ[3]
*** LT there is no breeding flocks at the moment. LT apply general monitoring programme for poultry.**							
ISO 6579:2002		CZ, LV, PL					
NMKL No 71:1999		NO, SE					
Countries not providing detailed information about monitoring programmes							
No information available		AT, CY, FI, DE, GR, HU, IE, LT[6], LU, MT, NL, PT, SI, ES					
No official surveillance programme		BE, CZ, DK, IT, UK[7]					
No geese breeder flocks present		EE, LV[8]					

(): Number in brackets represent number of samples
1. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of less than 1000 eggs
2. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of 1000 eggs or more
3. In Czech Rep., only clinically ill or suspected animals are sampled
4. In France, 1 gauze swab (the sampling method consists in wiping 5 different sites of the poultry house)
5. 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)
6. In Lithuania there is no breeding flocks at the moment. LT apply general monitoring programme for poultry.
7. In UK monitoring programmes are voluntary. Breeders are encouraged to monitor in the same way as for Gallus gallus under Directive 92/117. All isolations of Salmonella must be reported
8. In Latvia, monitoring programmes exits, but at the moment there is no breeder flocks

Appendix Table SA15. Salmonella monitoring programmes in ducks and geese – production level, 2006

Day old chicks		Rearing period and before slaughter (related to the flock)		At slaughter (related to the flock)	
Type of sample					
Faecal/swabs	CZ[1]	Faecal samples (60)	NO, SE	Carcass samples	IE
Sampling based on the directive	PL	Faecal/swabs	CZ[1]	Faecal/swabs	CZ[1]
		Sock swabs	DK (5)[2]	Sampling based on the directive	PL
		Sampling based on the directive	PL	Neck skin samples	AT[3], NO(≥1), SE
		Cloacal swabs	AT	Carcasses (1 flock per cycle=205 per annum)	IE
Frequency of sampling					
		2 – 3 weeks before slaughter	DK		
		1 - 2 weeks before slaughter	SE, PL		
		1 - 3 weeks before slaughter Every flock/batch	NO		
		max. 3 weeks before slaughter	AT		
Diagnostic methods used					
ISO 6579:2002		CZ, LV, PL, LT			
NMKL No 71:1999		NO, SE			
Countries not providing detailed information about monitoring programmes					
No information available		AT, CY, FI, FR, DE, GR, HU, LT, LU, MT, NL, PT, SK, SI, ES			
No official surveillance programme		BE, CZ, DK, IT, UK[4]			
No duck and geese production flocks present		EE			

(): Numbers in brackets represent number of samples
1. In Czech Republic, only clinically ill or suspected animals are sampled
2. In Denmark, samples are mainly in the duck production, as production of geese is limited
3. In Austria, flocks with positive findings in cloacal swabs (and if the carcasses is not subject to heat-treatment)
4. Monitoring programme in the UK is voluntary. All isolations of *Salmonella* must be reported

Appendix Table SA16. Salmonella monitoring programmes in pigs, 2006

Breeding and multiplying herds		Fattening herds – at farm		Fattening herds – at slaughter	
Type of sample					
Blood samples	DK (10)	Faecal samples	AT, EE[1, 3], NL, SE, NO	Carcass swabs	BE, DK, NO[1, 2] (3000/year) , SE[1], EE
Pen faecal samples	DK[4]	Faecal samples or swabs	CZ, SE[5]	Lymph nodes	FI[6], NO[1, 2] (3000/year), SE[1], SI
Faecal samples or swabs	CZ	Pen faecal samples	DK[1, 7], FI	Meat juice	DK[8], UK[9]
Faecal samples	EE[1, 3], FI[3], NO, SE	Carcass/rectal swabs/litter/feed	SI	Pen faecal samples	DK[1, 4]
Carcass/rectal swabs/litter/feed	SI	Blood samples	BE[1, 10]	Faecal samples or swabs	CZ
Frequency of sampling					
Monthly	DK, SI	Monthly	SI	Monthly	SI
Clinical suspicion	CZ, SK, SI	Clinical suspicion	NO, SE, SK, SI	Clinical suspicion	CZ
Once a year – all elite herds	FI, NO, SE	Random samples	NL	Random samples	NO, FI[5], SE, DK
Twice a year – all sow pools	SE			Continuous	BE, DK, FI, NO, SE
Diagnostic methods					
Modified ISO 6579 (2002)		AT, LT			
ISO 6579 (2002)		CZ, EE, FI, GR, NL, SI, SK			
Mix ELISA		DK, UK			
Bacteriology		DK, SI (At the farm)			
NMKL No 71:1999		FI, NO, SE			
Strategies in countries with no official sampling strategies, 2006					
No official monitoring		BE[10], CY, CZ, GR, IT[11], LV, PL, SK, LT, UK[9]			
Clinically ill or suspected animals are sampled		PL, SK, SI, UK			

Note: Monitoring is not compulsory by Directive 2003/99/EC
In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA18
"()" Numbers in brackets are number of samples taken
1. Number of samples depend on slaughterhouse capacity
2. In Norway, sows from multiplying herds are sampled in the same way as slaughter pigs at slaughter
3. In Finland and Estonia, all pigs sent to semen collection centres have to be examined for Salmonella with negative results.
4. In Denmark, if the herd reaches *Salmonella*-index 5 or above, max. two samples per year
5. In Sweden, pen faecal samples herds are affiliated to voluntary heath control program
6. In Finland, 3000 samples from fattening pigs and 3000 samples from sows annually, stratified sampling procedure
7. In Denmark, level 2 (herds with a higher proportion of reactors) and level 3 (herds with an unacceptable high proportion of reactors) herds, max. two samples per year
8. In Denmark, all herds producing more than 200 pigs for slaughter per year are monitored
9. In UK, sampling is voluntary
10. Belgium, samples are collected as part of a monitoring programme for Aujeszky's disease
11. In Italy, a monitoring programme is running in the Veneto Region

Appendix Table SA17. Measures taken in pig herds in case of Salmonella infections or Salmonella findings, 2006

Serovars covered	
All Serovars	AT[2], DK, EE[3], FI, SE, NO, UK (GB), SI[4]
Only *S.* Enteritidis, *S.* Typhimurium	CZ, UK (N-IE)
Restrictions on the farm	
Animal movement prohibited	FI, SE, NO, SI[4]
Isolation of *Salmonella* positive animals	EE, FI, NO, SI[4]
Person contacts restricted	EE, SE, NO, SI[4]
Advise to the farm for controlling the infection	FI, SE, NO, SI, UK, SI[4]
Consequence for slaughter animals	
Slaughterhouse is informed on positive animals	EE, NO, SE, FI
Sanitary slaughter	DK (level 3 herds)[5,] EE, FI, NO[6], SE[7]
Contaminated food withdrawn from market	NO, SE[8]
Treatment with antibiotics	EE, SI[2]
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	SE, SI[5]
Treatment of manure / sludge	EE, DK (level 3 herds), SI[4], SE, NO
Public health advice	UK (N-IE)
Cleaning and disinfection obligatory	EE, FI, NO, SI[4], SE
Repeated negative testing necessary before lifting the restrictions[1]	EE, FI, SE, NO
Reduction in payment for positive slaughter pigs	DK
Further investigations	
Epidemiological investigation is always started	BE, DK (level 2+3), EE, FI, NO, SI[4], SE
Feed suppliers are always included in the investigation	EE, NO, SE
Contact herds are included in the investigation	NO, SE
Vaccination	
Permitted	CZ, UK, SI[4]
No vaccination occur	AT, BE[9], DK[9], SE
Prohibited	EE, FI, NO

Note: No measures fixed in Directive 2003/99/EC
1. Typically, two consecutive samplings one month apart
2. 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
3. In Estonia, *S.* Enteritidis, *S.* Typhimurium, *S.* Dublin, *S.* Newport and *S.* Cholerasuis are notifiable
4. Measures are taken in case of clinical signs
5. In Denmark, hot water treatment of all carcasses from MART 104 positive herds with a *Salmonella* index above 20
6. In Norway samples from all sanitary slaughtered animals must be tested for Salmonella. If positive, the carcase is condemned
7. In Sweden, samples is collected from all sanitary slaughtered animals
8. In Sweden, carcasses contaminated with *Salmonella* are unfit for human consumption
9. No vaccine has been approved

Appendix Table SA18. Salmonella monitoring programmes in pigs and pig meat, 2006

Slaughterhouse and cutting plant		**Processing plants**		**Pork and pork products at retail**	
Type of sample					
Surface swabs	BE (100-300/matrix), CZ, DK[1], EE[1], FI[1, 6], DE, NO (3000 year)[1], SE[1], SI (50/year)			Regional programmes	UK (GB)
Lymph nodes	NO (3000/year)[3], SE[1], FI[6], SI	Depend on survey or own-control plans	DK[2], SE[2]	Depend on survey or own-control plans	DK[2], SE[2]
Meat juice ELISA	UK[7]	Fresh meat	LV	Minced meat	BE (100-300/ matrix)
Cutting and minced meat samples	BE (100-300/ matrix)	Final product	CZ, IE (twice per year)	Final product	CZ, DE
Crushed meat samples (cutting plants)	FI[1], NO[3, 4], SE[1]	Fresh meat, minced meat, final products	EE	Fresh meat, final products	EE, LV, LT
Fresh meat	EE[1], HU, SI	Surface swabs	HU	Fresh meat	NL
HACCP	AT, CZ, IT, SI, LT	HACCP	AT, CZ, IT, SI, LT	HACCP	AT, CZ, IT, SI
Frequency					
Weekly	BE	Continuous	ES, LV	May-August	SI
Every 2 weeks	CZ	Random and continuous	CZ, EE, HU[5]	Continuous	ES, LV
Random and continuous	DK, EE, FI, HU[5], NO, SE	Surveys or own-control	DK[2], SE[2]	Weekly	BE
Continuous	ES	Follow the Directive 03/99/EC	CZ	Random and continuous	CZ, EE, NL, SE
Every 2 month	SI (fresh meat)	Sampling according to Directive 94/65/EC	NO	Monitoring	DE, IE, LT
Monthly	SI (lymph nodes)			Survey or own-control	DK[2], SE[2]
According HACCP plan	LT	According HACCP plan	LT	Voluntary	CZ
Diagnostic methods					
Modified ISO 6579:1999		AT, DE, IT			
ISO 17025		BE, IT			
Belgian official method SP-VG-M002		BE, IT			
ISO 6579:2002		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 approved method according to Comm. Decision 2003/470		SE			

Note: Monitoring is not compulsory by Directive 2003/99/EC
In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA16
"()": Numbers in brackets are number of samples taken
1. Sample size and frequency depend on slaughterhouse capacity
2. Sampling by local authorities
3. Samples collected from cutting equipment, cleaning tools, tables etc.
4. In Norway Sample size and frequency depend on slaughterhouse and cutting plant capacity
5. In Hungary, sampling strategy is based on the previous years production
6. In Finland, 3000 samples from fattening pigs and 3000 samples from sows annually, stratified sampling procedure
7. Voluntary monitoring and control scheme in the UK

Appendix Table SA19. Salmonella monitoring programmes[1] in cattle, 2006

Breeding herds		Cattle - at farms		Cattle - at slaughter	
Type of sample					
Faecal samples	EE[8], FI[5]	Faecal samples	DK[3], CZ, EE[4], FI, DE, NL, NO, SK, UK[7]	Lymph nodes	FI (3000/year), NO (3000/year), SE
		Bulk milk	DK[2]	Carcass swabs	BE, DK, NO (3000/ year), SE, EE
		Organ samples	UK[7]	Blood	DK
				Faecal samples and organ samples	DE
				Faecal samples or swabs	CZ, SK, SI
Frequency of sampling					
		Every three months	DK	Random samples	FIN, N, S
		Once a year	NL	Once every 21 days-5 month	DK
		Clinical suspicion	FI, DE, NO, CZ, SK, SE	Continuous sampling	S
				Monthly	SI
				Clinical suspicion	CZ, DE
Diagnostic methods used through the production					
Modified ISO 6579 (2002)		AT, FR, SE, SI			
ISO 6579 (2002)		CZ, EE, FI, GR, SK			
Mix-ELISA		DK			
Bacteriology		DK, SK, UK			
NMKL No 71:1999		FIN, NO, SE			
Strategies in countries with no official sampling strategies, 2006					
No official monitoring		BE, CY, CZ, GR, IT[6], LV, PL, SK, UK[7]			
Clinically ill or suspected animals are sampled		CZ, PL, SK, UK			

Note: Monitoring is not compulsory by Directive 2003/99/EC
1. In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA21
2. In Denmark, serological testing; control programme for *S.* Dublin in dairy herds
3. In Denmark, when requested by the farmer
4. In Estonia, number of samples depend on herd size
5. In Finland, all animals sent to semen collection centres have to be examined for *Salmonella* with negative results.
6. In Italy, a monitoring programme is running in the Veneto Region
7. In United Kingdom, sampling is voluntary. Reporting of isolation of *Salmonella* in all farmed animals is statutory
8. In Estonia, all animals send to artificial fertilization stations or to semen collection centres are tested

Appendix Table SA20. Measures which may be taken in cattle herds in case of Salmonella infections or Salmonella findings, 2006

Serovars covered	
All Serovars	AT[2],DK, EE, FI, NO, SE, UK, SI[3]
Only *S*. Enteritidis, *S*. Typhimurium	CZ
Restrictions on the farm	
Animal movement prohibited	FI, DK (MR *S*. Typhimurium DT 104), SE, NO, SI[3]
Isolation of *Salmonella* positive animals	EE, FI, NO, SE, SI
Person contacts restricted	EE, NO, SE, SI[3]
Restriction on marketing of milk	NO, SE
Pasteurisation of milk obligatory	EE, FI, NO, SE
Advise to the farm for controlling the infection	DK, FI, NO, SK, SE, UK-GB, SI[3]
Consequence for slaughter animals	
Slaughterhouse is informed on positive animals	EE, FI, NO, SE
Sanitary slaughter	EE, DK, FI, NO[4], SE[5]
Contaminated food withdrawn from the market	SE[6]
Destruction of positive animals	DE
Treatment with antibiotics	EE, SI[3]
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	SK, SE, SI[3]
Treatment of manure / sludge	EE, DK, NO, SK, SE, SI[3]
Cleaning and disinfection obligatory	EE, FI, NO, SE, SI[3]
Repeated negative testing necessary before lifting the restrictions[1]	EE, DK, FI, NO, SE
Public health advise	UK-NI
Further investigations	
Epidemiological investigation is always started	DK (MR *S*. Typhimurium DT 104), EE, FI, NO, SK, SE, UK-NI[7], SI[3]
Feed suppliers are always included in the investigation	EE, NO, SE
Contact herds are included in the investigation	DK (MR *S*. Typhimurium DT 104), NO, SE
Vaccination	
Permitted	CZ, DE, UK (GB: *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. Typically, two consecutive samplings one month apart
2. 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
3. Measures are taken in case of clinical signs
4. In Norway samples from all sanitary slaughtered animals must be tested for *Salmonella*. If positive, the carcase is condemned
5. In Sweden, autopsies are collected from all sanitary slaughtered animals
6. In Sweden, carcasses contaminated with *Salmonella* are unfit for human consumption
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 SA21. Salmonella monitoring programmes[1] in cattle and bovine meat, 2006

Slaughterhouse and cutting plant		Processing plants		Beef at retail	
Type of sample					
Surface swabs at slaughter	BE[4] (100-300/matrix), CZ, DK[2], EE[2], FI[2](3000/year), NO[2] (3000/year), SE[2] (3000/year), SI (50/year)	Depend on survey or own-control plans	DK[5], SE[5]	Depend on survey or own-control plans	DK[5], SE[5]
Lymph nodes at slaughter	FI[2] (3000/year), NO (3000/year)[2], SE[2]			Minced beef	BE[4] (100-300/matrix), EE
Fresh meat at cutting plants	EE[2], HU, SI	Fresh meat, minced meat, final products	EE, DE, HU, ES	Fresh meat, final products	EE, HU, LT
Crushed meat samples[3] at cutting plants	FI[2], NO[2], SE[2]	Scrapings	SE	Fresh meat	NL
Faeces from rectum	GB	Fresh meat	SI	Final product	CZ, DE
Faeces (at slaughterhouse)	SI				
Minced beef	BE[4] (100-300/matrix)	Final product	CZ, HU	Regional programmes	UK
HACCP	AU, CZ, HU, IT, LT	HACCP	AU, CZ, HU, IT, LT	HACCP	AT, CZ, IT
Frequency					
Weekly	BE	Monthly	CZ	Weekly	BE
Monthly	CZ, SI (faeces)	Random and continuous	EE, DE, HU, ES	Random and continuous	CZ, EE, HU, DE, ES
Random and continuous	EE, DK, DE, FI, NO, SE, SI (carcass swabs), ES	Surveys or own-control	DK[5], SE[5]	Monitoring	DE, IE[5], LT
		Sampling according to Directive 94/65/EC	NO		
				Surveys or own-control	DK[7], SE[7]
		Every 2 month	SI	Monthly, voluntary	CZ
According HACCP plan	LT	According HACCP plan	LT	Surveys or own-control	DK[5], SE[5]
Diagnostic methods					
Modified ISO 6579:1999		AT, IT			
ISO 17025		BE, IT			
Belgian official method SP-VG-M002		BE, IT			
ISO 6579:2002		CZ, DE, EE, FI, HU, IT, SE, SK, SI, ES, LT			
Depend on the laboratory and/or survey		DK			
NMKL No 71:1999		FI, NO, SE			
Other approved methods according to Commission Decision 2003/470/EC		SE			

Note: Monitoring is not compulsory by Directive 2003/99/EEC, "()": Numbers in brackets are number of samples taken
1. In this table priority is given to sample based approaches; farm-based approaches at slaughterhouse may be described in Table SA19
2. Sample size and frequency depend on slaughterhouse and cutting plant capacity
3. Samples collected from cutting equipment, cleaning tools, tables etc.
4. In Belgium, a monitoring programme based on matrixes of carcasses, cuts and minced meat of beef was carried out in 2005
5. Sampling by local authorities

Appendix Table SA22. Countries providing data on serovars[1], 2006

	Humans	Cattle	Pigs	*Gallus gallus*	Other poultry	Beef	Pork	Broiler meat	Other poultry meat
Austria	o[2]	x	x	x	x	x	x	x	x
Belgium			x	o	x	x	x	x	x
Cyprus	x					x	x	x	x
Czech Republic	x	x	x	x	x	o	o	o	o
Denmark	x		o	o	x	x	x	o	o
Estonia	x	x	x	x		x	x	x	x
Finland	x	x	x	x	x	x	x	x	x
France	x	x	x	o	o	x	x	x	x
Germany	x	o	o	o	x	o	o	o	o
Greece		o	o	x	x	x	x	x	x
Hungary	x								
Ireland	o[2]			o	x	x	x	x	x
Italy	o[2]	x	x	x	x	o	o	o	o
Latvia	x	x	x	x	x		x	x	
Lithuania	x	x	x	x	x	x		o	
Luxembourg	x	x	x	o		o	o	x	o
Malta	x	No data on animals & food							
Netherlands	x		x	o	x	o	o		
Poland	x	o	o	o	x	o	o	o	o
Portugal	o[2]	x	x	x	x	x	x	x	x
Slovakia	o[2]	x	x	x	x	o	x	x	x
Slovenia	x	x	x	x	x	x	x	x	x
Spain	o[2]			x		x	x		
Sweden	x	x	x	x	x	x	x	x	x
United Kingdom	o[2]	x		x	x			o	
Norway	o	x	x	x	x	x	x	x	x
Switzerland				x				x	

x: complete serotype distribution
o: typing only specified to *S.* Enteritidis, *S.* Typhimurium and *Salmonella* other
1. In 2005, Sweden was the only MS to provide information about phagetypes. Sweden reported on cattle and pigs
2. Serotyping only specified to *Salmonella* spp.

Appendix Table SA23. Notification on Salmonella in humans, Gallus gallus, other animals and food, 2006

	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	1998	1998	2004
Cyprus	yes	yes	yes	-
Czech Republic	yes	yes	yes	-
Denmark	1979	no	1993[4]	-
Estonia	1958	2000[8]	2000[8]	2000
Finland	1995[12]	1970's	1970's	1970's
France	1986	yes[9] (1998)	-	yes
Germany	yes	-	yes	-
Greece	yes	1992	1980	-
Hungary	1959	no	no	1984
Ireland	1948	-	-	yes[7]
Italy	1990	1954	1954	1962
Latvia	1958	yes	yes	2002
Lithuania	1962	yes	yes	-
Luxembourg	-	-	-	-
Malta	-	-	-	-
Netherlands	no[11]	yes	yes	-
Poland	1961	1999[10]	-	-
Portugal	yes	yes	yes	-
Slovakia	yes	2004	yes[4]	2000
Slovenia	1949	1991[6]	1991[6]	2003
Spain	1982	1994	1994	1994
Sweden	1968	1961	1961	1961
United Kingdom	-	1989	1989	no
Norway	1975	1965	1965	1995[5]
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 Norway, only those detected in the national control programme
6. In Slovenia, the year of independence, however this disease was notifiable before 1991
7. In Ireland, detection of *S*. Enteritidis and *S*. Typhimurium is notifiable
8. In Estonia, *S*. Enteritidis, *S*. Typhimurium, *S*. Dublin, *S*. Newport and *S*. Cholerasuis are notifiable
9. In France, in breeding flocks and laying hens, *S*. Enteritidis and *S*. Typhimurium, only (2006)
10. In Poland, *S*. Enteritidis, *S*. Typhimurium, *S*. Pullorum and *S*. Gallinarum are notifiable in poultry
11. In the Netherlands, only notifiable if the patient is working in the food industry or horeca, work with treatment or nursing of other persons, or belongs to a group of two or more persons which eat/drink the same food within a period of 24 hours
12. In Finland, notifiable also before 1995, but legislation changed in 1995

Appendix Table CA1. Campylobacter monitoring, surveys and diagnostic methods used for humans animals and food, 2006

	Human		*Gallus Gallus*	
	Sample type	**Diagnostic**	**Sample type**	**Diagnostic**
Austria	Faecal	Bacteriology	At slaughter: Caeca	Bacteriology
			Cattle and pig: Colon	Bacteriology (in cattle at first enrichment)
Belgium	-	-	At slaughter: Caeca	-
Cyprus	-	-	-	-
Czech Republic	-	-	At slaughter: Clocal swaps	ISO 10272:1997
Denmark	Faecal	Bacteriology	At slaughter: Clocal swaps	PCR
Estonia	Faecal	Bacteriology	At slaughter: Caeca	ISO 10272
Finland	-	Bacteriology	At slaughter: Caeca	NMKL 119:1990 w/no enrichment
France	Faecal	Bacteriology	At slaughter: Caeca	Multiplex PCR
Germany	-	-	At slaughter: Caeca	ISO 10272
Greece	-	-	-	-
Hungary	Faecal	Bacteriology	-	-
Ireland	-	-	-	-
Italy	-	-	At slaughter: Cloacal swaps (Veneto region)	Bacteriology
Latvia	-	-	-	-
Lithaunia	-	Bacteriology	At slaughter: cloacal and neck skin	Bacteriology
Luxembourg	-	-	-	-
Netherlands	-	-	-	-
Poland	Faecal	Bacteriology	-	-
Portugal	-	-	-	-
Slovakia	-	-	-	-
Slovenia	Faeces and blood	Bacteriology	At slaughter: Caeca	ISO 10272:1995, modified
Spain	-	Bacteriology	Rearing; at farm, before slaughter; at slaughter: Faeces	ISO 6579:2002
Sweden	Faeces and blood	Bacteriology	At slaughter: Caeca	ISO 10272
United Kingdom	Faecal	Bacteriology	At slaughter - caeca and neck skin	ISO 10272
Norway	Faecal	Bacteriology	At the farm, before slaughter: Faeces At slaughter: Caeca	At the farm, before slaughter: PCR At slaughter: NMKL 119:1990
Switzerland	-	-	At slaughter: Clocal swaps	Bacteriology

Broiler meat		Other food	
Sample type	**Diagnostic**	**Sample type**	**Diagnostic**
-	-	-	ISO 10272:1995 or enrichment method
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: Carcass At processing/retail: Fresh and meat products	ISO 10272:1995	Retail: Cheeses	ISO 10272:1995
At processing/retail: Depends on survey	-	-	-
At processing/retail: Fresh meat and meat preparation	Slaughter/processing: ISO 10272:1995 Retail: NMKL 119: 1990	Pig meat and bovine meat at retail	Retail: NMKL 119:1990
At slaughter: neck skin	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
At slaughter: Fresh meat At retail: Fresh meat and meat products	ISO 10272:1995	-	-
At processing/retail: Depends on survey	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	ISO 10272, typning by Lior method
-	-	-	ISO 10272
At slaughter: Fresh meat At retail: Fresh meat	ISO 10272:1995	Pig meat and meat from bovine. At retail: Cheeses, sour milk	ISO 10272:1995
At slaughter/processing/ retail: Fresh meat and skin	ISO 10272:2006	-	-
At retail	NMKL 119:1990	-	NMKL 119:1990, ISO 10272, PCR
At retail: Fresh refrigerated meat	ISO 10272:1995	-	-
At retail: Fresh meat	NMKL 119:1990	-	-
At retail: Fresh meat	Swiss food manual	-	-

Appendix Table CA2. Notification on Campylobacter in humans, animals and food, 2006

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1996	no	1975
Belgium	2000	1998	2004
Cyprus	2005	-	-
Czech Republic	yes	no	yes
Denmark	1979	no	no
Estonia	1988	2000	yes[1]
Finland	1995	2004[2]	no[3]
France	2002	-	-
Germany	no	-	-
Greece	yes	no	no
Hungary	1998	no	no
Ireland	2004	-	no
Italy	1990	no	1962
Latvia	1999	yes[4]	2004
Lithuania	1990	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	yes	yes	yes
Poland	no	-	-
Portugal	-	no	-
Slovakia	1980's	no	2000
Slovenia	1987	no	2003
Spain	1989	1994	1994
Sweden	1989	no	no
United Kingdom	no	no	no
Norway	1991	yes[5]	yes[5]
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 Latvia, only clinical cases notifiable
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, 2006

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	-	-
Cyprus	-	-	-	-	-	-
Czech Republic	Monitoring accor-ding 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	-	NMKL 136, 2004 ISO 11290-1:1996 (E):1996,1998	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	-
Finland	Survey on vegetables.	Random sampling	-	ISO 11290-1:1996 (E):1996,1998	Bacteriological culture	
France	Monitoring programme on meat products	Random sampling	yes	Bacteriological culture	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid.	no
Germany	Monitoring, surveys and own-control	-	-	-	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	-
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	-	-	-	-	-	-
Italy	-	-	yes	-	-	-
Latvia	No monitoring programme. Surveys by the local authorities	Random sampling	yes	ISO 11290-1:1996 (E):1996,1998	Microbiological identification	-
Lithuania	-	-	-	-	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	-
Luxembourg	-	-	-	-	-	-
Malta	Survey on cheese	-	-	-	-	-
Netherlands	-	-	-	-	-	-

Appendix Table LI1. Monitoring programmes and diagnostic methods for Listeria monocytogenes, 2006 (cntd.)

Country	Surveillance	Frequency and type of samples	HACCP	Diagnostic method	Human diagnostic	Survey on cheeses from raw and thermised milk
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	-	-
Slovakia	No monitoring programme. Surveys by the local authorities	-	-	ISO 11290	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	-
Slovenia	Surveys by the local authorities. At retail: annual monitoring programme.	-	yes	ISO 11290-1:1996 (E):1996,1998	Isolation of *L. monocytogenes* from blood and cerebral spinal fluid	yes
Spain	-	-	-	-	-	-
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	-	yes	NMKL 136	Isolation of *L. monocytogenes* from a normally sterile site.	-

Appendix Table LI2. Notification of Listeria in humans, animals and food, 2006

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1]	no	1975
Belgium	< 1999[2]	1998	2004
Cyprus	2005	-	-
Czech Republic	yes	no	-
Denmark	1993	no	-
Estonia	2003	2000	2000
Finland	1995	1995[3]	no[4]
France	1998	no	1994
Germany	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	-	-	-
Malta	yes	-	-
Netherlands	no	yes	yes
Poland	1966	-	-
Portugal	yes	no	-
Slovakia	yes	yes	2000
Slovenia	1977	>1991[5]	2003
Spain	1982	1994	1994
Sweden	>30 years[6]	yes	no
United Kingdom	no	no	no
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. In Slovenia, the year of independence, however this disease was notifiable before 1991
6. In Sweden, only clinical cases notifiable

Appendix Table VT2. Notification of VTEC in humans, animals and food, 2006

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1950[1, 2]	no	1975
Belgium	< 1999	2005	2004
Cyprus	2005 (EHEC)	-	-
Czech Republic	yes	no	-
Denmark	2000 + HUS (EHEC)	no	-
Estonia	1958 (EHEC)	2000	2000
Finland	1998	2004[3]	no[4]
France	1996 (HUS)	-	-[5]
Germany	yes	-	-
Greece	yes (EHEC)	-	-
Hungary	1998	no	-
Ireland	2004 (EHEC)	-	no
Italy	1990	no	1962
Latvia	1999	yes[6]	2004
Lithuania	2004	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	yes	no	yes
Poland	2004	-	-
Portugal	-	-	-
Slovakia	yes	no	2000
Slovenia	1995	no	2003
Spain	yes	1994	1994
Sweden	2004[7]	yes[8]	no
United Kingdom	no	no	no
Norway[9]	1995	no	no
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 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
6. In Latvia, only clinical cases notifiable
5. In France, the food business operators have to notify the competent authority when contaminated products are on the market
7. In Sweden, VTEC O157 infection have been notifiable since 1996, since 2004 all clinical VTEC have been notifiable
8. In Sweden, infections with VTEC associated with human cases of EHEC
9. Notification required when further transmission to humans is suspected or has occurred

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)

	Bovine brucellosis		*Brucella melitensis*		Bovine tuberculosis
	OBF[1] since	Comments	ObmF[2] since	Comments	OTF[3] since
Austria	1999	-	2001	-	1999
Belgium	2003	-	2001	-	2003
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
Denmark	1980	No cases since 1962	1979	Never detected	1980
Estonia	no	No cases since 1961, Surveillance according to EC legislation in 2004	no	No cases since 1962, surveillance of breeding herds	no
Finland	1994	No cases since 1960	1994	Never detected	1994
France	2005	-	2001 (64 departements)	-	2000
Germany	2000	-	2000	-	1997
Greece	no	Eradication programme. Thessaloniki area is eradication and vaccination area for Bovine brucellosis, only	no	Eradication pro-gramme on Islands, vaccination on the mainland	-
Hungary	no	Declared free by OIE in 1985	2004	Never detected	no
Ireland	no	-	yes	Never detected	-
Italy	yes (41 provinces)	Vaccination in two areas (Monti Nebrodi in Sicily and Caserta in Campania)	yes (44 provinces)	Vaccination in Sicily	yes (9 provinces)
Latvia	no	No cases since 1963	no	Never detected	-
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	no	-	no	Surveillance of breeding herds, *B. Melitensis* never detected	-
Portugal	2002 (Azores)	Eradication programme, vaccination in exeptional situations	2002 (Azores)	Eradication programmes, regional vaccination	-
Slovakia	2005		2004	-	2005
Slovenia	no	Yes, according to OIE demands. No cases since 1961	2005		no
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
United Kingdom	1985 (GB)	Northern Ireland not officially free	1991	Never detected	no
Norway	1994	Declared eliminated in 1953	1994	Never detected	1994
Switzerland	yes	-	no	-	2005

1. OBF according to Council Directive 64/432/EEC as amended by Council Directive 97/12/EC and Commission Decisions 93/52/EEC, 2003/467/EC, 2004/320/EC, 2005/604/EC and 2005/764/EC
2. ObmF according to Council Directive 91/68/EEC and Commission Decisions 93/52/EEC, 94/877/EEC, 2003/467/EC, 2004/320/EC, 2005/179/EC, 2005/764/EC
3. OTF according to Council Directive 64/432/EEC as amended by Council Directive 97/12/EC and regulation (EC) 1226/2002, and Commission Decision 2003/467/EEC, 2004/230/EC, 2005/28/EC and 2005/179/EC

Appendix Table TB1. Notification of tuberculosis in humans, Gallus gallus, other animals and food, 2006

	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
Cyprus	1932	-	-	-
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	-
Greece	yes	-	1936 (bovine)	-
Hungary	1946	no	yes (bovine)	no
Ireland	1948	-	-	-
Italy	1990	-	1954	1928
Latvia	yes	yes	yes	-
Lithuania	1990	yes	yes	-
Luxembourg	-	-	-	-
Malta	-	-	-	-
Netherlands	yes	no	1999	-
Poland	1919	-	-	-
Portugal	yes	yes	yes	-
Slovakia	yes	no	yes	-
Slovenia	1949	-	>1991[4]	2003
Spain	1948	-	1952	1952
Sweden	>30 years ago	yes	yes	-
United Kingdom	yes	no	>1984[5]	-
Norway	1900	1965	1894	1894[6]
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 Slovenia, the year of independence. The disease was notifiable before 1991
5. In the United Kingdom, the first TB Orders were passed in 1913 and 1925 to remove clinically ill cattle. In deer, TB has been notifiable since 1st June 1989. In 2005, TB became notifiable in all mammals except man
6. In Norway, mandatory meat inspection at slaughterhouse

Appendix Table BR1. Notification of Brucella in humans, animals and food, 2006

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1]	1957	1975
Belgium	< 1999	1978	2004
Cyprus	1983	-	-
Czech Republic	yes	yes	-
Denmark	no[2]	1920[3]	-
Estonia	1947	1962	no
Finland	1995	1920's	1920's
France	1960[4]	1965	-
Germany	yes	yes	-
Greece	yes	1972	-
Hungary	1950	1928	no
Ireland	1948	-	-
Italy	1990	1954	1929
Latvia	1974	yes	-
Lithuania	1957	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	yes	yes	yes
Poland	1946	1951	-
Portugal	yes	yes	-
Slovakia	yes	no	no
Slovenia	1977	<1991[5]	2003
Spain	1943	1952	1952
Sweden	2004	yes	no
United Kingdom	1996[6, 7]	1971	1989
Norway	1975[7]	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
3. In Denmark, only clinical cases are notifiable
4. In France, mainly imported cases
5. In Slovenia, the year of independence. The disease was notifiable before 1991
6. In United Kingdom, reportable under Reporting of Injuries, Disease and Dangerous Occurrences Regulations – applies to all work related activities but not to all incidents
7. In Norway and The United Kingdom, imported or laboratory infected cases occur

Appendix Table YE1. Notification on Yersinia in humans, animals and food, 2006

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1,2]	no	1975
Belgium	<1999[3]	1998	2004
Cyprus	2005[4]	-	-
Czech Republic	yes	no	-
Denmark	1979	no	-
Estonia	1982	no	2000
Finland	1995	no	no[5]
France	yes	-	-
Germany	yes	-	-
Greece	-	-	-
Hungary	1998	no	-
Ireland	2004	-	no
Italy	1990	no	1962
Latvia	1988	yes[6]	-
Lithuania	1985	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	no	yes	yes
Poland	2004	-	no
Portugal	-	no	-
Slovakia	yes	no	2000
Slovenia	1977	no	2003
Spain	yes	1994	1994
Sweden	1996	no	no
United Kingdom	no	no	no
Norway	1992	no	no
Switzerland	yes	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 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

Appendix Table EH1. Echinococcus monitoring programmes and diagnostic methods in humans and/or animals, 2006

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	-	-	Information campaign in wooded areas about consumption of berries
Cyprus	-	-	Scheme to treat dogs and stray dogs with Pranziquantel
Czech Republic	-	-	A monitoring programme for Echinococcus in foxes was introduced in the year 2005. Samples are taken from foxes which were hunted for Rabies efficiency control.
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
France	Voluntary reporting	animal: Faeces --> Flotation and PCR, Intestines --> Scrapping and sedimentation Humans: ELISA, Western blot, histopathology, X-ray	A survey on Echinococcus multilocularis in foxes. Faecal samples analysis.
Germany	-	-	-
Greece	-	Humans: Xray/echo+ sero investigation	-
Hungary	Laboratory confirmed	Western blot	-
Ireland	-	-	-
Italy	-	-	-
Latvia	Laboratory confirmed/ monthly	Serology	-
Lithuania	Laboratory confirmed	Histopathology, imaging, serology	-
Luxembourg	-	-	-
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
Slovakia	Laboratory confirmed	Humans: Serology and histopathology	-
Slovenia	Laboratory confirmed	Humans: Serology, Rtg, CT Scan, MRI	Systematic dehelminthisation of dogs along with anti-rabies vaccination.
Spain	Laboratory confirmed, passive case finding	According to Decision 2119/98/EC, Commission Decision 2002/253/EC and Commission Decision 2002/243/EC	Control infection in animals

Appendix Table EH1. Echinococcus monitoring programmes and diagnostic methods in humans and/or animals, 2006 (cntd.)

Country	Type of data	Diagnostic methods	Monitoring, treatment etc.
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. Antihelmintic treatment required for dogs imported from countries other than Finland and Norway
United Kingdom	Voluntary reporting	-	Treatment for imported dogs and cats. Regional deworming programme. Abattoir testing
Norway	Laboratory confirmed	Humans: Serology, Histopathology. Animals: PCR, egg detection, histopathology	Antihelmintic 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	-	-	-

Appendix Table EH2. Notification of Echinococcus in humans, animals and food, 2006

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	2004	1994	1994
Belgium	< 1999	1998	2004
Cyprus	1969	-	-
Czech Republic	yes	no	-
Denmark	no	yes	-
Estonia	1986	2000	2000
Finland	1995	1995[1]	1995[1]
France	yes	no	-
Germany	yes	-	-
Greece	yes	1980	
Hungary	1960	no	1984
Ireland	2004	-	no
Italy	1990	yes	1964
Latvia	1999	yes	-
Lithuania	1990	yes	-
Luxemburg	-	-	-
Malta	-	-	-
Netherlands	no	yes	yes
Poland	1959/1997[2]	-	-
Portugal	yes	yes	-
Slovakia	yes	yes[3]	no
Slovenia	1977	1991[4]	2003
Spain	1982	1994	1994
Sweden	2004	>30 years	>30 years
United Kingdom	no	no	no
Norway	2003	1985	1965[5]
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. Mandatory meat inspection for hydatid cysts.

Appendix Table TR1. Diagnostic methods and monitoring programmes for Trichinella, 2006

	Humans	Animals	Animals - monitoring programmes	
	Diagnostic methods	Diagnostic methods	Meat inspection at slaughter	Other monitoring
Austria	Serology (ELISA), Western Blot	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, farmed wild boars	Wild boars: monitoring scheme
Belgium	-	Directive 77/96/EEC (digestion method)	Pigs, horses, wild boar	Other wildlife monitored when relevant
Cyprus	EU recommendations	Directive 77/96/EEC (digestion method)	Pigs (started in 2004, 80% examined)	-
Czech Republic	-	Pepsin digest method according to Commission Regulation EC No. 2075/2005	Pigs, horses, wild boars	Other wildlife monitored when relevant
Denmark	Serology, histopathology	Pepsin digest method according to Commission Regulation EC No. 2075/2005	Pigs and horses slaughtered at export approved slaughter houses, all wild boars	-
Estonia	Clinical symptoms, eosinophilia	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	Other wildlife monitored when relevant
Finland	Serology, histopathology	Pepsin digest method according to Commission Regulation EC No. 2075/2005	Pigs, horses, wild boars, bears	Other wildlife monitored when relevant
France	Serology, histopathology	Digestion method	Pigs, horses	Wild boars: sampling are carried out as a survey
Germany	Serology (ELISA), histopathology	Directive 77/96/EEC (digestion method) and PCR	Pigs, horses, wild boars	Other wildlife monitored when relevant
Greece	-	Directive 77/96/EEC (digestion or compression method)	Pigs	-
Hungary	Serology (ELISA), histopathology, Western Blot	Directive 77/96/EEC (digestion method)	Pigs, horses, wild boars	Other wildlife monitored when relevant
Ireland	-	-	-	-
Italy	-	Directive 77/96/EEC (digestion method)	Pigs	-
Latvia	Serology (ELISA)	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	Home slaughtering: The owner is responsible for ensuring control
Lithuania	Serology, (ELISA)	-	-	-
Luxembourg	-	Directive 77/96/EEC (digestion or compression method)	Wild boar	Pigs and horses: risk assessment scheme
Malta	-	Compression method	Horses	Pigs: random on the slaughter line
Netherlands	-	Directive 77/96/EEC (digestion method)	Pigs, horses	
Poland	Serology and histopathology	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	-
Portugal	-	Directive 77/96/EEC (digestion or compression method)	-	Some pigs at meat inspection
Slovakia	-	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	Other wildlife monitored when relevant
Slovenia	Serology, histopathology	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	Other wildlife monitored when relevant

Appendix Table TR1. Diagnostic methods and monitoring programmes for Trichinella, 2006 (cntd.)

	Humans	Animals	Animals - monitoring programmes	
Spain	Serology, histopathology	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars, hunted wildlife	-
Sweden	Serology (ELISA/IFL)	Directive 77/96/EEC (digestion method) for pigs, directive 2075/2005/EC (digestion method) for horses	Pigs, horses, wild boars, bears	Survey of 300 foxes annually, other wildlife monitored when relevant
United Kingdom	Histopathology	Pepsin digest method according to Commis-sion Regulation EC No. 2075/2005	Pigs, horses	Foxes, approximately 400-700 annually
Norway	Serology and histopathology	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars, badgers, bears	Wildlife and farmed foxes occasionally
Switzerland	-	Directive 77/96/EEC (digestion method)	Pigs slaughtered for export (34% of all pigs slaughtered)	-

Appendix Table TR2. Notification of Trichinella in humans, animals and food, 2006

	Notifiable in humans since	Notifiable in animals since		Notifiable in food since
Austria	1950	1994	Pigs, horses, wild boars,	1994
Belgium	<1999[1]	1998	-	2004
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	Pig, horses, wild boars, other wildlife	2000
Finland	1995	1930	Pigs, horses, farmed and wild game	1930
France	2000	-	Pig, horses, wild boars	<1990
Germany	yes	yes	Pig, horses, wild boars, other wildlife	-
Greece	yes	1980	Pigs	1977
Hungary	1960	no	Pigs, horses, nutria, wild boars	1984
Ireland	2004	-	-	-
Italy	1990	-	Pigs	1958
Latvia	1988	yes	Pigs, horses	-
Lithuania	1990	>30 years	-	-
Luxembourg	-	-	Pigs, wild boar	-
Malta	-	-	Pigs (random), horses	-
Netherlands	yes	yes	Pigs, horses, ruminants	-
Poland	1919	1928	Pigs, horses, wild boars	-
Portugal	yes	1953	Pigs	yes
Slovakia	yes	yes	All animals for human consumption	2000
Slovenia	1977	1991	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	no	1980	Pigs, horses	yes
Norway	1975	1965	Pigs, horses, wild boars, badger, bears	1965
Switzerland	no	1966	Pigs, horses	no

1. In Belgium, the Flemish Community
2. In Denmark, only clinical cases are notifiable
Note: Directive 64/433/EEC and/or Directive 77/96/EEC were no longer in force in 2006. Replaced by Regulation EC No.:2075/2005

Appendix Table TO1. Monitoring and diagnostics for Toxoplasmosis in humans and animals, 2006

	Humans		Animals
Country	**Type of cases reported**	**Monitoring**	**Monitoring**
Austria	-	Serological screening of pregnant women	-
Belgium	-	Screening of pregnant women is common	-
Cyprus	EU-recommended (clinical+lab)	-	-
Czech Republic	EU-recommended (clinical+lab)	-	-
Denmark	Only congenital cases reported	Since 1999 nationwide neonatal screening	-
Estonia	EU-recommended (clinical+lab)	No monitoring	-
Finland	Lab-confirmed clinical cases	-	-
Germany	Only congenital cases reported	-	-
Greece	Only congenital cases reported	-	Animals data from routine diagnostics
Hungary	Lab-confirmed	-	-
Ireland	EU-recommended (clinical+lab)	-	-
Italy	-	-	Data from local and general control programme and research
Latvia	Lab-confirmed clinical cases	-	Animals data from routine diagnostics
Lithuania	Lab confirmed clinical cases and congenital cases	-	-
Netherlands	-	No monitoring	-
Poland	Lab confirmed clinical cases	No monitoring	no monitoring in animals
Portugal	-	-	-
Slovakia	-	No monitoring	-
Slovenia	EU-recommended (clinical+lab)	Routine serological screening of pregnant women	-
Spain	-	Serological screening of pregnant women. Surveillance according to Directive 2003/99/EC.	-
Sweden	Notification stopped July 2004	-	Animal data from routine diagnostics
United Kingdom	Lab confirmed clinical cases	Voluntary lab reporting except from Scotland (notification)	Vaccine available for sheep
Norway	Lab-confirmed Encephalitic cases since 1975. Other notification stopped 1995.	Encephalitis cases	No monitoring

Appendix Table TO2. Notification and monitoring of Toxoplasma in humans, animals and food, 2006

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	no	no	no
Belgium	< 1999[1]	1998	2004
Cyprus	2005	-	-
Czech Republic	yes	no	-
Denmark	no	no	-
Estonia	1997	no	2000
Finland	1995	1995[2]	no[3]
France	no	-	-
Germany	yes (congenital cases)	yes	-
Greece	yes (congenital cases)	-	-
Hungary	1967	no	-
Ireland	2004	no	no
Italy	1990	no	-
Latvia	1996	yes	-
Lithuania	yes (congenital cases since 1999)	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	no	yes	yes
Poland	1966	-	-
Portugal	-	no	-
Slovakia	no	no	no
Slovenia	1977	1991[4]	2003
Spain	1982[5]	1994	1994
Sweden	no	no	no
United Kingdom	1990 (Scotland)[6]	no	no
Norway	no[7]	1965	no
Switzerland	no	1966	-

1. In Belgium, the French Community
2. In Finland, not notifiable in wild animals also notifiable before 1995, but legislation changed in 1995
3. In Finland, food business operator has to notify to the competent authority, but there is no central notification system
4. In Slovenia, the year of independence. The disease was notifiable before 1991
5. In Spain, Microbiological Information System
6. Notifiable in humans in Scotland only, not notifiable in the rest of UK
7. In Norway, since 1995, the disease has not been notifiable, except when it manifests itself as encephalitis

Appendix Table RA1. Vaccination programmes for rabies in animals, 2006

Country	Vaccination programmes in pets	Vaccination programmes in wildlife
Austria	-	Since 1991, oral vaccines distributed to foxes twice a year. The programme is approved and co-financed by EU (2005/873/EC).
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 boarder with Poland and Slovakia. The programme is approved and will be co-financed by EU (2005/873/EC).
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 (2005/873/EC).
Finland	Vaccination in dogs and cats are recommended	Since 1991, oral vaccines distributed to foxes and racoon 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 (2005/873/EC).
France	-	-
Germany	-	Oral vaccines distributed to foxes twice a year in endemic areas. The programme is approved and co-financed by EU (2005/873/EC).
Greece	Compulsory vaccination of dogs	-
Hungary	Compulsory vaccination of dogs	Since 2004, oral vaccines distributed to foxes twice a year by flight. The programme started in 1997.
Ireland	-	-
Italy	-	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 (2005/873/EC).
Lithuania	Compulsory vaccination of dogs and cats	Since 1995, Oral vaccines distributed to foxes twice a year by flight. The programme is approved by EU (2005/873/EC), but not co-financed (2006/912/EC).
Luxembourg	-	-
Malta	-	-
Netherlands	-	-
Poland	Vaccination programme for dogs since 1949	Since 2002, oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (2005/873/EC).
Portugal	Compulsory vaccination of dogs since 1925	-
Slovakia	Compulsory vaccination of domestic carnivores	Oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (2005/873/EC).
Slovenia	Compulsory vaccination of dogs since 1947	Since 1995, Oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (2005/873/EC).
Spain	-	From 2004, compulsory surveillance according to Directive 03/99/EEC
Sweden	Vaccination of dogs and cats being brought in and out of the country	-
United Kingdom	-	-
Bulgaria	Compulsory vaccination of dogs	-
Norway	Vaccination of dogs and cats being brought in and out of the country	-
Romania	Compulsory vaccination of dogs and cats	In 2006, oral vaccines was distributed manually in restricted areas
Switzerland	Compulsory vaccination of dogs 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, 2006

	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, immunohisto-chemistry, RT-PCR	Brain	Fluorescent antibody test (FAT), rabies tissue culture infection test (RTCIT). 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
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
France	Cerebrospinal fluid, blood, salvia, if post-mortem: brain tissue	PCR, FAT, immunohi-stochemistry, direct microscopy, RFFIT	Brain	FAT, cell culture, RT-PCR, MIT, FAVN
Germany	-	-	-	FAT, cell culture
Greece	-	-	-	-
Hungary	Cerebrospinal fluid, blood	In vivo from cornea imprint of the patient by immunofluorescence method, or determina-tion of specific antibody titre of the blood or liquor by immunofluore-scence method during the second week of the illness. Post mortem: detection of the Negri-body in the brain tissue, or the antigen by immu-nofluorescence method, or identification of the viral genetic material by PCR, or isolation of the virus in mouse.	-	-
Ireland	-	-	-	-
Italy	-	-	Brain	FAT
Latvia	-	Elisa	Brain	FAT, MIT
Lithuania	Cerebrospinal fluid, salvia	Isolation of virus, antigen detection, mouse inoculation test, ELISA, PCR.	-	-
Luxembourg	-	-	Brain	FAT, virus isolation (by sub-contractance)
Malta	-	-	-	-
Netherlands	-	-	-	-
Poland	Cerebrospinal fluid, blood, salvia, if post-mortem: brain tissue	FAT, RT-PCR, MIT, RFFIT	-	FAT, MIT, RFFIT
Portugal	-	-	-	-
Slovakia	Cerebrospinal fluid, salvia	Isolation of virus, anti-gen detection	-	FAT, ELISA, RT-PCR, FAVN

Appendix Table RA2. Type of samples and diagnostic methods used when diagnosing rabies in humans and animals, 2006 (cntd.)

	Humans		Animals	
Slovenia	Cerebrospinal fluid, salvia, 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, blood, skin biopsy from neck.	FAT, RFFIT, MIT, PCR	Brain tissue/blood	FAT, ELISA, PCR
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, MIT, RTCIT, PCR
Switzerland	-	RFFIT	-	RFFIT

Appendix Table RA3. Notification of rabies in humans and animals, and Official Rabies Free status, 2006

	Notifiable in humans since	Notifiable in animals since	Rabies status	Since
Austria	1947	1957		
Belgium	<1999	1883	Declared itself free from rabies	2001
Cyprus	2004	yes	Rabies free	
Czech Republic	yes	1999	Declared itself free from rabies	2005
Denmark	1964	1920		
Estonia	1946	1950		
Finland	1995	1922	Declared itself free from rabies	1991
France	yes	yes	Declared itself free from rabies	2001
Germany	yes	yes		
Greece	yes	1936	Rabies free	
Hungary	1950	1928		
Ireland	1976	-	Declared itself free from rabies	
Italy	1990	1954		
Latvia	1974	yes		
Lithuania	1957	<1975		
Luxembourg	-	-	Declared itself free from rabies	2003
Malta	-	-	Rabies free since 1911	
Netherlands	yes	yes		
Poland	1919	1927		
Portugal	-	yes		
Slovakia	yes	yes		
Slovenia	1949	<1991[1]		
Spain	1901	1952	The mainland and islands are considered rabies free	
Sweden	<1975	yes	Rabies free since 1886	
United Kingdom	yes	yes	Declared itself free from rabies	
Bulgaria	-	-		
Norway	1975	1965	Declared itself free from rabies (the mainland)	
Romania	-	-		
Switzerland	1952	1952	Declared itself free from rabies	1998

1. In Slovenia, the year of independence, however, this disease was notifiable before 1991

Appendix Table PO1. Human population in 100,000, 2002-2006

	2006	2005	2004	2003	2002
Austria	82,659	82,065	81,401	81,022	80,651
Belgium	105,114	104,459	103,964	103,558	103,097
Cyprus	7,664	7,492	7,304	7,151	7,055
Czech Republic	102,511	102,206	102,115	102,033	102,064
Denmark	54,275	54,114	53,976	53,835	53,684
Estonia	13,447	13,470	13,510	13,560	13,612
Finland	52,556	52,366	52,197	52,063	51,949
France	629,988	623,708	599,007	596,350	593,425
Germany	824,380	825,008	825,317	825,367	824,403
Greece	111,252	110,757	110,411	110,064	109,687
Hungary	100,766	100,975	101,167	101,424	101,749
Ireland	42,090	41,092	40,277	39,637	38,999
Italy	587,517	584,624	578,882	573,211	569,937
Latvia	22,946	23,064	23,192	23,315	23,458
Lithuania	34,033	34,253	34,459	34,626	34,756
Luxembourg	4,595	4,550	4,516	4,483	4,441
Malta	4,043	4,027	3,999	3,973	3,946
Netherlands	163,342	163,055	162,580	161,926	161,053
Poland	381,571	381,738	381,906	382,185	382,422
Portugal	105,696	105,293	104,747	104,075	103,293
Slovakia	53,892	53,848	53,801	53,792	53,790
Slovenia	20,034	19,976	19,964	19,950	19,940
Spain	437,583	430,380	423,453	415,506	408,505
Sweden	90,478	90,114	89,757	89,408	89,091
United Kingdom	603,930	600,345	596,731	593,289	591,399
EU total	**4,636,359**	**4,612,979**	**4,568,633**	**4,545,803**	**4,526,406**
Bulgaria	77,188	77,610	78,013	78.46	78.92
Norway	46,4	46,064	45,775	45,523	45,241
Romania	216,102	216,585	217,113	217.73	218.33
Switzerland	74,59	74,151	73,641	73,139	72,557

Reference: Eurostat

Appendix Table PO2. Animal populations, 2006

	Cattle	Pigs	Goats	Sheep	Solipeds	Total *Gallus gallus*	Turkey	Ducks	Geese
Austria	2,002,919	3,160,819	69,047	376,327	-	59,680,606[2]	2,037,066[2]	-	-
Belgium	2,697,824	5,503,886	43,727	219,274	10,728[2]	247,721,072[2]	634,389[2]	78,674[2]	1,826[2]
Cyprus	58,948	-	627,249	627,249	-	-	-	-	-
Czech Republic	1,430,713	2,736,135	14,402	148,412	61469	200,703,694	1,735,000	1,146,000	84,000
Denmark	1,620,826	14,581,382	21,011	195,907	2,539[2]	23,317,956	530,975	-	-
Estonia	252,717	240,712	1,971	56,877	5856	2,411,141	809	6,810	3,772
Finland	949,291	1,436,470	6,670	116,653	28638	9,731,427	492,643	3,464	939
France	18,903,638	15,009,310	1,254,448	8,494,176	402149	77,710,270	27,861,696[3]	25,449,243[3]	742,947[3]
Germany	12,676,700	26,820,600	-	2,642,400	9,630[2,3]	92,919,600[3]	10,611,100[3]	-	-
Greece	840,123	2,071,847	2,883,219	5,324,207	49265	108,504,761	306,300	16,246	8,769
Hungary	800,882	3,987,000	16,021	1,121,971	60000	30,303,000	4,087,000	2,579,000	2,708,000
Ireland	6,321,823	1,620,000	5,594	3,601,064	-	15,296,500	830,000	-	-
Italy	6,156,374	-	-	-	-	-	-	-	-
Latvia	401,468	354,739	10,966	64,280	13370	3,344,020	80	1,110	620
Lithuania	859,917	1,127,100	22,000	36,600	60900	7,855,310	103,000	41,000	47,500
Luxembourg	183,640	84,151	1,950	96441	4336	81,252	191	241	276
Netherlands	3,673,000	13,846,395[2]	326,162	1,384,360	128473	91,782,254	1,139,840	1,043,349	-
Poland	5,273,123	25,100,000	21,536	251,422	198000	314,000,000	14,000,000	2,000,000	4,000,000
Portugal	1,315,634	2,812,022	133,367[2]	1,097,340[2]	82,567[3]	158,528,000[2]	3,797,000[2]	3,078,000[2]	-
Slovakia	524,247	921,723	5,507	326,322	11500	6,889,000	400,000	5,000	3,000
Slovenia	454,033	575,116	27,798	131,528	19,249[3]	2,686,415	151,589[3]	12,535	-
Spain	6,359,710	24,353,445	2,969,255	22,119,192	403194	201,716,594	2,999,436	-	-
Sweden	1,604,933[3]	1,811,216[3]	5,509[5]	471,284[3]	283,100[4]	76,782,159[2]	489,921[2]	20,710[2]	22,576[2]
United Kingdom	10,270,000	4,933,000	98,000	34,722,000	-	156,607,000	6,123,000	-	-
EU total	**85,632,483**	**153,087,068**	**8,565,409**	**83,538,489**	**1,834,963**	**1,252,940,594**	**78,331,035**	**35,481,382**	**7,624,225**
Norway	918,200	813,800	72,100	2,334,200	1,600[2]	50,931,800[2]	250,400	-	-
Switzerland	1,494,296	1,631,593	76,273	442,875	59202	7,508,484	137,671	-	-

1. Meat production animals only
2. Number slaughtered animals
3. 2005 data
4. 2004 data
5. 2003 data

Appendix Table PO3. Animal herd and flock populations, 2006

	Cattle	Pigs	Goats	Sheep	Solipeds	Farmed Deer	*Gallus gallus*	Turkey	Ducks	Geese
	Herds	Herds	Herds	Herds	Herds	Herds	Flocks	Flocks	Flocks	Flocks
Austria[1]	80,161	52,450	10,548	15,896	-	-	-	-	-	-
Belgium[1]	40,640	10,631	14,247	32,323	-	2,021	1,682	41	25	5
Cyprus	349	-	3,855	3,855	-	-	-	-	-	-
Czech Republic[1]	-	4,193	3,203	7,709	8,689	117	1,332	108	40	17
Denmark	27,832	13,869	3,334	10,818	-	-	622	54	-	-
Estonia	9,267	125	407	1,832	951	-	3,610	165	1,151	962
Finland[1]	20,098	2,876	483	1,949	5,270	6	1,711	126	106	90
France[1]	217,120	36,985	18,237	67,360	62,508	409[2]	7,185	15,063[2]	28,976[2]	17,758[2]
Germany[1]	171,900	83,000	-	30,300[2]	-	-	87,400	2,500[2]	-	-
Greece	32,502[1]	4,572[1]	21,682	65,865	27,156	55	4,004	97	1,914	1,106
Hungary	22,943	-	492[1]	6,842[1]	-	-	-	-	-	-
Ireland	122,392	480	292	35,006	-	-	976	141	8	-
Italy	172,355	80,469	38,429	97,235	-	-	7,886	1,146	360	245
Latvia	54,724	3,274	2,380	3,924	8,011	41	165	2	3	2
Lithuania[1]	164,077	33,715	3,621	3,093	-	-	62	15	-	52
Luxembourg	1,520	183	106	227	544	5	562	12	64	92
Netherlands[1]	51,716	14,117	10,285	29,135	16,945	-	2,662	79	95	-
Poland	813,151	534,000	4,194	5,242	73,000	150	224,698	16,000	35,000	15,000
Portugal[1]	77,502	7,730	-	-	-	202	-	-	-	-
Slovakia[1]	19,904	6,808	918	4,949	500	-	761	27	2	3
Slovenia[1,2]	43,675	33,945	4,108	5,747	5,128	-	48,173	1,251	2,582	-
Spain[1]	200,343	99,373	73,025	127,472	97,668	120	9,968	740	378	188
Sweden[1]	26,179	2,794	-	7,653[2]	56,000[3]	635	-	-	-	-
United Kingdom[1,2]	86,100	14,400	-	79,900	-	-	40,500	-	-	-
EU total	**2,456,450**	**1,039,989**	**213,846**	**644,332**	**362,370**	**3,761**	**443,959**	**36,316**	**70,704**	**35,520**
Norway	20,500	3,000	1,300	16,000	-	62	4,900	51	-	-
Switzerland	44,897[1]	11,487	6,645[1]	10,874[1]	111,054[1]	-	19,746	313	-	-

1. Holdings
2. 2005 data
3. 2004 data

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Largo N. Palli 5/A
I-43100 Parma
Italy

Tel: +39 0521 036 111
Fax: +39 0521 036 110
info@efsa.europa.eu
www.efsa.europa.eu